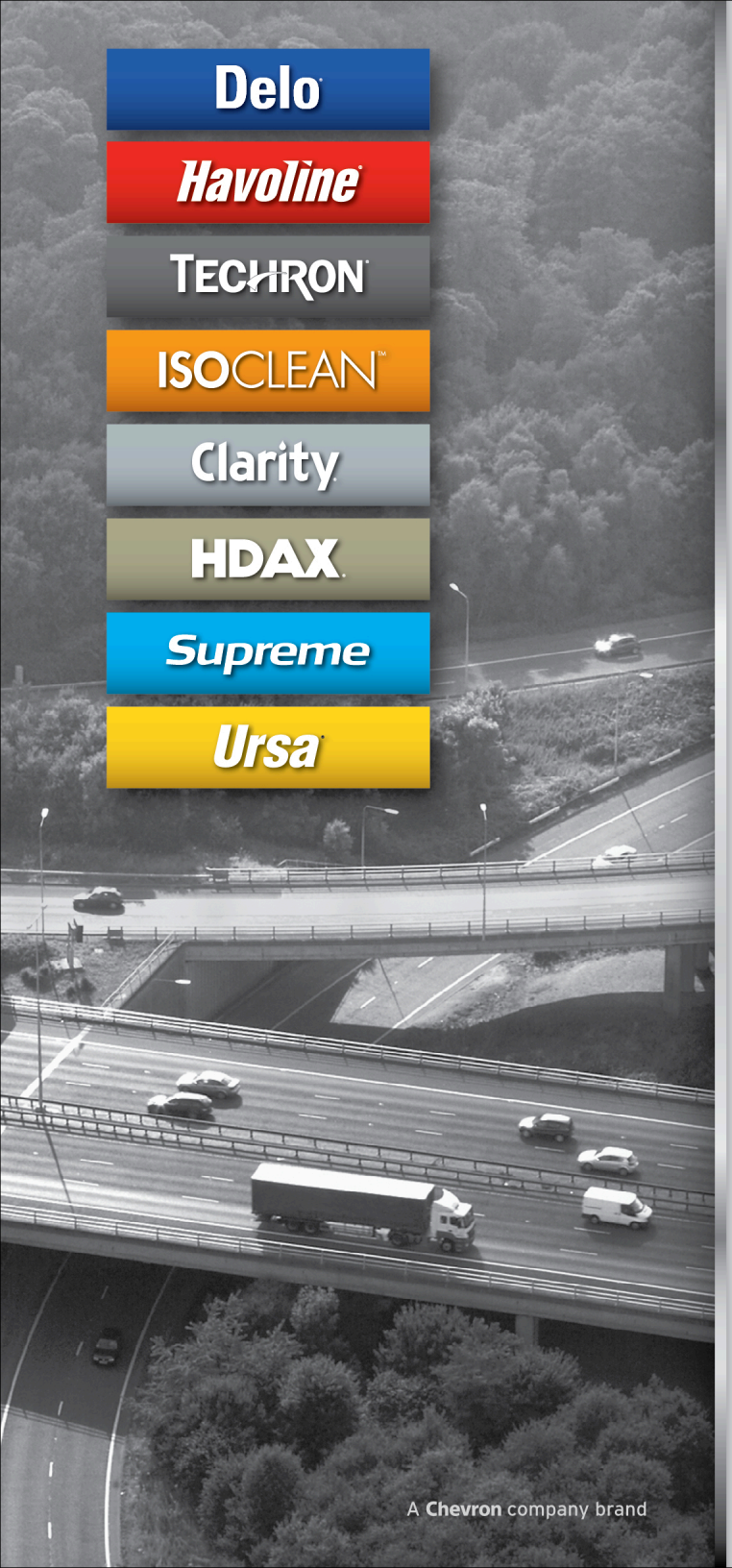

Chevron

PREMIUM
LUBRICANTS

Product Salesfax Digest

Product Salesfax Digest

August 2018, Rev. 1

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1

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2

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INTRODUCTION

The Product Salesfax Digest provides brief and concise information on the technical properties and typical uses of Chevron lubricants, fuels, and special products. Information printed in the Product Salesfax Digest is current at the time of publication. Product data may change at any time.

For health and safety information, consult the labels and Safety Data Sheets (SDSs) for each product.

In all instances, you should confirm that the Chevron product selected is consistent with the original equipment manufacturers' recommendation for the equipment operating conditions and customer maintenance practices. It is also essential that you follow all the original equipment manufacturers' instructions and recommendations regarding changing out or replacing one product with another. These recommendations often include completely draining, purging or flushing out the current product before replacement with new product to reduce the risk of compatibility problems. Except as set forth in Chevron's applicable standard product warranty or any specific agreement between you and Chevron, Chevron makes no representations or warranties of any kind and specifically disclaims any implied warranty of merchantability or fitness for particular purpose.

The properties shown for each product are typical test data. Typical test data are approximate values only. Minor variations in typical test values are to be expected in normal manufacturing.

To locate the Chevron Lubrication Marketer or agent nearest you, visit www.chevronlubricants.com, select an industry and click on "Marketer Locator" or call 1-800-822-5823.

LUBE TEK

Chevron's LUBE TEK technical assistance staff can provide customers with:

- Proper lubricant product recommendations
- Competitive product cross references
- Assistance with lubrication problems
- Interpretation of used oil analysis
- Lubrication change interval recommendations
- Change out recommendations when switching from one lubricant product to another
- Lubricating oil and grease compatibility information

Telephone: 1-800-LUBE-TEK (1-800-582-3835)
E-mail: lubetek@chevron.com

August 2018

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North American Finished Lubricants

Contact Information - United States

You can contact Chevron Global Lubricants in the United States in several ways, depending on your question or requirement, please review the following options:

General Questions and Feedback

Chevron Information Center	800-533-6571

Global Lubricants Office Locations

Chevron Corporation (Corporate Offices, Chevron Brand)
6101 Bollinger Canyon Rd.
San Ramon, CA 94583
United States

Contact Information - Canada

Please phone 1-800-465-2772 for additional information about where to buy Chevron products in Canada.

Contact Information - Mexico

The Productos Chevron Mexico team, with headquarters in Mexico City:

- Markets Chevron lubricants, coolants and fuel additives through sales agents and distributors throughout Mexico.
- Provides customers with quality products and services through our highly motivated and professional team.
- Satisfies customer needs through workshops, transportation options, retail branch outlets, and industrial sector marketing activities.

Productos Chevron México S. de R.L. de C.V.
Oriente 171 Núm. 401
Col. San Juan de Aragón Ampliación
Delegación Gustavo A. Madero
C.P. 07470 México D.F.

USA Customer Service #	800-526-3013
Mexico Customer Service #	55-5747-4900
Fax	55-5520-9358
E-mail	ordenesmexico@chevron.com

Environmental, Health, and Safety Data

Safety Data Sheets (SDSs)

SDSs have been prepared for all Chevron products to comply with the requirements of OSHA Hazard Communication 29 CFR 1910.1200 (2012) and many state and federal health and safety related laws and regulations.

SDSs are available from

- https://cglapps.chevron.com/msdspds
- lubemsds@chevron.com
- your Chevron Lubrication Marketer
- If you are unable to contact your Chevron Lubrication Marketer, please contact

  Chevron Products Company
  Chevron Business Center
  9401 Williamsburg Plaza, Suite 201
  Louisville, KY 40222

If you send a written request, be sure to include your full return address, telephone number, fax number, and e-mail address, if applicable.

Emergency Telephone Numbers

Health (24 hr)

USA only	800-231-0623
Outside USA	001-510-231-0623, international collect calls accepted

Transportation (24 hr)

CHEMTREC - USA only	1-800-424-9300
CHEMTREC - Outside USA	1-703-527-3887, international collect calls accepted
Mexico - SETIQ	01 800 00 214 00 and 55 59 15 88 (D.F.) Javier Ramirez, Emmanuel Remigio, Enrique Perea and Guillermo Vega

Chevron ISOCLEAN® Program

Solution to Controlling Particle Contamination

Particle contamination in lubricants is known as the leading cause of lubricant-related failure in equipment. Lubricating oils are the lifeblood of equipment components and contaminated oils cost companies downtime, parts, repairs and replacements, field service expenses, and their competitive business edge. Fluid particle contamination directly impacts the potential useful life of the machine components and the company's capital investment.

Start Clean—Meet OE Fluid Cleanliness

Chevron ISOCLEAN® Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry-leading filtration and testing technology. They are the first step for contamination control and maximizing component life.

- Certified to Equipment Manufacturers' Fluid ISO Cleanliness recommendations
- Exceed Equipment Manufacturers' Performance Specifications
- Certified and backed by Chevron
- Certificate of Analysis on every delivery
- Tested three times with three different methods prior to certification

Stay Clean—Maintain Fluid Cleanliness

The performance of equipment depends on the cleanliness and integrity of the fluid being used. Machines operating under normal temperature with fluid systems kept free of solids, moisture and gasses are likely to last significantly longer than equipment with contaminated systems. Chevron ISOCLEAN® Services are a proactive approach to maintaining your systems to peak performance and to maximize component service life.

Onsite Services Available:

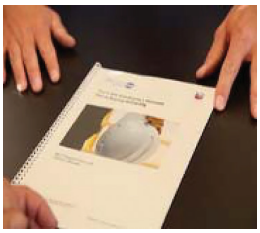
- Fluid Purification and Dehydration—removal of particles, water, and dissolved gases
- Varnish Removal and Mitigation—using the latest chemical cleaning and resin technologies
- High-velocity Flushing—ensure loosening and removal of particles
- Reservoir and Tank Cleaning—fully trained and certified technicians in confined space entry
- Condition Monitoring and System Audits—on-site sampling, sensor monitoring, and reporting

CLEAN. REDEFINED.

Chevron ISOCLEAN® Program

Fast. Simple. Turn Key.

Our Four Step Program



Step 1 » Contact Chevron ISOCLEAN® Lubricant Marketer

- Complete Site Assessment & Fluids Analysis

Step 2 » Set Fluid Cleanliness Requirements

- Research OEM Cleanliness Specifications

Step 3 » Evaluate Onsite Contamination Control Options

- Air and Breather Controls
- Storage Tanks (Clean or Not Clean)
- Point of Dispensing
- Last Chance Filtration

Step 4 » Begin Delivery of Chevron ISOCLEAN® Certified Lubricants

Chevron

ISOCLEAN™

CERTIFICATE *of* ANALYSIS

CERTIFIED ISOCLEAN™

This original Certificate of Analysis verifies that the product delivered with this certificate meets the ISO Cleanliness standards as indicated below.

Chevron Rando HD 68 - ISOCLEAN Certified
ISO Cleanliness Code: 18/16/13

Date: 11/1/2015
Product Code: 254614
Volume Certified: 330 gallons
ISOCLEAN Certificate #: 24831CHV1101141030

ABC Marketer
Orlando, FL
Joe ISOCLEAN - Technician

To learn more about the Chevron ISOCLEAN® Program
visit www.chevronisoclean.com
Or call 1-866-354-4476

ISOCLEAN™ CERTIFIED LUBRICANTS

CLEAN. REDEFINED.

HEAVY DUTY MOTOR OILS

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DELO® 100 MOTOR OIL
SAE 40

PRODUCT DESCRIPTION

Delo® 100 Motor Oil is recommended for use in two- and four-stroke diesel engines in farm machinery, construction equipment, marine, and other off-highway applications where the SAE 40 grade is specified by the OEM.

CUSTOMER BENEFITS

Delo 100 Motor Oil is recommended for use in older two- and four-stroke diesel engines where the SAE 40 engine oil is specified by the OEM.

Delo 100 Motor Oil delivers value through:

- **High temperature deposit control** — Protects against high temperature oxidation and oil thickening in older engines.
- **Special extreme pressure antiwear properties** — Protects critical valve train components.
- **Protection against rust, corrosion, varnish, and sludge** — Helps keep oil screens, filters, and rings clean and free for prolonged periods.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.* Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Helps maximize your bottom line business results.

FEATURES

Delo 100 Motor Oil is a high performance crankcase oil for older diesel engines requiring an SAE 40 monograde engine oil.

It is manufactured using selected premium paraffinic base oils and detergent, dispersant, wear control, antioxidant, corrosion inhibitor, and foam suppressant additives.

APPLICATIONS

Delo 100 Motor Oil is recommended for use in two- and four-stroke diesel engines in farm machinery, construction equipment, marine, and other off-highway applications where SAE 40 grade is specified by the OEM. Delo 100 Motor Oil is recommended for use in two-stroke diesel engines requiring highly effective control of wear and deposits.

Delo 100 Motor Oil utilizes exceptional quality technology to provide excellent performance in older engines burning ultra low sulfur diesel fuels.

Delo 100 Motor Oil meets the requirements of:

- **API Service Categories**
  - — CF†, CF-2†
- **Detroit Diesel Corporation two-stroke** engine recommendations, including the 0.85% ash maximum limit for Series 149 engines.

* See Warranty Plus for details and restrictions.

† Obsolete specification.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

9 July 2013
HDMO-10

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TYPICAL TEST DATA

SAE Grade	**40**
Product Number	*222404*
SDS Number	*7329*
API Gravity	27.7
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 145 15.0
Viscosity Index	104
Flash Point, °C(°F)	258(498)
Pour Point, °C(°F)	-24(-11)
Sulfated Ash, wt %	0.80
Base Number, ASTM D2896	7.3
Phosphorus, wt %	0.096
Zinc, wt %	0.105

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400

SAE 10W, 20, 30, 40, 50

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 monograde oils are mixed-fleet motor oils recommended for older four-stroke gasoline and diesel engines.

CUSTOMER BENEFITS

Delo 400 monograde motor oils are recommended for use in four-stroke gasoline and diesel engines where the SAE 10W, 20, 30, 40 or 50 monogrades are specified by the OEM.

Delo 400 monograde heavy duty motor oils deliver value through:

- **Controlled oil costs** — Minimal crownland deposits and outstanding oxidation stability lead to the ability to minimize oil consumption.
- **Long engine life** — Excellent control of deposits and wear optimize the engine overhaul intervals.
- **Exceptional engine cleanliness** — High detergency provides excellent deposit and sludge control in the piston ring belt area.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.* Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Help maximize your bottom line business results.

FEATURES

Delo 400 monograde heavy duty motor oils are premium quality engine oils.

They are formulated utilizing advanced additive technology which helps provide outstanding engine protection for four-stroke diesel engines requiring a monograde engine oil.

Delo 400 SAE 10W, 20, 30, 40 and 50 are manufactured using carefully selected premium paraffinic base oils and an optimal blend of dispersant, detergent, oxidation inhibition, antiwear, corrosion inhibition, and defoaming additives.

FUNCTIONS

Delo 400 monograde motor oils are high performance crankcase oils for older diesel engines requiring 10W, 20, 30, 40 or 50 monograde engine oil.

They are manufactured using selected premium paraffinic base oils and detergent, dispersant, wear control, antioxidant, corrosion inhibitor, and foam suppressant additives.

APPLICATIONS

Delo 400 monograde oils are mixed-fleet motor oils recommended for older four-stroke gasoline and diesel engines that require a monograde engine oil.

Delo 400 oils are formulated for exceptional performance in older engines using both normal, high, and low sulfur diesel fuels.

Delo 400 monograde oils are not recommended for use in DDC two-stroke engines.

Delo 400 is approved for:

- **MAN** M 3275-2 (SAE 30, 40)
- **MB-Approval** 228.2 (SAE 30, 40)
- **MTU** Category 2 (SAE 30, 40)

* See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

21 September 2015
HDMO-50

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Delo® 400 meets the requirements of:

- **API Service Categories**
  - — CF†
  - — SJ (SAE 30, 40)
- **MAN** 270 (SAE 30, 40)

† Obsolete specification.

TYPICAL TEST DATA

SAE Grade	10W	20	30	40	50
Product Number	*235109*	*235117*	*235118*	*235120*	*235119*
SDS Number	*28323*	*28323*	*6711*	*6711*	*6711*
Density at 15°C, kg/L	0.8700	0.8747	0.8819	0.8863	0.8934
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 45 7.0	 61 8.5	 94 11.5	 136 14.7	 214 19.3
Viscosity, Cold Crank, °C/mPa.s	-25/5370	—	—	—	—
Viscosity Index	113	111	111	108	102
Flash Point, °C(°F)	226(439)	236(457)	236(457)	250(482)	264(507)
Pour Point, °C(°F)	-30(-22)	-30(-22)	-27(-17)	-24(-11)	-21(-6)
Sulfated Ash, mass %	0.95	0.95	1.5	1.5	0.95
Base Number, mgKOH/g, ASTM D2896	6.3	6.3	10.1	10.1	6.3
Phosphorus, mass %	0.069	0.069	0.11	0.11	0.069
Zinc, mass %	0.076	0.076	0.122	0.122	0.076

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 LE
SAE 15W-40

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 LE SAE 15W-40 is a mixed fleet motor oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CJ-4 service category and SAE 15W-40 viscosity grade are recommended.

CUSTOMER BENEFITS

Delo 400 LE SAE 15W-40 is an API CJ-4 heavy duty engine oil specifically formulated for on-highway and off-highway applications including 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems. It is fully compatible with previous engine models and previous API Oil Service Categories. It delivers value through:

- **Minimized operating costs** — Exceptional soot dispersancy and wear control. Cylinders, pistons, rings, and injectors are well protected against wear and corrosion, providing optimum service life and minimal maintenance. Contributes to maximum vehicle utilization and minimal downtime.
- **Excellent emission control system life** — Provides optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing your maintenance costs.
- **Managed inventory costs** — Backward compatible with previous API Oil Service Categories and engine models. Suitable for use in four-stroke gasoline and naturally aspirated, turbocharged and modern electronically controlled/low emission diesel engines calling for an SAE 15W-40 heavy duty motor oil. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Help maximize your bottom line business results.

FEATURES

Delo® 400 LE SAE 15W-40 is an industry leading, premium quality engine oil meeting industry and engine manufacturers' performance requirements.

It is formulated using advanced additive technology to provide outstanding protection for on- and off-highway applications including 2010 compliant engines of on highway diesel trucks burning Ultra Low Sulfur Diesel (ULSD).

Delo 400 LE SAE 15W-40 is formulated with ISOSYN® Technology. ISOSYN Technology is a combination of premium base oils and high performance additives with Chevron's formulating expertise that "Rivals Synthetic Performance" and provides superb diesel engine parts protection - all at an outstanding value. ISOSYN Technology benefits customers by helping:

- Provide Extended Service Protection
- Maximize Engine Durability
- Minimize Operating Cost

Today, Delo 400 LE SAE 15W-40 meets the most stringent EGR soot control and particulate requirements.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

5 July 2018
HDMO-25

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Delo 400 LE SAE 15W-40 has been specifically designed to meet the demands of EGR and SCR engines while at the same time providing exceptional performance in conventional engines and other engine technologies like Caterpillar ACERT.

FUNCTIONS

Delo 400 LE SAE 15W-40 helps keep rings clean and free for maximum combustion pressure and minimal wear. Delo 400 LE SAE 15W-40 minimizes valve and piston crown land deposits, leading to minimal oil consumption. Its high level of ashless dispersants keeps fuel soot in suspension and helps avoid filter plugging, heavy cylinder head sludge, abrasive polishing wear, high viscosity increase, and oil gelling. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Specially selected oxidation inhibitors control oxidation, sludge, and undue thickening during oil drain periods. Delo 400 LE SAE 15W-40's unique blend of extreme pressure antiwear additive protects against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A specially selected viscosity index improver ensures easy flow at low temperatures and excellent film protection in hot engine areas. A defoaming additive helps prevent air entrapment.

The combination of premium dispersant additives and ISOSYN Technology allows Delo 400 LE SAE 15W-40 to effectively disperse soot and keep it in suspension. This minimizes the risk of valve train wear, lever polishing, and filter plugging.

APPLICATIONS

Delo 400 LE SAE 15W-40 is a mixed fleet motor oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CJ-4 service category and SAE 15W-40 viscosity grade are recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

Delo 400 LE SAE 15W-40 is excellent for use in engines equipped with features like four-valve heads, super-charging, turbo-charging, direct injection, shorter piston crowns, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust selective catalytic reduction, exhaust gas recirculation, and exhaust particulate filters.

It is formulated for exceptional performance with Ultra Low Sulfur Diesel and low sulfur diesel fuels.

This product is recommended for use in:

- Today's on-highway low emission designs as well as in older engines.
- Today's off-highway engines including those adapted for current emissions standards in construction, agriculture, marine, and mining applications.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Delo® 400 LE SAE 15W-40 is approved for:

- **API Service Categories** CJ-4, CI-4 PLUS, CI-4, CH-4, SM
- **Cummins** CES 20081
- **Detroit Diesel** DDC Power Guard 93K218
- **DEUTZ** DQC III-10 LA
- **Mack** EO-O Premium Plus
- **MAN** M 3575
- **MB-Approval** 228.31
- **MTU** Category 2.1
- **Renault** VI RLD-3
- **Volvo** VDS-4
- **ZF** TE-ML 04C (Approval number ZF001847)
- **ZF** TE-ML 23B (Approval number ZF001847)

Delo 400 LE SAE 15W-40 meets the requirements of:

- **Caterpillar** ECF-3, ECF-2
- **Ford** WSS-M2C171-E
- **JASO** DH-2
- **ACEA European Service Categories** E9, E7
- **major diesel engine manufacturers':**
  - — Caterpillar
  - — Cummins
  - — Detroit Diesel
  - — MACK
  - — MAN
  - — Mercedes
  - — Volvo

Delo 400 LE SAE 15W-40 has successfully completed a 7000 hour field trial in Caterpillar 3612 engines with used oil analysis and engine inspections.

Resulting from satisfactory field trial performance, Delo 400 LE SAE 15W-40 is approved by MTU for Series 4000 T94/T94L engines in oil and gas fracking applications in North America. This is the first MTU category 2.1 approved oil for this application that typically requires a category 3.0 or 3.1 approval.

TYPICAL TEST DATA

SAE Grade	15W-40
Product Number	*222220*
SDS Number	*17108*
Density at 15°C, kg/L	0.8806
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 131 15.7
Viscosity, Cold Crank, °C/mPa.s	-20/6400
Viscosity, MRV, °C/mPa.s	-25/26,400
Viscosity Index	126
Flash Point, °C(°F), minimum	> 204(> 399)
Pour Point, °C(°F)	-33(-27)
Sulfated Ash, mass %	1.0
Base Number, mgKOH/g, ASTM D2896	 9.3
Phosphorus, mass %	0.12
Sulfur, mass %	0.32
Zinc, mass %	0.13

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 LE ISOCLEAN® CERTIFIED LUBRICANT

SAE 15W-40

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 LE SAE 15W-40 ISOCLEAN® Certified Lubricant is a mixed fleet motor oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CJ-4 service category and SAE 15W-40 viscosity grade are recommended. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant is an API CJ-4 heavy duty engine oil specifically formulated for on-highway and off-highway applications including 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems. It is fully compatible with previous engine models and previous API Oil Service Categories. It delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Minimized operating costs** — Exceptional soot dispersancy and wear control. Cylinders, pistons, rings, and injectors are well protected against wear and corrosion, providing optimum service life and minimal maintenance. Contributes to maximum vehicle utilization and minimal downtime.
- **Excellent emission control system life** — Provides optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing your maintenance costs.
- **Managed inventory costs** — Backward compatible with previous API Oil Service Categories and engine models. Suitable for use in four-stroke gasoline and naturally aspirated, turbocharged and modern electronically controlled/low emission diesel engines calling for an SAE 15W-40 heavy duty motor oil. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Help maximize your bottom line business results.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

5 July 2018
HDMO-25 ISOCLEAN

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FEATURES

Delo® 400 LE SAE 15W-40 ISOCLEAN® Certified Lubricant is an industry leading, premium quality engine oil meeting industry and engine manufacturers' performance requirements.

It is formulated using advanced additive technology to provide outstanding protection for on- and off-highway applications including 2010 compliant engines of on highway diesel trucks burning Ultra Low Sulfur Diesel (ULSD).

Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant is formulated with ISOSYN® Technology. ISOSYN Technology is a combination of premium base oils and high performance additives with Chevron's formulating expertise that "Rivals Synthetic Performance" and provides superb diesel engine parts protection - all at an outstanding value. ISOSYN Technology benefits customers by helping:

- Provide Extended Service Protection
- Maximize Engine Durability
- Minimize Operating Cost

Today, Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant meets the most stringent EGR soot control and particulate requirements.

Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant has been specifically designed to meet the demands of EGR and SCR engines while at the same time providing exceptional performance in conventional engines and other engine technologies like Caterpillar ACERT.

FUNCTIONS

Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant helps keep rings clean and free for maximum combustion pressure and minimal wear. Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant minimizes valve and piston crown land deposits, leading to minimal oil consumption. Its high level of ashless dispersants keeps fuel soot in suspension and helps avoid filter plugging, heavy cylinder head sludge, abrasive polishing wear, high viscosity increase, and oil gelling. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Specially selected oxidation inhibitors control oxidation, sludge, and undue thickening during oil drain periods. Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant's unique blend of extreme pressure antiwear additive protects against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A specially selected viscosity index improver ensures easy flow at low temperatures and excellent film protection in hot engine areas. A defoaming additive helps prevent air entrapment.

The combination of premium dispersant additives and ISOSYN Technology allows Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant to effectively disperse soot and keep it in suspension. This minimizes the risk of valve train wear, lever polishing, and filter plugging.

APPLICATIONS

Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant is a mixed fleet motor oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CJ-4 service category and SAE 15W-40 viscosity grade are recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant is excellent for use in engines equipped with features like four-valve heads, super-charging, turbo-charging, direct injection, shorter piston crowns, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust selective catalytic reduction, exhaust gas recirculation, and exhaust particulate filters.

It is formulated for exceptional performance with Ultra Low Sulfur Diesel and low sulfur diesel fuels.

This product is recommended for use in:

- Today's on-highway low emission designs as well as in older engines.
- Today's off-highway engines including those adapted for current emissions standards in construction, agriculture, marine, and mining applications.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Delo® 400 LE SAE 15W-40 ISOCLEAN® Certified Lubricant is approved for:

- **API Service Categories** CJ-4, CI-4 PLUS, CI-4, CH-4, SM
- **Cummins** CES 20081
- **Detroit Diesel** DDC Power Guard 93K218
- **DEUTZ** DQC III-10 LA
- **Mack** EO-O Premium Plus
- **MAN** M 3575
- **MB-Approval** 228.31
- **MTU** Category 2.1
- **Renault** VI RLD-3
- **Volvo** VDS-4
- **ZF** TE-ML 04C (Approval number ZF001847)
- **ZF** TE-ML 23B (Approval number ZF001847)

Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant meets the requirements of:

- **Caterpillar** ECF-3, ECF-2
- **Ford** WSS-M2C171-E
- **JASO** DH-2
- **ACEA European Service Categories** E9, E7
- **major diesel engine manufacturers':**
  - — Caterpillar
  - — Cummins
  - — Detroit Diesel
  - — MACK
  - — MAN
  - — Mercedes
  - — Volvo

Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant has successfully completed a 7000 hour field trial in Caterpillar 3612 engines with used oil analysis and engine inspections.

Resulting from satisfactory field trial performance, Delo 400 LE SAE 15W-40 ISOCLEAN Certified Lubricant is approved by MTU for Series 4000 T94/T94L engines in oil and gas fracking applications in North America. This is the first MTU category 2.1 approved oil for this application that typically requires a category 3.0 or 3.1 approval.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

SAE Grade	15W-40
Product Number	*278058*
SDS Number	*17108*
Density at 15°C, kg/L	0.8806
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 131 15.7
Viscosity, Cold Crank, °C/mPa.s	-20/6400
Viscosity, MRV, °C/mPa.s	-25/26,400
Viscosity Index	126
Flash Point, °C(°F), minimum	> 204(> 399)
Pour Point, °C(°F)	-33(-27)
Sulfated Ash, mass %	1.0
Base Number, mgKOH/g, ASTM D2896	9.3
Phosphorus, mass %	0.12
Sulfur, mass %	0.32
Zinc, mass %	0.13

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 SDE

SAE 15W-40

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 SDE SAE 15W-40 with ISOSYN® Advanced Technology is a heavy duty engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4 or SN service category and SAE 15W-40 viscosity grade are recommended. Delo 400 SDE 15W-40 is also backwards compatible with diesel engines in which the API CJ-4, CI-4, CI-4 Plus and CH-4 service categories are recommended.

CUSTOMER BENEFITS

Delo 400 SDE SAE 15W-40 with ISOSYN Advanced Technology is an API CK-4 heavy duty engine oil specifically formulated for 2017 greenhouse gas (GHG 17) compliant diesel engines designed to meet lower CO_2 emissions and improved fuel economy, in addition to EPA 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems. It is fully compatible with previous engine models and previous API Oil Service Categories. It delivers value through:

- **Minimized Operating Costs**— Exceptional soot dispersancy and wear control. Cylinders, pistons, rings, and valve train components are well protected against wear and corrosion, providing optimum service life and minimal maintenance. Contributes to maximum vehicle utilization and minimal downtime.
- **Excellent Emission Control System Life** — Provides optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing your maintenance costs.
- **Managed Inventory Costs** — Backward compatible with previous API Oil Service Categories and engine models. Suitable for use in four-stroke gasoline and naturally aspirated, turbocharged and modern electronically controlled/low emission diesel engines calling for an SAE 15W-40 heavy duty motor oil. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's Lubrication and Industry Knowledge** — Helps maximize your bottom line business results.

FEATURES

Delo 400 SDE SAE 15W-40 with ISOSYN Advanced Technology is a super premium quality conventional engine oil which exceeds industry and engine manufacturers' performance requirements. It is the most recommended OEM viscosity grade for over-the-road and off-highway diesel engines.

It is formulated using the most advanced additive technology to provide outstanding protection for on- and off-highway applications, including GHG 17 and EPA 2010 compliant engines of on-highway diesel trucks burning Ultra Low Sulfur Diesel (ULSD), as well as 2014 compliant engines for off-highway vehicle diesel engines.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

1 December 2017
HDMO-28

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Today, Delo® 400 SDE SAE 15W-40 with ISOSYN® Advanced Technology meets the most stringent EGR soot control requirements.

Delo 400 SDE SAE 15W-40 with ISOSYN Advanced Technology has been specifically designed to meet the demands of EGR and SCR engines. It is formulated to comply with passenger car requirements where API SN performance standard and SAE 15W-40 viscosity grade are acceptable, and when maximum 800 ppm phosphorous is specified.

Delo 400 SDE SAE 15W-40 is formulated with ISOSYN Advanced Technology, which is the combination of Chevron's industry leading formulating expertise with unique, high performance additive chemistry to help extend the durability of your critical diesel engine parts.

ISOSYN ADVANCED TECHNOLOGY

ISOSYN Advanced Technology is the combination of Chevron's outstanding formulating expertise, unique high performance additive chemistry and premium base oils that helps extend the durability of critical diesel engine parts.

Delo 400 products formulated with ISOSYN Advanced Technology can provide improved engine longevity, extended oil drain performance, and excellent diesel component parts protection, helping to extend vehicle life and minimize total cost of ownership when compared with previous generation Chevron HDMO formulations.

ISOSYN Advanced Technology benefits customers by helping to provide:

- Up to 35% improved oil oxidation control*
- Up to 68% improved wear protection*
- Up to 64% improved piston deposit control*

*Results will vary based on the particular Delo 400 product, operating conditions, and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

FUNCTIONS

Delo 400 SDE SAE 15W-40 with ISOSYN Advanced Technology helps keep rings clean and free for maximum combustion pressure and minimal wear. Delo 400 SDE SAE 15W-40 minimizes valve and piston crown land deposits, thereby maintaining minimal oil consumption. Its high level of ashless dispersants keep fuel soot in suspension and help avoid filter plugging, heavy cylinder head sludge, abrasive polishing wear, high viscosity increase, and oil gelling. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Specially selected oxidation inhibitors control oxidation, sludge, and undue thickening during oil drain periods. Delo 400 SDE SAE 15W-40's unique antiwear additive protects against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A specially selected viscosity index improver ensures easy flow at low temperatures and excellent film protection in hot engine areas.

The combination of premium dispersant additives and ISOSYN Advanced Technology allows Delo 400 SDE SAE 15W-40 to effectively disperse soot and keep it in suspension. This minimizes the risk of valve train wear, lever polishing, and filter plugging.

APPLICATIONS

Delo 400 SDE SAE 15W-40 with ISOSYN Advanced Technology is a mixed fleet motor oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4 or SN service category and SAE 15W-40 viscosity grade are recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

Delo 400 SDE SAE 15W-40 with ISOSYN Advanced Technology is excellent for use in new advanced engines developed to meet the latest emissions and reliability standards and in engines equipped with features like four-valve heads, super-charging, turbo-charging, direct injection, shorter piston crowns, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust selective catalytic reduction, exhaust gas recirculation, and exhaust particulate filters.

It is formulated for exceptional performance with ultra low sulfur diesel and low sulfur diesel fuels.

This product is recommended for use in today's most modern off-highway engines including those adapted for current emissions standards in construction, agriculture, mining, and marine applications

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Delo® 400 SDE SAE 15W-40 is approved for:

- **API Service Categories** CK-4, CJ-4, CI-4 PLUS, CI-4, CH-4, SN
- **Cummins** CES 20086
- **Daimler MB-Approval** 228.31
- **Detroit Fluids Specification** (DFS) 93K222
- **DEUTZ** DQC III-10 LA
- **Mack** EOS 4.5
- **MTU** Category 2.1
- **Renault** RLD-4
- **Volvo** VDS-4.5

Delo 400 SDE SAE 15W-40 meets the requirements for:

- **ACEA** E9
- **Caterpillar** ECF-3
- **JASO** DH-2
- **MAN** M3575

TYPICAL TEST DATA

SAE Grade	**15W-40**
Product Number	*222290*
SDS Number *U.S.* *Canada* *Mexico* *Colombia* *El Salvador*	 *42671* *43551* *43552* *43918* *43919*
Density at 15°C, kg/L	0.877
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 112 14.6
Viscosity, Cold Crank, °C/mPa.s	-20/5400
Viscosity, MRV, °C/mPa.s	-25/16,700
Viscosity, HTHS, mPa.s	4.2
Viscosity Index	134
Flash Point, °C(°F)	230(446)
Pour Point, °C(°F)	-43(-45)
Sulfated Ash, mass %	1.0
Base Number, mgKOH/g, ASTM D2896	 10
Phosphorus, mass %	0.076
Sulfur, mass %	0.3
Zinc, mass %	0.08

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 SDE ISOCLEAN® CERTIFIED LUBRICANT

SAE 15W-40

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 SDE SAE 15W-40 ISOCLEAN® Certified Lubricant with ISOSYN® Advanced Technology is a heavy duty engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4 or SN service category and SAE 15W-40 viscosity grade are recommended. Delo 400 SDE 15W-40 ISOCLEAN Certified Lubricant is also backwards compatible with diesel engines in which the API CJ-4, CI-4, CI-4 Plus and CH-4 service categories are recommended.

Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo 400 SDE SAE 15W-40 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is an API CK-4 heavy duty engine oil specifically formulated for 2017 greenhouse gas (GHG 17) compliant diesel engines designed to meet lower CO_2 emissions and improved fuel economy, in addition to EPA 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems. It is fully compatible with previous engine models and previous API Oil Service Categories. It delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Minimized Operating Costs**— Exceptional soot dispersancy and wear control. Cylinders, pistons, rings, and valve train components are well protected against wear and corrosion, providing optimum service life and minimal maintenance. Contributes to maximum vehicle utilization and minimal downtime.
- **Excellent Emission Control System Life** — Provides optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing your maintenance costs.
- **Managed Inventory Costs** — Backward compatible with previous API Oil Service Categories and engine models. Suitable for use in four-stroke gasoline and naturally aspirated, turbocharged and modern electronically controlled/low emission diesel engines calling for an SAE 15W-40 heavy duty motor oil. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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HDMO-28 ISOCLEAN

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labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.

- **Access to Chevron's Lubrication and Industry Knowledge** — Helps maximize your bottom line business results.

FEATURES

Delo 400 SDE SAE 15W-40 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is a super premium quality conventional engine oil which exceeds industry and engine manufacturers' performance requirements. It is the most recommended OEM viscosity grade for over-the-road and off-highway diesel engines.

It is formulated using the most advanced additive technology to provide outstanding protection for on- and off-highway applications, including GHG 17 and EPA 2010 compliant engines of on-highway diesel trucks burning Ultra Low Sulfur Diesel (ULSD), as well as 2014 compliant engines for off-highway vehicle diesel engines.

Today, Delo® 400 SDE SAE 15W-40 ISOCLEAN® Certified Lubricant with ISOSYN® Advanced Technology meets the most stringent EGR soot control requirements.

Delo 400 SDE SAE 15W-40 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology has been specifically designed to meet the demands of EGR and SCR engines. It is formulated to comply with passenger car requirements where API SN performance standard and SAE 15W-40 viscosity grade are acceptable, and when maximum 800 ppm phosphorous is specified.

Delo 400 SDE SAE 15W-40 ISOCLEAN Certified Lubricant is formulated with ISOSYN Advanced Technology, which is the combination of Chevron's industry leading formulating expertise with unique, high performance additive chemistry to help extend the durability of your critical diesel engine parts.

ISOSYN ADVANCED TECHNOLOGY

ISOSYN Advanced Technology is the combination of Chevron's outstanding formulating expertise, unique high performance additive chemistry and premium base oils that helps extend the durability of critical diesel engine parts.

Delo 400 products formulated with ISOSYN Advanced Technology can provide improved engine longevity, extended oil drain performance, and excellent diesel component parts protection, helping to extend vehicle life and minimize total cost of ownership when compared with previous generation Chevron HDMO formulations.

ISOSYN Advanced Technology benefits customers by helping to provide:

- Up to 35% improved oil oxidation control*
- Up to 68% improved wear protection*
- Up to 64% improved piston deposit control*

*Results will vary based on the particular Delo 400 product, operating conditions, and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

FUNCTIONS

Delo 400 SDE SAE 15W-40 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology helps keep rings clean and free for maximum combustion pressure and minimal wear. Delo 400 SDE SAE 15W-40 ISOCLEAN Certified Lubricant minimizes valve and piston crown land deposits, thereby maintaining minimal oil consumption. Its high level of ashless dispersants keep fuel soot in suspension and help avoid filter plugging, heavy cylinder head sludge, abrasive polishing wear, high viscosity increase, and oil gelling. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Specially selected oxidation inhibitors control oxidation, sludge, and undue thickening during oil drain periods. Delo 400 SDE SAE 15W-40 ISOCLEAN Certified Lubricant's unique antiwear additive protects against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A specially selected viscosity index improver ensures easy flow at low temperatures and excellent film protection in hot engine areas.

The combination of premium dispersant additives and ISOSYN Advanced Technology allows Delo 400 SDE SAE 15W-40 ISOCLEAN Certified Lubricant to effectively disperse soot and keep it in suspension. This minimizes the risk of valve train wear, lever polishing, and filter plugging.

1 See Warranty Plus for details and restrictions.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

APPLICATIONS

Delo 400 SDE SAE 15W-40 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is a mixed fleet motor oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4 or SN service category and SAE 15W-40 viscosity grade are recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

Delo 400 SDE SAE 15W-40 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is excellent for use in new advanced engines developed to meet the latest emissions and reliability standards and in engines equipped with features like four-valve heads, super-charging, turbo-charging, direct injection, shorter piston crowns, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust selective catalytic reduction, exhaust gas recirculation, and exhaust particulate filters.

It is formulated for exceptional performance with ultra low sulfur diesel and low sulfur diesel fuels.

This product is recommended for use in today's most modern off-highway engines including those adapted for current emissions standards in construction, agriculture, mining, and marine applications

Delo® 400 SDE SAE 15W-40 ISOCLEAN® Certified Lubricant is approved for:

- **API Service Categories** CK-4, CJ-4, CI-4 PLUS, CI-4, CH-4, SN
- **Cummins** CES 20086
- **Daimler MB-Approval** 228.31
- **Detroit Fluids Specification** (DFS) 93K222
- **DEUTZ** DQC III-10 LA
- **Mack** EOS 4.5
- **MTU** Category 2.1
- **Renault** RLD-4
- **Volvo** VDS-4.5

Delo® 400 SDE SAE 15W-40 ISOCLEAN® Certified Lubricant meets the requirements for:

- **ACEA** E9
- **Caterpillar** ECF-3
- **MAN** M3575
- **JASO** DH-2

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

SAE Grade	15W-40
Product Number	*278085*
SDS Number *U.S.* *Canada* *Mexico* *Colombia* *El Salvador*	 *42671* *43551* *43552* *43918* *43919*
Density at 15°C, kg/L	0.877
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 112 14.6
Viscosity, Cold Crank, °C/mPa.s	-20/5400
Viscosity, MRV, °C/mPa.s	-25/16,700
Viscosity, HTHS, mPa.s	4.2
Viscosity Index	134
Flash Point, °C(°F)	230(446)
Pour Point, °C(°F)	-43(-45)
Sulfated Ash, mass %	1.0
Base Number, mgKOH/g, ASTM D2896	 10
Phosphorus, mass %	0.076
Sulfur, mass %	0.3
Zinc, mass %	0.08

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 NG

SAE 15W-40

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 NG with ISOSYN® Technology is a premium CNG/LNG oil formulated to deliver outstanding protection and long drain performance in a wide variety of compressed natural gas (CNG), liquefied natural gas (LNG) and liquefied petroleum gas (LPG) engine applications. It has demonstrated excellent field performance in a variety of operations and has the capability to help customers minimize operating costs in CNG/LNG engines of municipal bus service, Linehaul and delivery truck service, waste truck operations and off road equipment.

CUSTOMER BENEFITS

Key benefits of Delo 400 NG SAE 15W-40 include:

- **Alternative fuel performance:** Delivers great performance for medium and heavy duty vehicles using CNG, LNG or LPG.
- **Excellent engine cleanliness** — Excellent ratings for sludge control; and valve, or piston deposits in field trials and engine tests.
- **Superb oil oxidation/nitration control** — Minimal main or connecting rod bearing corrosion
- **Low wear performance:** Offers excellent tappet and liner wear performance in alternative fuel engines.
- **Extended oil drain performance:** Delivers long drain performance protection despite higher stress of CNG combustion[1]
- **Warranty Plus protection** — warranty protection provided for CNG/LNG engines using Delo 400 NG[2]
- **Access to Chevron's lubrication and industry knowledge** — Helps maximize your bottom line business results.

FEATURES

Delo 400 NG is formulated with Chevron's ISOSYN Technology which incorporates premium base oils, shear stable viscosity modifier and a low ash additive package specially formulated for long service in spark and pilot diesel injection ignited, CNG/LNG engines in stressful, high temperature conditions.

In heavy duty natural gas vehicles, Delo 400 NG:

- Promotes engine reliability and durability through exceptional wear protection
- Minimizes valve recession and deposits
- Helps minimize oil consumption

APPLICATIONS

Delo 400 NG SAE 15W-40 can be used in various applications as follows:

- LNG/CNG Linehaul truck service
- LNG/CNG Delivery truck service
- LNG/CNG Waste truck service
- LNG/CNG Cement truck service
- LNG/CNG Oil Field truck servicing
- CNG Municipal Bus Service
- Light Duty CNG pick-up trucks

1 Chevron has successfully tested Delo 400 NG SAE 15W-40 in Cummins ISL G series CNG engines in severe delivery truck service and has achieved oil drain intervals of 33% longer than the Cummins recommended drain interval for this engine in this service. Chevron recommends always following OEM specified oil drain intervals.

2 See Warranty Plus for details and limitations.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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The types of CNG/LNG engine models that Delo® 400 NG will provide maximum performance protection include:

- Cummins B5.9G
- Cummins C8.3G
- Cummins ISL G (8.9L)
- Cummins ISX12 G
- Cummins ISX15 G
- Detroit Diesel Series 50G
- Detroit Diesel Series 60G
- Navistar LNG Maxxforce® DT 7.6L
- Navistar LNG Maxxforce 13L

APPROVALS

Delo 400 NG is recommended for engines in medium and heavy duty vehicles fueled by CNG, LNG or LPG.

Delo 400 NG meets **Cummins** Engineering Standard CES 20085.

It is approved for **Detroit Diesel** 93K216 mobile gas engine oil specification and is suitable for use under:

- MB 226.9
- Volvo CNG
- Mack CNG
- Renault RGD
- Isuzu CNG
- Hino CNG
- Hyundai CNG

TYPICAL TEST DATA

SAE Grade	15W-40
Product Number	*222221*
SDS Number	*31888*
Density at 15°C, kg/L	0.876
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 126 15.8
Viscosity Index	132
Viscosity, Cold Crank °C/Poise	 -20/66
Flash Point, °C(°F)	230(446)
Pour Point, °C(°F)	-27(-17)
Sulfated Ash, wt %	0.85
Acid Number, ASTM D664	1.9
Base Number, ASTM D2896	6.1
Base Number, ASTM D4739	5.1
Phosphorus, ppm	800
Zinc, ppm	880

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 SD

SAE 15W-30

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 SD SAE 15W-30 is a premium and innovative diesel engine oil intended for engines that have duty cycles which qualify as "severe duty." These include reducing idling time by turning the engine off at stops or deliveries, stop and go in heavy traffic or city delivery, or situations where engine cooling may be stressed like when towing heavy loads or when cycling between fully loaded and unloaded in off road applications.

CUSTOMER BENEFITS

Delo 400 SD SAE 15W-30 is an API CJ-4 heavy duty engine oil specifically formulated for severe duty in on and off highway applications including 2010 and Tier 4 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR).

Delo 400 SD SAE 15W-30 is acceptable for use in engine models where OEMs recommend the use of XW-30 engine oils.

Delo 400 SD SAE 15W-30 delivers value through:

- **Severe Duty** — Intended for severe duty applications like reducing idle time by turning the engine off at stops or deliveries, stop and go in heavy traffic or city delivery, towing heavy loads, or situations where temperatures of engine components are high. Severe duty applications typically have lower drain intervals relative to other duty cycles. See OEM recommendations for drain interval recommendations.
- **Exceptional oxidation and deposit control** — Exceptional oxidation stability and deposit control help protect piston ring belt zones and turbocharger bearings. Contributes to maximum vehicle utilization and minimal downtime.
- **Improved fuel economy** — Tests show comparable fuel economy to SAE 10W-30 in (Class 6) stop and go applications and up to 0.7% fuel economy improvement with long haul trucks (Class 8) when compared to a SAE 15W-40 oil.[1]
- **OEM approvals** — Carries a range of OEM approvals.
- **Excellent emission control system life** — Provides optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing your maintenance costs.
- **Managed inventory costs** — Backwards compatible with previous API Oil Service Categories and engine models where XW-30 oils are appropriate as noted in the OEM recommendations. Suitable for use in four-stroke gasoline and naturally aspirated, turbocharged and modern electronically controlled/low emission diesel engines. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[2] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Help maximize your bottom line business results.

1 SAE J1321 Fuel Consumption Test for short haul and Volvo D12D for long haul. Actual results will vary depending upon vehicle type, load and other driving conditions.
2 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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FEATURES

Delo® 400 SD SAE 15W-30 is formulated using Chevron patent pending technology to provide outstanding protection for on and off highway applications including 2010 compliant engines of on highway diesel trucks burning ultra low sulfur diesel (ULSD). Delo 400 SD SAE 15W-30 is formulated with ISOSYN® Technology and contains an optimal blend of dispersant, detergent, oxidation inhibition, antiwear, corrosion inhibition, viscosity improver, and defoaming additives.

Today, Delo 400 SD SAE 15W-30 meets the most stringent EGR soot control and particulate requirements.

FUNCTIONS

Delo 400 SD SAE 15W-30 helps keep rings clean and free for maximum combustion pressure and minimal wear. It minimizes valve and piston crown land deposits, thus managing oil consumption. Its high level of resistance to oxidation helps to avoid filter plugging, corrosive wear, heavy sludge, abrasive polishing wear, high viscosity increase, and oil gelling. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Delo 400 SD SAE 15W-30 is uniquely designed to minimize oxidation, sludge, and undue thickening in severe duty applications. Its unique blend protects against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. Its resistance to oxidation and resulting deposit control help protect in hot engine components.

APPLICATIONS

Delo 400 SD SAE 15W-30 is a mixed fleet motor oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CJ-4/SM service category and SAE XW-30 viscosity grade is recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

It is excellent for use in new advanced engines developed to meet the latest emissions and reliability standards and in engines equipped with features like four-valve heads, super-charging, turbo-charging, direct injection, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust selective catalytic reduction, exhaust gas recirculation, and exhaust particulate filters.

Delo 400 SD SAE 15W-30 is approved for:

- **API Service Categories** CJ-4, CI-4 PLUS, CI-4, CH-4, SM
- **Cummins** CES 20081
- **Detroit Diesel DDC** Power Guard 93K218
- **DEUTZ** DQC III-10 LA
- **Mack** EO-O Premium Plus
- **MAN** M 3575
- **MB-Approval** 228.31
- **Renault** VI RLD-3
- **Volvo** VDS-4

Delo 400 SD SAE 15W-30 is recommended for:

- **Caterpillar** ECF-3

TYPICAL TEST DATA

SAE Grade	15W-30
Product Number	*224615*
SDS Number	*36110*
Density at 15°C, kg/L	0.881
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 89.1 12.0
Viscosity, MRV, °C/Poise	-25/14,900
Viscosity, Cold Crank, °C/Poise	-20/64.0
Viscosity Index	128
Flash Point, °C(°F)	233(451)
Pour Point, °C(°F)	-36(-33)
Sulfated Ash, wt %	1.0
Base Number, ASTM D2896	9
Phosphorus, wt %	0.12
Sulfur, wt %	0.31
Zinc, wt %	0.12

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 SD ISOCLEAN® CERTIFIED LUBRICANT

SAE 15W-30

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 SD SAE 15W-30 is a premium and innovative diesel engine oil intended for engines that have duty cycles which qualify as "severe duty." These include reducing idling time by turning the engine off at stops or deliveries, stop and go in heavy traffic or city delivery, or situations where engine cooling may be stressed like when towing heavy loads or when cycling between fully loaded and unloaded in off road applications.

Chevron ISOCLEAN® Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo 400 SD SAE 15W-30 ISOCLEAN Certified Lubricant is an API CJ-4 heavy duty engine oil specifically formulated for severe duty in on and off highway applications including 2010 and Tier 4 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR).

Delo 400 SD SAE 15W-30 is acceptable for use in engine models where OEMs recommend the use of XW-30 engine oils.

Delo 400 SD SAE 15W-30 ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Severe Duty** — Intended for severe duty applications like reducing idle time by turning the engine off at stops or deliveries, stop and go in heavy traffic or city delivery, towing heavy loads, or situations where temperatures of engine components are high. Severe duty applications typically have lower drain intervals relative to other duty cycles. See OEM recommendations for drain interval recommendations.
- **Exceptional oxidation and deposit control** — Exceptional oxidation stability and deposit control help protect piston ring belt zones and turbocharger bearings. Contributes to maximum vehicle utilization and minimal downtime.
- **Improved fuel economy** — Tests show comparable fuel economy to SAE 10W-30 in (Class 6) stop and go applications and up to 0.7% fuel economy improvement with long haul trucks (Class 8) when compared to a SAE 15W-40 oil.[1]
- **OEM approvals** — Carries a range of OEM approvals.
- **Excellent emission control system life** — Provides optimum Diesel Particulate Filter (DPF) life

1 SAE J1321 Fuel Consumption Test for short haul and Volvo D12D for long haul. Actual results will vary depending upon vehicle type, load and other driving conditions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

1 July 2016
HDMO-37 ISOCLEAN

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for minimal downtime and cleaning, thus managing your maintenance costs.

- **Managed inventory costs** — Backwards compatible with previous API Oil Service Categories and engine models where XW-30 oils are appropriate as noted in the OEM recommendations. Suitable for use in four-stroke gasoline and naturally aspirated, turbocharged and modern electronically controlled/low emission diesel engines. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[2] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Help maximize your bottom line business results.

FEATURES

Delo® 400 SD SAE 15W-30 ISOCLEAN® Certified Lubricant is formulated using Chevron patent pending technology to provide outstanding protection for on and off highway applications including 2010 compliant engines of on highway diesel trucks burning ultra low sulfur diesel (ULSD). Delo 400 SD SAE 15W-30 is formulated with ISOSYN® Technology and contains an optimal blend of dispersant, detergent, oxidation inhibition, antiwear, corrosion inhibition, viscosity improver, and defoaming additives.

Today, Delo 400 SD SAE 15W-30 ISOCLEAN Certified Lubricant meets the most stringent EGR soot control and particulate requirements.

FUNCTIONS

Delo 400 SD SAE 15W-30 ISOCLEAN Certified Lubricant helps keep rings clean and free for maximum combustion pressure and minimal wear. It minimizes valve and piston crown land deposits, thus managing oil consumption. Its high level of resistance to oxidation helps to avoid filter plugging, corrosive wear, heavy sludge, abrasive polishing wear, high viscosity increase, and oil gelling. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Delo 400 SD SAE 15W-30 ISOCLEAN Certified Lubricant is uniquely designed to minimize oxidation, sludge, and undue thickening in severe duty applications. Its unique blend protects against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. Its resistance to oxidation and resulting deposit control help protect in hot engine components.

APPLICATIONS

Delo 400 SD SAE 15W-30 ISOCLEAN Certified Lubricant is a mixed fleet motor oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CJ-4/SM service category and SAE XW-30 viscosity grade is recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

It is excellent for use in new advanced engines developed to meet the latest emissions and reliability standards and in engines equipped with features like four-valve heads, super-charging, turbo-charging, direct injection, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust selective catalytic reduction, exhaust gas recirculation, and exhaust particulate filters.

Delo 400 SD SAE 15W-30 ISOCLEAN Certified Lubricant is approved for:

- **API Service Categories** CJ-4, CI-4 PLUS, CI-4, CH-4, SM
- **Cummins** CES 20081
- **Detroit Diesel DDC** Power Guard 93K218
- **DEUTZ** DQC III-10 LA
- **Mack** EO-O Premium Plus
- **MAN** M 3575
- **MB-Approval** 228.31
- **Renault** VI RLD-3
- **Volvo** VDS-4

Delo 400 SD SAE 15W-30 ISOCLEAN Certified Lubricant is recommended for:

- **Caterpillar** ECF-3

2 See Warranty Plus for details and restrictions.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN® Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

SAE Grade	15W-30
Product Number	*224616*
SDS Number	*36110*
Density at 15°C, kg/L	0.881
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 89.1 12.0
Viscosity, MRV, °C/Poise	-25/14,900
Viscosity, Cold Crank, °C/Poise	-20/64.0
Viscosity Index	128
Flash Point, °C(°F)	233(451)
Pour Point, °C(°F)	-36(-33)
Sulfated Ash, wt %	1.0
Base Number, ASTM D2896	9
Phosphorus, wt %	0.12
Sulfur, wt %	0.31
Zinc, wt %	0.12

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 SYNTHETIC
SAE 0W-30

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 Synthetic SAE 0W-30 is a mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CG-4*, CF-4* and CF* service categories and SAE 0W-30 viscosity grade is recommended.

CUSTOMER BENEFITS

Delo 400 Synthetic heavy duty engine oil delivers value through:

- **Exceptional Cold Weather Starting** — Due to excellent low temperature pumpability.
- **Optimized Oil Cost** — Low oil consumption as proven by excellent deposit control on piston crownlands. Outstanding oxidation stability contributes to long oil service life.
- **Optimal Operating Costs** — Excellent soot dispersancy and wear control contributes to maximizing engine life to overhaul and helps defer the cost of investing in new equipment. Helps keep filters clean, contributing to maximum filter life.
- **Outstanding Engine Life** — The combination of exceptional soot dispersancy and excellent low temperature pumpability helps lead to less wear at startup and during all around operating conditions.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.† Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's Lubrication and Industry Knowledge** — Help maximize your bottom line business results.

FEATURES

Delo 400 SP SAE 0W-30 is a mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CG-4*, CF-4* and CF* service categories and SAE 0W-30 viscosity grade is recommended.

It is manufactured using stable synthetic base stocks. This oil utilizes highly dispersed viscosity index improvers that promote stable viscosities and soot dispersancy between oil drains.

FUNCTIONS

Delo 400 Synthetic heavy duty engine oil has excellent shear stability and is designed to not shear down to a lower viscosity grade in most applications. Thus, engines are well protected during maximum drain intervals.

Delo 400 Synthetic heavy duty engine oil maintains excellent deposit control. It retards the formation of sludge, deposits, and varnish associated with low and high temperature operation, thus helping to keep engines clean.

This oil also provides outstanding wear, rust, and corrosion protection.

With its low viscosity, Delo 400 Synthetic heavy duty engine oil assures consistent cold weather engine starting. The outstanding low temperature pumpability also minimizes wear. This oil maintains excellent oil circulation once the engine has started and is running.

* Obsolete specification
† See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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Delo® 400 Synthetic heavy duty engine oil minimizes oil thickening and has excellent oxidation and thermal stability. It minimizes oil consumption because of its low volatility.

APPLICATIONS

Delo 400 Synthetic is a mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CG-4, CF-4 and CF service categories and SAE 0W-30 viscosity grade is recommended.

Delo 400 Synthetic heavy duty engine oil meets the requirements of:

- API Service Categories
  - — CG-4, CF-4, CF, SH‡, SJ
  - — Energy Conserving for API SH

It meets the requirements of:

- Allison C4

TYPICAL TEST DATA

SAE Grade	0W-30
Product Number	*235195*
SDS Number	*17066*
API Gravity	33.1
Viscosity, Kinematic cSt at -40°C cSt at 40°C cSt at 100°C	 11,000 52.2 10.3
Viscosity, Cold Crank, °C/Poise	 -35/47.5
Viscosity Index	190
Flash Point, °C(°F)	215(419)
Pour Point, °C(°F)	-51(-60)
Sulfated Ash, wt %	1.1
Base Number, ASTM D2896	10
Phosphorus, wt %	0.114
Zinc, wt %	0.130

Minor variations in product typical test data are to be expected in normal manufacturing.

‡ Obsolete specification

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 SP

SAE 0W-30 (Synthetic)

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 SP SAE 0W-30 (Synthetic) is a mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which an SAE 0W-30 viscosity grade is recommended for cold weather start-up and operation. It is formulated with the same technology found in Chevron's Delo 400 XSP SAE 5W-40 and Delo 400 XSP SAE 5W-30 products that are licensed against API CK-4.

CUSTOMER BENEFITS

Delo 400 SP heavy duty engine oil delivers value through:

- **Exceptional Cold Weather Starting** — Due to excellent low temperature pumpability.
- **Optimized Oil Cost** — Low oil consumption as proven by excellent deposit control on piston crownlands. Outstanding oxidation stability contributes to long oil service life.
- **Optimal Operating Costs** — Excellent soot dispersancy and wear control contributes to maximizing engine life to overhaul and helps defer the cost of investing in new equipment. Helps keep filters clean, contributing to maximum filter life.
- **Outstanding Engine Life** — The combination of exceptional soot dispersancy and excellent low temperature pumpability helps lead to less wear at startup and during all around operating conditions.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.* Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's Lubrication and Industry Knowledge** — Help maximize your bottom line business results.

FEATURES

Delo 400 SP SAE 0W-30 is a mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which an SAE 0W-30 viscosity grade is recommended for cold weather start-up and operation. It is formulated with the same technology found in Chevron's Delo 400 XSP SAE 5W-40 and Delo 400 XSP SAE 5W-30 products that are licensed against API CK-4.

It is designed for subzero arctic-type temperatures and manufactured using stable synthetic base stocks. This oil utilizes highly dispersed viscosity index improvers that promote stable viscosities and soot dispersancy.

FUNCTIONS

Delo 400 SP SAE 0W-30 heavy duty engine oil has excellent shear stability and is designed to not shear down to a lower viscosity grade in most applications. Thus, engines are well protected during maximum drain intervals.

Delo 400 SP SAE 0W-30 heavy duty engine oil maintains excellent deposit control. It retards the formation of sludge, deposits, and varnish associated with low and high temperature operation, thus helping to keep engines clean.

* See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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This oil also provides outstanding wear, rust, and corrosion protection.

With its low viscosity, Delo® 400 SP SAE 0W-30 heavy duty engine oil assures consistent cold weather engine starting. The outstanding low temperature pumpability also minimizes wear. This oil maintains excellent oil circulation once the engine has started and is running.

Delo 400 SP SAE 0W-30 heavy duty engine oil minimizes oil thickening and has excellent oxidation and thermal stability. It minimizes oil consumption because of its low volatility.

APPLICATIONS

Delo 400 SP SAE 0W-30 is a mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which an SAE 0W-30 viscosity grade is recommended for cold weather start-up and operation. It is formulated with the same technology found in Chevron's Delo 400 XSP SAE 5W-40 and Delo 400 XSP SAE 5W-30 products that are licensed against API CK-4.

Delo 400 SP SAE 0W-30 heavy duty engine oil is recommended for diesel and gasoline engines that need API CK-4 / SN performance capability and ability to operate in subzero arctic environments.

TYPICAL TEST DATA

SAE Grade	0W-30
Product Number	*235196*
SDS Number	*44986*
Density at 15°C, Kg/L	0.840
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 56.4 10.2
Viscosity, Cold Crank, mPa.s at -35°C	4447
Viscosity, MRV, mPa.s at -40°C	13550
Viscosity, HTHS, mPa.s	3.1
Viscosity Index	171
Flash Point, °C(°F)	232(450)
Pour Point, °C(°F)	-54(-65)
Sulfur, mass %	0.3
Sulfated Ash, mass %	1.0
Base Number, ASTM D2896, mgKOH/g	10
Phosphorus, mass %	0.08
Zinc, mass %	0.08

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 XSP

SAE 5W-30 (Synthetic)

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 XSP SAE 5W-30 (Synthetic) with ISOSYN® Advanced Technology is a mixed-fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4, API SN or API SN PLUS service categories and SAE 5W-30 viscosity grade are recommended.

CUSTOMER BENEFITS

Delo 400 XSP SAE 5W-30 with ISOSYN Advanced Technology is an API CK-4 performance heavy duty engine oil specifically formulated for on highway applications including 2017 greenhouse gas-compliant (GHG 17) diesel engines with lower CO_2 emissions and improved fuel economy, in addition to EPA 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems. It is fully compatible with previous API Oil Service Categories. It delivers value through:

- **Fuel Economy Improvement** — Up to 2% improvement vs. SAE 15W-40 oil[1] in class 8 diesel engine bench testing.
- **Promotes Consistent Cold Engine Starting** — Low viscosity synthetic base stocks promote consistent cold engine starting for diesel engines operating in sub-zero temperature.
- **Minimized Operating Costs** — Exceptional soot dispersancy and wear control help protect cylinders, pistons, rings, and valve train components contributing to maximum vehicle utilization and minimal downtime.
- **Exceptional Deposit Control** — Provides high performance piston deposit control and turbocharger protection due to its superb oxidation performance. Its high performing detergent and dispersant additives allow for extended diesel engine component protection.
- **Excellent Emission Control System Life** — Promotes optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus minimizing maintenance costs.
- **Managed Inventory Costs** — Delo 400 XSP SAE 5W-30 is compatible with previous API Oil Service Categories. Suitable for use in gasoline engines and naturally aspirated or turbocharged electronically controlled/low emission diesel engines. One oil that meets the performance requirements of most North American and European engine manufacturers. One oil that allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that help save money, space and handling time.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[2] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Helps maximize your bottom line business results.

1 Actual results will vary depending upon vehicle type, load and other driving conditions.

2 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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FEATURES

Delo® 400 XSP SAE 5W-30 is formulated with ISOSYN® Advanced Technology, which is the combination of Chevron's industry leading formulating expertise with unique, high performance additive chemistry to help extend the durability of your critical diesel engine parts.

Delo 400 XSP SAE 5W-30 with ISOSYN Advanced Technology meets the most stringent EGR soot control requirements.

Delo 400 XSP SAE 5W-30 with ISOSYN Advanced Technology has been specifically designed to meet the demands of EGR and EGR/SCR engines while at the same time providing the highest level of performance in older diesel engines.

ISOSYN ADVANCED TECHNOLOGY

ISOSYN Advanced Technology is the combination of Chevron's outstanding formulating expertise, unique high performance additive chemistry and premium base oils that helps extend the durability of critical diesel engine parts.

Delo 400 products formulated with ISOSYN Advanced Technology can provide improved engine longevity, extended oil drain performance, and excellent diesel component parts protection, helping to extend vehicle life and minimize total cost of ownership when compared with previous generation Chevron HDMO formulations.

ISOSYN Advanced Technology benefits customers by helping to provide:

- Up to 35% improved oil oxidation control*
- Up to 69% improved wear protection*
- Up to 64% improved piston deposit control*

*Results will vary based on the Delo 400 product, operating conditions, and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

FUNCTIONS

Delo 400 XSP SAE 5W-30 with ISOSYN Advanced Technology helps keep piston rings clean and free for optimum combustion pressure and minimal wear. Delo 400 XSP SAE 5W-30 with ISOSYN Advanced Technology minimizes valve and piston crown land deposits, thereby managing oil consumption. Its high level of ashless dispersants keeps fuel soot in suspension and helps to avoid filter plugging, abrasive wear, viscosity increases, and oil gelation. These problems could cause excessive engine wear and bearing failure, without prior warning.

Optimized additive chemistries combined with synthetic base stocks control oxidation, sludge, and undue thickening between oil drains. Delo 400 XSP SAE 5W-30 engine oil's antiwear technologies protect against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A defoaming additive helps prevent air entrainment.

APPLICATIONS

Delo 400 XSP SAE 5W-30 with ISOSYN Advanced Technology is a mixed-fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4, API SN or API SN PLUS service categories and SAE 5W-30 viscosity grade are recommended. It is formulated for engines operating under severe service.

Delo 400 XSP SAE 5W-30 with ISOSYN Advanced Technology is excellent for use in new, advanced engines developed to meet the latest emissions and reliability standards and in engines equipped with features like super-charging, turbo-charging, direct injection, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust selective catalytic reduction, exhaust gas recirculation, and exhaust particulate filters.

Vocational and light duty fleets are often a mix between diesel and gasoline engines. This product is recommended for API SN and API SN PLUS, and will meet the latest gasoline qualifications providing for one oil in a mixed vocational, short haul, or delivery fleet.

Delo 400 XSP SAE 5W-30 with ISOSYN Advanced Technology is formulated for exceptional performance with many fuels, including low sulfur and ultra low sulfur diesel fuels, gasoline, most gasoline fuel blends, and many biofuel formulations.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Delo® 400 XSP SAE 5W-30 with ISOSYN Advanced Technology is recommended for use in older engines in conditions when SAE 5W-30 viscosity grade is recommended, as well as in today's most modern low emission designs.

Delo 400 XSP SAE 5W-30 with ISOSYN® Advanced Technology is recommended for use in Caterpillar engines in off-highway or construction applications in conditions when SAE 5W-30 viscosity grade is recommended.

Delo 400 XSP SAE 5W-30 is approved for:

- **API Service Categories** CK-4, CJ-4, CI-4, CI-4 PLUS, SN
- **Cummins** CES 20086
- **Daimler MB-Approval** 228.51
- **Daimler MB-Approval** 228.31
- **DEUTZ** DQC IV-10 LA
- **Detroit Fluids Specification (DFS)** 93K222
- **Mack** EOS 4.5
- **Volvo** VDS-4.5

Delo 400 XSP SAE 5W-30 is recommended for:

- **ACEA European Service Categories** E6, E7, E9
- **API Service Category** SN PLUS
- **Caterpillar** ECF-3
- **JASO** DH-2
- **MTU** Category 3.1

TYPICAL TEST DATA

SAE Grade	5W-30
Product Number	*257001*
SDS Number *U.S.* *Canada* *Mexico*	 *45138* *45139* *45140*
Density at 15°C, kg/L	0.85
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 72.4 12.1
Viscosity, Cold Crank, °C/mPa.s	-30/6100
Viscosity, MRV, mPa.s at -35°C	 22032
Viscosity, HTHS, mPa.s	3.5
Viscosity Index	165
Flash Point, °C(°F)	224(435)
Pour Point, °C(°F)	-46(-51)
Sulfated Ash, mass %	0.9
Base Number, mgKOH/g, ASTM D2896	10
Phosphorus, mass %	0.08
Sulfur, mass %	0.31
Zinc, mass %	0.08

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 XSP

SAE 5W-40 (Synthetic)

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 XSP SAE 5W-40 (Synthetic) with ISOSYN® Advanced Technology is a mixed-fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4, API SN or API SN PLUS service categories and SAE 5W-40 viscosity grade is recommended.

CUSTOMER BENEFITS

Delo 400 XSP SAE 5W-40 with ISOSYN Advanced Technology is an API CK-4 heavy duty engine oil specifically formulated for on-highway and off-highway applications including 2017 greenhouse gas (GHG 17) compliant diesel engines with lower CO_2 emissions and improved fuel economy, in addition to EPA 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems. It is fully compatible with previous engine models and previous API Oil Service Categories. It delivers value through:

- **Low Viscosity Synthetic Base Stock** — Promotes consistent cold engine starting for gasoline and diesel engines operating in sub-zero temperatures.
- **Minimized Operating Costs** — Exceptional soot dispersancy and wear control protect the cylinders, pistons, rings, and valve train components against wear and corrosion, promoting optimum service life and minimal maintenance. Contributes to maximum vehicle utilization and minimal downtime.
- **Excellent Emission Control System Life** — Promotes optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus minimizing maintenance costs.
- **Managed Inventory Costs** — Is compatible with previous API Oil Service Categories. Suitable for use in gasoline engines and naturally aspirated or turbocharged electronically controlled/low emission diesel engines. One oil that meets the engine performance requirements of most North American and European engine manufacturers. One oil that allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that help save money, space and handling time.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's Lubrication and Industry Knowledge** — Helps maximize your bottom line business results.

FEATURES

Delo 400 XSP SAE 5W-40 is formulated with ISOSYN Advanced Technology, which is a combination of premium base oils and high performance additives with Chevron's formulating expertise that provides superb diesel engine parts protection - all at an outstanding value.

Delo 400 XSP SAE 5W-40 with ISOSYN Advanced Technology meets the most stringent EGR soot control requirements.

Delo 400 XSP SAE 5W-40 with ISOSYN Advanced Technology has been specifically designed to meet the

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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demands of EGR and EGR/SCR engines while at the same time providing the highest level of performance in older diesel engines.

ISOSYN ADVANCED TECHNOLOGY

ISOSYN Advanced Technology is the combination of Chevron's outstanding formulating expertise, unique high performance additive chemistry and premium base oils that helps extend the durability of critical diesel engine parts.

Delo 400 products formulated with ISOSYN Advanced Technology can provide improved engine longevity, extended oil drain performance, and excellent diesel component parts protection, helping to extend vehicle life and minimize total cost of ownership when compared with previous generation Chevron HDMO formulations.

ISOSYN Advanced Technology benefits customers by helping to provide:

- Up to 35% improved oil oxidation control*
- Up to 69% improved wear protection*
- Up to 64% improved piston deposit control*

*Results will vary based on the Delo 400 product, operating conditions, and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

FUNCTIONS

Delo 400 XSP SAE 5W-40 with ISOSYN Advanced Technology helps keep piston rings clean and free for optimum combustion pressure and minimal wear. Delo 400 XSP SAE 5W-40 with ISOSYN Advanced Technology minimizes valve and piston crown land deposits, thereby managing oil consumption. Its high level of ashless dispersants keeps fuel soot in suspension and helps to avoid filter plugging, cylinder head sludge, abrasive wear, viscosity increases, and oil gelation. These problems could cause excessive engine wear and bearing failure, without prior warning.

Optimized additive chemistries combined with synthetic base stocks control oxidation, sludge, and undue thickening between oil drains. Delo 400 XSP SAE 5W-40's antiwear technologies protect against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A defoaming additive helps prevent air entrapment.

APPLICATIONS

Delo 400 XSP SAE 5W-40 with ISOSYN Advanced Technology is a mixed-fleet motor oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4, API SN or API SN PLUS service categories and SAE 5W-40 viscosity grade is recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

Delo 400 XSP SAE 5W-40 with ISOSYN Advanced Technology is excellent for use in engines developed to meet 2010 emissions standards and in engines equipped with features like four-valve heads, supercharging, turbocharging, direct injection, shorter piston crowns, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust gas recirculation, and exhaust particulate filters.

This product is recommended for use in older engines, as well as in today's most modern low emission designs.

Delo 400 XSP SAE 5W-40 is approved for:

- **API Service Categories** CK-4, CJ-4, CI-4, CI-4 PLUS, SN
- **Allison** TES-439, heavy-duty automatic transmissions
- **Cummins** CES 20086
- **DEUTZ** DQC III-10 LA
- **Detroit Fluids Specification (DFS)** 93K222
- **Mack** EOS 4.5
- **Volvo** VDS-4.5

Delo 400 XSP SAE 5W-40 is recommended for:

- **ACEA European Service Category** E9
- **API Service Category** SN PLUS
- **Caterpillar** ECF-3
- **Daimler MB-Approval** 228.31
- **JASO** DH-2
- **MAN** M 3575
- **MTU** Category 2.1

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

SAE Grade	5W-40
Product Number	*257002*
SDS Number *U.S.* *Canada* *Mexico*	 *45599* *455600* *455601*
Density at 15°C, kg/L	0.852
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 96.0 15.4
Viscosity, Cold Crank, °C/mPa.s	-30/6311
Viscosity Index	170
Viscosity, MRV, mPa.s at -35°C	29081
Viscosity, HTHS, mPa.s	4.2
Flash Point, °C(°F)	223(433)
Pour Point, °C(°F)	-46(-51)
Sulfated Ash, mass %	1.0
Base Number, ASTM D2896, mg KOH/g	10.1
Phosphorus, mass %	0.08
Zinc, mass %	0.08

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 XLE

SAE 10W-30 (Synblend)

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 XLE SAE 10W-30 with ISOSYN® Advanced Technology is a premium synthetic blend fuel economy and mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4, API SN or API SN PLUS service category and SAE 10W-30 viscosity grade are recommended.

CUSTOMER BENEFITS

Delo 400 XLE SAE 10W-30 (Synblend) with ISOSYN Advanced Technology is an API CK-4 heavy duty engine oil specifically formulated for on-highway applications, including 2017 greenhouse gas (GHG 17) compliant diesel engines with lower CO_2 emissions, and 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems calling for SAE 10W-30 heavy duty engine oil.

Delo 400 XLE SAE 10W-30 with ISOSYN Advanced Technology is also recommended for off-highway applications when SAE 10W-30 viscosity grade is required. It is formulated for newer engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems. These newer engines generally meet Tier IV (2014) emissions requirements.

It is fully compatible with previous engine models and previous API Oil Service Categories.

Delo 400 XLE SAE 10W-30 delivers value through:

- **Improved Fuel Efficiency** — Up to 1% improvement vs. SAE 15W-40 oils in Class 8 diesel engine bench testing.
- **Better Low Temperature Pumpability** — Improved flow rate and pumpability versus SAE 15W-40 oils.
- **Exceptional Deposit Control** — Provides high performance piston deposit control and turbocharger protection due to its superb oxidation performance. Its high performing detergent and dispersant additives allows for extended diesel engine component protection.
- **Minimized Operating Costs** — Exceptional soot dispersancy and wear control. Cylinders, pistons, rings, and valve train components are well protected against wear and corrosion, providing optimum service life and minimal maintenance. Contributes to maximum vehicle utilization and minimal downtime.
- **Excellent Emission Control System Life** — Provides optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing your maintenance costs.
- **Managed Inventory Costs** — Backwards compatible with previous API Oil Service Categories. Suitable for use in four-stroke gasoline and naturally aspirated turbocharged and modern electronically controlled/low emission diesel engines calling for an SAE 10W-30 heavy duty engine oil. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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- **Access to Chevron's Lubrication and Industry Knowledge** — Helps to maximize your bottom line business results.

FEATURES

Delo® 400 XLE SAE 10W-30 with ISOSYN® Advanced Technology is formulated using advanced additive technology to provide outstanding protection and improved fuel efficiency for on highway applications including 2010 compliant engines.

Delo 400 XLE SAE 10W-30 is formulated with ISOSYN Advanced Technology, which is a combination of Chevron's industry-leading formulating expertise with unique, high performance additive chemistry to help extend the durability of critical engine parts.

ISOSYN ADVANCED TECHNOLOGY

ISOSYN Advanced Technology is the combination of Chevron's outstanding formulating expertise, unique high performance additive chemistry and premium base oils that helps extend the durability of critical diesel engine parts.

Delo 400 products formulated with ISOSYN Advanced Technology can provide improved engine longevity, extended oil drain performance, and excellent diesel component parts protection, helping to extend vehicle life and minimize total cost of ownership when compared with previous generation Chevron HDMO formulations.

ISOSYN Advanced Technology benefits customers by helping to provide:

- Up to 35% improved oil oxidation control*
- Up to 68% improved wear protection*
- Up to 64% improved piston deposit control*

*Results will vary based on the Delo 400 product, operating conditions, and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

FUNCTIONS

Delo 400 XLE SAE 10W-30 with ISOSYN Advanced Technology helps to keep rings clean and free for maximum combustion pressure and to provide minimal wear. It minimizes valve and piston crown land deposits, thus managing oil consumption. Its high level of ashless dispersants keeps fuel soot in suspension and thus helps to avoid filter plugging, heavy cylinder head sludge, abrasive polishing wear, high viscosity increase, and oil gelling. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Specially selected oxidation inhibitors control oxidation, sludge, and undue thickening. Its unique blend of extreme pressure antiwear additive protects against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A specially selected viscosity index improver ensures easy flow at low temperatures and excellent film protection in hot engine areas. A defoaming additive protects against air entrapment.

The combination of premium dispersant additives and ISOSYN Advanced Technology allows Delo 400 XLE SAE 10W-30 to effectively disperse soot and keep it in suspension. This minimizes the risk of valve train wear and filter plugging.

Applications

Delo 400 XLE SAE 10W-30 with ISOSYN Advanced Technology is a fuel economy and mixed fleet motor oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4, API SN or API SN PLUS service categories and SAE 10W-30 viscosity grade are recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

Excellent performance in new advanced engines developed to meet the latest emissions and reliability standards and in engines equipped with features like four-valve heads, super-charging, turbo-charging, direct injection, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust selective catalytic reduction, exhaust gas recirculation, and exhaust particulate filters.

Delo 400 XLE SAE 10W-30 with ISOSYN Advanced Technology is formulated for exceptional performance with ultra low sulfur diesel (ULSD) and other low sulfur diesel fuels.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

This product is recommended for use in:

- Today's most modern on highway low emission designs as well as some older engines.
- Today's most modern off highway engines where an SAE 10W-30 viscosity grade is recommended including those adapted for the most stringent emissions standards in construction, agriculture, marine, and mining applications.
- Excellent performance in Auxiliary Power Units (APUs) found on trailer refrigeration (refer) units or on truck tractors to help reduce main engine idle.

Delo® 400 XLE SAE 10W-30 is approved for:

- **API Service Categories** CK-4, CJ-4, CI-4, CI-4 PLUS
- **Cummins** CES 20086
- **Daimler MB-Approval** 228.31
- **Daimler MB-Approval** 228.51
- **Detroit Fluids Specification (DFS)** 93K222
- **DEUTZ** DQC III-10 LA
- **Mack** EOS 4.5
- **MTU** Category 2.1
- **Renault** VI RLD-4
- **Volvo** VDS-4.5

Delo® 400 XLE SAE 10W-30 is recommended for:

- **ACEA** E6/E9
- **API Service Category** SN PLUS
- **Caterpillar** ECF-3
- **JASO** DH-2
- **MAN** M 3575

TYPICAL TEST DATA

SAE Grade	10W-30
Product Number	*257000*
SDS Number *U.S.* *Canada* *Mexico*	 *42039* *42040* *42041*
Density at 15°C, kg/L	0.868
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 81 11.9
Viscosity, Cold Crank, °C/mPa.s	-25/6300
Viscosity, MRV, °C/mPa.s	-30/20,400
Viscosity Index	142
Flash Point, °C(°F)	234(453)
Pour Point, °C(°F)	-46(-51)
Sulfated Ash, mass %	0.98
Base Number, mgKOH/g, ASTM D2896	 10.3
Phosphorus, mass %	0.076
Sulfur, mass %	0.27
Zinc, mass %	0.082

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 XLE ISOCLEAN® CERTIFIED LUBRICANT

SAE 10W-30 (Synblend)

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 XLE SAE 10W-30 ISOCLEAN® Certified Lubricant with ISOSYN® Advanced Technology is a premium synthetic blend fuel economy and mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4, API SN or API SN PLUS service category and SAE 10W-30 viscosity grade are recommended. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo 400 XLE SAE 10W-30 (Synblend) ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is an API CK-4 heavy duty engine oil specifically formulated for on-highway applications, including 2017 greenhouse gas (GHG 17) compliant diesel engines with lower CO_2 emissions, and 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems calling for SAE 10W-30 heavy duty engine oil.

Delo 400 XLE SAE 10W-30 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is also recommended for off-highway applications when SAE 10W-30 viscosity grade is required. It is formulated for newer engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems. These newer engines generally meet Tier IV (2014) emissions requirements.

It is fully compatible with previous engine models and previous API Oil Service Categories.

Delo 400 XLE SAE 10W-30 ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Improved Fuel Efficiency** — Up to 1% improvement vs. SAE 15W-40 oils in Class 8 diesel engine bench testing.
- **Better Low Temperature Pumpability** — Improved flow rate and pumpability versus SAE 15W-40 oils.
- **Exceptional Deposit Control** — Provides high performance piston deposit control and turbocharger protection due to its superb oxidation performance. Its high performing detergent and dispersant additives allows for extended diesel engine component protection.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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- **Minimized Operating Costs** — Exceptional soot dispersancy and wear control. Cylinders, pistons, rings, and valve train components are well protected against wear and corrosion, providing optimum service life and minimal maintenance. Contributes to maximum vehicle utilization and minimal downtime.
- **Excellent Emission Control System Life** — Provides optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing your maintenance costs.
- **Managed Inventory Costs** — Backwards compatible with previous API Oil Service Categories. Suitable for use in four-stroke gasoline and naturally aspirated turbocharged and modern electronically controlled/low emission diesel engines calling for an SAE 10W-30 heavy duty engine oil. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's Lubrication and Industry Knowledge** — Helps to maximize your bottom line business results.

FEATURES

Delo® 400 XLE SAE 10W-30 ISOCLEAN® Certified Lubricant with ISOSYN® Advanced Technology is formulated using advanced additive technology to provide outstanding protection and improved fuel efficiency for on highway applications including 2010 compliant engines.

Delo 400 XLE SAE 10W-30 ISOCLEAN Certified Lubricant is formulated with ISOSYN Advanced Technology, which is a combination of Chevron's industry-leading formulating expertise with unique, high performance additive chemistry to help extend the durability of critical engine parts.

ISOSYN ADVANCED TECHNOLOGY

ISOSYN Advanced Technology is the combination of Chevron's outstanding formulating expertise, unique high performance additive chemistry and premium base oils that helps extend the durability of critical diesel engine parts.

Delo 400 products formulated with ISOSYN Advanced Technology can provide improved engine longevity, extended oil drain performance, and excellent diesel component parts protection, helping to extend vehicle life and minimize total cost of ownership when compared with previous generation Chevron HDMO formulations.

ISOSYN Advanced Technology benefits customers by helping to provide:

- Up to 35% improved oil oxidation control*
- Up to 68% improved wear protection*
- Up to 64% improved piston deposit control*

*Results will vary based on the Delo 400 product, operating conditions, and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

FUNCTIONS

Delo 400 XLE SAE 10W-30 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology helps to keep rings clean and free for maximum combustion pressure and to provide minimal wear. It minimizes valve and piston crown land deposits, thus managing oil consumption. Its high level of ashless dispersants keeps fuel soot in suspension and thus helps to avoid filter plugging, heavy cylinder head sludge, abrasive polishing wear, high viscosity increase, and oil gelling. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Specially selected oxidation inhibitors control oxidation, sludge, and undue thickening. Its unique blend of extreme pressure antiwear additive protects against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A specially selected viscosity index improver ensures easy flow at low temperatures and excellent film protection in hot engine areas. A defoaming additive protects against air entrapment.

1 See Warranty Plus for details and restrictions.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

The combination of premium dispersant additives and ISOSYN Advanced Technology allows Delo 400 XLE SAE 10W-30 to effectively disperse soot and keep it in suspension. This minimizes the risk of valve train wear and filter plugging.

APPLICATIONS

Delo® 400 XLE SAE 10W-30 ISOCLEAN® Certified Lubricant with ISOSYN Advanced Technology is a fuel economy and mixed fleet motor oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4, API SN or API SN PLUS service categories and SAE 10W-30 viscosity grade are recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

Excellent performance in new advanced engines developed to meet the latest emissions and reliability standards and in engines equipped with features like four-valve heads, super-charging, turbo-charging, direct injection, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust selective catalytic reduction, exhaust gas recirculation, and exhaust particulate filters.

Delo 400 XLE SAE 10W-30 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is formulated for exceptional performance with ultra low sulfur diesel (ULSD) and other low sulfur diesel fuels.

This product is recommended for use in:

- Today's most modern on highway low emission designs as well as some older engines.
- Today's most modern off highway engines where an SAE 10W-30 viscosity grade is recommended including those adapted for the most stringent emissions standards in construction, agriculture, marine, and mining applications.
- Excellent performance in Auxiliary Power Units (APUs) found on trailer refrigeration (refer) units or on truck tractors to help reduce main engine idle.

Delo® 400 XLE SAE 10W-30 ISOCLEAN Certified Lubricant is approved for:

- **API Service Categories** CK-4, CJ-4, CI-4, CI-4 PLUS
- **Cummins** CES 20086
- **Daimler MB-Approval** 228.31
- **Daimler MB-Approval** 228.51
- **Detroit Fluids Specification (DFS)** 93K222
- **DEUTZ** DQC III-10 LA
- **Mack** EOS 4.5
- **MTU** Category 2.1
- **Renault** VI RLD-4
- **Volvo** VDS-4.5

Delo 400 XLE SAE 10W-30 ISOCLEAN Certified Lubricant is recommended for:

- **ACEA** E6/E9
- **API Service Category** SN PLUS
- **Caterpillar** ECF-3
- **JASO** DH-2
- **MAN** M 3575

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

SAE Grade	10W-30
Product Number	*257011*
SDS Number *U.S.* *Canada* *Mexico*	 *42039* *42040* *42041*
Density at 15°C, kg/L	0.868
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 81 11.9
Viscosity, Cold Crank, °C/mPa.s	-25/6300
Viscosity, MRV, °C/mPa.s	-30/20,400
Viscosity Index	142
Flash Point, °C(°F)	234(453)
Pour Point, °C(°F)	-46(-51)
Sulfated Ash, mass %	0.98
Base Number, mgKOH/g, ASTM D2896	 10.3
Phosphorus, mass %	0.076
Sulfur, mass %	0.27
Zinc, mass %	0.082

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 XLE

SAE 15W-40 (Synblend)

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 XLE SAE 15W-40 with ISOSYN® Advanced Technology is a premium synthetic blend long drain and mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4 or SN service category and SAE 15W-40 viscosity grade are recommended.

CUSTOMER BENEFITS

Delo 400 XLE SAE 15W-40 (Synblend) with ISOSYN Advanced Technology is an API CK-4 heavy duty engine oil specifically formulated for on highway applications, including 2017 greenhouse gas (GHG 17) compliant diesel engines with lower CO_2 emissions, in addition to 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems calling for SAE 15W-40 premium heavy duty motor oil.

Delo 400 XLE SAE 15W-40 with ISOSYN Advanced Technology is also recommended for off highway Tier IV emission compliant engine applications where an SAE 15W-40 viscosity grade is required. It is formulated for newer engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems. Additionally, Delo 400 XLE SAE 15W-40 is recommended for use with transmissions that require the Allison TES-439 specification in heavy duty off-road applications.

It is fully compatible with previous engine models and previous API Oil Service Categories.

Delo 400 XLE SAE 15W-40 delivers value through:

- **Exceptional Deposit Control** — Provides high performance piston deposit control and turbocharger protection due to its superb oxidation performance. Its high performing detergent and dispersant additives provide excellent diesel engine component protection.
- **Better Low Temperature Pumpability** — Improved flow rate and pumpability versus conventional SAE 15W-40 oils and similar pour point to conventional SAE 10W-30 products with better cold flow properties than conventional SAE 15W-40 products.
- **Superb Long Drain Performance** — Formulated for exceptional long oil drain protection for both on and off-road diesel engines.
- **Minimized Operating Costs** — Exceptional soot dispersancy and wear control. Cylinders, pistons, rings, and valve train components are well protected against wear and corrosion, providing optimum service life and minimal maintenance. Contributes to maximum equipment utilization and minimal downtime.
- **Excellent Emission Control System Life** — Provides optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing your maintenance costs.
- **Managed Inventory Costs** — Backwards compatible with previous API Oil Service Categories. Provides single solution for the oil and gas industry for both heavy duty stationary engine and Allison off highway transmission performance. Suitable for use in four-stroke gasoline and naturally aspirated turbocharged and modern electronically controlled/ low emission diesel engines. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's Lubrication and Industry Knowledge** — Helps maximize your bottom line business results.

FEATURES

Delo® 400 XLE SAE 15W-40 with ISOSYN® Advanced Technology is formulated using advanced additive technology to provide outstanding protection for on highway applications including new GHG 17 compliant engines.

Delo 400 XLE SAE 15W-40 is formulated with ISOSYN Advanced Technology, which is a combination of Chevron's industry-leading formulating expertise with unique, high performance additive chemistry to help extend the durability of critical diesel engine parts.

ISOSYN ADVANCED TECHNOLOGY

ISOSYN Advanced Technology is the combination of Chevron's outstanding formulating expertise, unique high performance additive chemistry and premium base oils that helps extend the durability of critical diesel engine parts.

Delo 400 products formulated with ISOSYN Advanced Technology can provide improved engine longevity, extended oil drain performance, and excellent diesel component parts protection, helping to extend vehicle life and minimize total cost of ownership when compared with previous generation Chevron HDMO formulations.

ISOSYN Advanced Technology benefits customers by helping to provide:

- Up to 35% improved oil oxidation control*
- Up to 68% improved wear protection*
- Up to 64% improved piston deposit control*

*Results will vary based on the Delo 400 product, operating conditions, and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

FUNCTIONS

Delo 400 XLE SAE 15W-40 with ISOSYN Advanced Technology helps to keep rings clean and free for maximum combustion pressure and to provide minimal wear. It minimizes valve and piston crown land deposits, thus managing oil consumption. Its high level of ashless dispersants keeps fuel soot in suspension and thus helps to avoid filter plugging, heavy cylinder head sludge, abrasive polishing wear, high viscosity increase, oil gelling, and minimizes the risk of valve train wear. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Specially selected oxidation inhibitors control oxidation, sludge, and undue thickening. Its unique blend of extreme pressure anti-wear additives protect against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A specially selected viscosity index improver ensures easy flow at low temperatures and excellent film protection in hot engine areas. A defoaming additive protects against air entrainment.

APPLICATIONS

Delo 400 XLE SAE 15W-40 with ISOSYN Advanced Technology is a mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4 or SN service categories and SAE 15W-40 viscosity grade are recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

Delo 400 XLE SAE 15W-40 with ISOSYN Advanced Technology provides excellent performance in new advanced engines developed to meet the latest emissions and reliability standards and in engines equipped with features like four-valve heads, super-

1 See Warranty Plus for details and restrictions.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

charging, turbo-charging, direct injection, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust selective catalytic reduction, exhaust gas recirculation, and exhaust particulate filters. It has excellent performance in Allison heavy duty transmission units requiring Allison TES-439 approval, and provides excellent shear stability and component protection.

This product is recommended for use in:

- Today's most modern on-highway low emission designs as well as older on-highway diesel engines.
- Modern and older off-highway engines where an SAE 15W-40 viscosity grade is recommended including those adapted for the most stringent emissions standards in oil and gas, construction, agriculture, marine, and mining applications.

Delo 400 XLE SAE 15W-40 is approved for:

- **API Service Categories** CK-4, CJ-4, CI-4 PLUS, CI-4, CH-4, SN
- **Cummins** CES 20086
- **DEUTZ** DQC III-10 LA
- **Mack** EOS 4.5
- **Renault** VI RLD-4
- **Volvo** VDS-4.5

Delo 400 XLE SAE 15W-40 is recommended for:

- **ACEA** E6/E9
- **Allison** TES-439
- **Caterpillar** ECF-3
- **Detroit Fluids Specification (DFS)** 93K222
- **MAN** M 3575
- **MB** 228.51
- **MB** 228.31
- **MTU** Category 3.1

TYPICAL TEST DATA

SAE Grade	15W-40
Product Number	*257004*
SDS Number *U.S.* *Canada* *Mexico*	 *43380* *43381* *43382*
Density at 15°C, kg/L	0.873
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 111 14.9
Viscosity, Cold Crank, °C/mPa.s	-20/5200
Viscosity, MRV, °C/mPa.s	-25/16,600
Viscosity, HTHS, mPa.s	4.2
Viscosity Index	140
Flash Point, °C(°F)	228(442)
Pour Point, °C(°F)	-47(-53)
Sulfated Ash, mass %	1.0
Base Number, mgKOH/g, ASTM D2896	 10.7
Phosphorus, mass %	0.076
Sulfur, mass %	0.277
Zinc, mass %	0.083

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 XLE ISOCLEAN® CERTIFIED LUBRICANT

SAE 15W-40 (Synblend)

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 XLE SAE 15W-40 ISOCLEAN® Certified Lubricant with ISOSYN® Advanced Technology is a premium synthetic blend long drain and mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4 or SN service category and SAE 15W-40 viscosity grade are recommended.

CUSTOMER BENEFITS

Delo 400 XLE SAE 15W-40 (Synblend) ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is an API CK-4 heavy duty engine oil specifically formulated for on highway applications, including 2017 greenhouse gas (GHG 17) compliant diesel engines with lower CO_2 emissions, in addition to 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems calling for SAE 15W-40 premium heavy duty motor oil.

Delo 400 XLE SAE 15W-40 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is also recommended for off highway Tier IV emission compliant engine applications where an SAE 15W-40 viscosity grade is required. It is formulated for newer engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems. Additionally, Delo 400 XLE SAE 15W-40 is recommended for use with transmissions that require the Allison TES-439 specification in heavy duty off-road applications.

It is fully compatible with previous engine models and previous API Oil Service Categories.

Delo 400 XLE SAE 15W-40 ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Exceptional Deposit Control** — Provides high performance piston deposit control and turbocharger protection due to its superb oxidation performance. Its high performing detergent and dispersant additives provide excellent diesel engine component protection.
- **Better Low Temperature Pumpability** — Improved flow rate and pumpability versus conventional SAE 15W-40 oils and similar pour point to conventional SAE 10W-30 products with better cold flow properties than conventional SAE 15W-40 products.
- **Superb Long Drain Performance** — Formulated for exceptional long oil drain protection for both on and off-road diesel engines.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

1 May 2017
HDMO-54 ISOCLEAN

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- **Minimized Operating Costs** — Exceptional soot dispersancy and wear control. Cylinders, pistons, rings, and valve train components are well protected against wear and corrosion, providing optimum service life and minimal maintenance. Contributes to maximum equipment utilization and minimal downtime.
- **Excellent Emission Control System Life** — Provides optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing your maintenance costs.
- **Managed Inventory Costs** — Backwards compatible with previous API Oil Service Categories. Provides single solution for the oil and gas industry for both heavy duty stationary engine and Allison off highway transmission performance. Suitable for use in four-stroke gasoline and naturally aspirated turbocharged and modern electronically controlled/ low emission diesel engines. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's Lubrication and Industry Knowledge** — Helps maximize your bottom line business results.

FEATURES

Delo® 400 XLE SAE 15W-40 ISOCLEAN® Certified Lubricant with ISOSYN® Advanced Technology is formulated using advanced additive technology to provide outstanding protection for on highway applications including new GHG 17 compliant engines.

Delo 400 XLE SAE 15W-40 ISOCLEAN Certified Lubricant is formulated with ISOSYN Advanced Technology, which is a combination of Chevron's industry-leading formulating expertise with unique, high performance additive chemistry to help extend the durability of critical diesel engine parts.

ISOSYN ADVANCED TECHNOLOGY

ISOSYN Advanced Technology is the combination of Chevron's outstanding formulating expertise, unique high performance additive chemistry and premium base oils that helps extend the durability of critical diesel engine parts.

Delo 400 products formulated with ISOSYN Advanced Technology can provide improved engine longevity, extended oil drain performance, and excellent diesel component parts protection, helping to extend vehicle life and minimize total cost of ownership when compared with previous generation Chevron HDMO formulations.

ISOSYN Advanced Technology benefits customers by helping to provide:

- Up to 35% improved oil oxidation control*
- Up to 68% improved wear protection*
- Up to 64% improved piston deposit control*

*Results will vary based on the Delo 400 product, operating conditions, and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

FUNCTIONS

Delo 400 XLE SAE 15W-40 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology helps to keep rings clean and free for maximum combustion pressure and to provide minimal wear. It minimizes valve and piston crown land deposits, thus managing oil consumption. Its high level of ashless dispersants keeps fuel soot in suspension and thus helps to avoid filter plugging, heavy cylinder head sludge, abrasive polishing wear, high viscosity increase, oil gelling, and minimizes the risk of valve train wear. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Specially selected oxidation inhibitors control oxidation, sludge, and undue thickening. Its unique blend of extreme pressure anti-wear additives protect against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A specially selected viscosity index improver ensures easy flow at low temperatures and excellent film protection in hot engine areas. A defoaming additive protects against air entrainment.

1 See Warranty Plus for details and restrictions.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

APPLICATIONS

Delo® 400 XLE SAE 15W-40 ISOCLEAN® Certified Lubricant with ISOSYN Advanced Technology is a mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API CK-4 or SN service categories and SAE 15W-40 viscosity grade are recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

Delo 400 XLE SAE 15W-40 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology provides excellent performance in new advanced engines developed to meet the latest emissions and reliability standards and in engines equipped with features like four-valve heads, super-charging, turbo-charging, direct injection, higher power density, intercooling, full electronic management of fuel and emissions systems, exhaust selective catalytic reduction, exhaust gas recirculation, and exhaust particulate filters. It has excellent performance in Allison heavy duty transmission units requiring Allison TES-439 approval, and provides excellent shear stability and component protection.

This product is recommended for use in:

- Today's most modern on-highway low emission designs as well as older on-highway diesel engines.
- Modern and older off-highway engines where an SAE 15W-40 viscosity grade is recommended including those adapted for the most stringent emissions standards in oil and gas, construction, agriculture, marine, and mining applications.

Delo 400 XLE SAE 15W-40 is approved for:

- **API Service Categories** CK-4, CJ-4, CI-4 PLUS, CI-4, CH-4, SN
- **Cummins** CES 20086
- **DEUTZ** DQC III-10 LA
- **Mack** EOS 4.5
- **Renault** VI RLD-4
- **Volvo** VDS-4.5

Delo 400 XLE SAE 15W-40 is recommended for:

- **ACEA** E6/E9
- **Allison** TES-439
- **Caterpillar** ECF-3
- **Detroit Fluids Specification (DFS)** 93K222
- **MAN** M 3575
- **MB** 228.51
- **MB** 228.31
- **MTU** Category 3.1

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

SAE Grade	15W-40
Product Number	*278017*
SDS Number *U.S.* *Canada* *Mexico*	 *43380* *43381* *43382*
Density at 15°C, kg/L	0.873
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 111 14.9
Viscosity, Cold Crank, °C/mPa.s	-20/5200
Viscosity, MRV, °C/mPa.s	-25/16,600
Viscosity, HTHS, mPa.s	4.2
Viscosity Index	140
Flash Point, °C(°F)	228(442)
Pour Point, °C(°F)	-47(-53)
Sulfated Ash, mass %	1.0
Base Number, mgKOH/g, ASTM D2896	 10.7
Phosphorus, mass %	0.076
Sulfur, mass %	0.277
Zinc, mass %	0.083

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® 400 ZFA

SAE 10W-30 (Synblend)

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 ZFA SAE 10W-30 with ISOSYN® Advanced Technology is a premium synthetic blend fuel economy and mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API FA-4 or SN service category and SAE 10W-30 viscosity grade are recommended.

CUSTOMER BENEFITS

Delo 400 ZFA SAE 10W-30 (Synblend) with ISOSYN Advanced Technology is an API FA-4 heavy duty engine oil specifically formulated for on highway applications, including certain 2017 greenhouse gas (GHG 17) compliant diesel engines with lower CO_2 emissions and improved fuel economy, in addition to certain EPA 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems calling for SAE 10W-30 heavy duty motor oil.

Delo 400 ZFA SAE 10W-30 with ISOSYN Advanced Technology is formulated to protect new generation GHG'17 model diesel engines.

Delo 400 ZFA SAE 10W-30 delivers value through:

- **Improved Fuel Economy** — Up to 1.3% improvement vs. SAE 15W-40 oils in Class 8 vehicle diesel engine bench testing programs.
- **Better Low Temperature Pumpability** — Excellent cold flow properties help with rapid oil circulation to minimize wear during cold temperature starting.
- **Exceptional Deposit Control** — Superb oxidation resistance, thermal stability and detergency minimize piston and turbocharger deposits.
- **Minimized Operating Costs** — Exceptional anti-wear, deposit and soot control. Cylinders, pistons, rings and valve train components are well protected against wear and corrosion, providing optimum service life and minimal maintenance. Contributes to maximum vehicle utilization and minimal downtime.
- **Excellent Emission Control System Life** — Provides optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing maintenance costs.
- **Managed Inventory Costs** — Suitable for use in four-stroke gasoline and naturally aspirated turbocharged and modern electronically controlled/ low emission diesel engines where API FA-4 or SN performance oils are required. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's Lubrication and Industry Knowledge** — Helps maximize your bottom line business results.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

20 June 2018
HDMO-75

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FEATURES

Delo® 400 ZFA SAE 10W-30 with ISOSYN® Advanced Technology is formulated using advanced additive technology to provide outstanding protection and improved fuel economy for on-highway diesel engine applications that allow the use of an API FA-4 SAE 10W-30.

Delo 400 ZFA SAE 10W-30 is formulated with ISOSYN Advanced Technology, which is the combination of Chevron's industry-leading formulating expertise with unique, high performance additive chemistry to help extend the durability of critical engine parts.

ISOSYN ADVANCED TECHNOLOGY

ISOSYN Advanced Technology is the combination of Chevron's outstanding formulating expertise, unique high performance additive chemistry and premium base oils that helps extend the durability of critical diesel engine parts.

Delo 400 products formulated with ISOSYN Advanced Technology can provide improved engine longevity, extended oil drain performance, and excellent diesel component parts protection, helping to extend vehicle life and minimize total cost of ownership when compared with previous generation Chevron HDMO formulations.

ISOSYN Advanced Technology benefits customers by helping to provide:

- Up to 35% improved oil oxidation control*
- Up to 68% improved wear protection*
- Up to 64% improved piston deposit control*

*Results will vary based on the Delo 400 product, operating conditions, and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

FUNCTIONS

Delo 400 ZFA SAE 10W-30 with ISOSYN Advanced Technology helps to keep rings clean and free for maximum combustion pressure and minimal wear. It minimizes valve and piston crown land deposits, thus managing oil consumption. Its high level of ashless dispersants keeps fuel soot in suspension and thus helps to avoid filter plugging, heavy cylinder head sludge, abrasive polishing wear, high viscosity increase, and oil gelling. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Specially selected oxidation inhibitors control oxidation, sludge, and undue thickening. Its unique blend of extreme pressure anti-wear additives protect against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A specially selected viscosity index improver ensures easy flow at low temperatures and excellent film protection in hot engine areas. A defoaming additive protects against air entrainment.

The combination of premium dispersant additives and ISOSYN Advanced Technology allows Delo 400 ZFA SAE 10W-30 to effectively disperse soot and keep it in suspension. This minimizes the risk of valve train wear and filter plugging.

Applications

Delo 400 ZFA SAE 10W-30 with ISOSYN Advanced Technology is a fuel economy and mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API FA-4 or SN service categories and SAE 10W-30 viscosity grade are recommended. It is formulated for engines operating under severe service and in a wide range of climatic conditions.

Delo 400 ZFA SAE 10W-30 with ISOSYN Advanced Technology is formulated for exceptional performance with ultra low sulfur diesel (ULSD) and other low sulfur diesel fuels.

Delo 400 ZFA SAE 10W-30 is approved for:

- **API Service Categories** FA-4, SN
- **Cummins** CES 20087
- **Detroit Fluids Specification (DFS)** 93K223

Delo 400 ZFA SAE 10W-30 is recommended for:

- **Ford F150** diesel engines where Ford WSS-M2C214-B1 or API FA-4 SAE 10W-30 is specified
- **MB 228.61**

It is also recommended for today's most modern on-highway low emission designs, as well as some previous generation model diesel engines (Detroit Diesel DD15/DD13 EPA 13 and EPA 10 model diesel

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

engines) that are authorized to use API FA-4 SAE 10W-30 engine oils.

TYPICAL TEST DATA

SAE Grade	10W-30
Product Number	*257003*
SDS Number	*42683*
Density at 15°C, kg/L	0.867
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 65 9.8
Viscosity, Cold Crank, °C/mPa.s	-25/5100
Viscosity, MRV, °C/mPa.s	-30/15,400
Viscosity Index	135
Flash Point, °C(°F)	232(450)
Pour Point, °C(°F)	-48(-54)
Sulfated Ash, mass %	0.96
Base Number, mgKOH/g, ASTM D2896	 10.3
Phosphorus, mass %	0.076
Sulfur, mass %	0.28
Zinc, mass %	0.083

Minor variations in product typical test data are to be expected in normal manufacturing.

DELO® 400 ZFA ISOCLEAN® CERTIFIED LUBRICANT

SAE 10W-30 (Synblend)

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 400 ZFA SAE 10W-30 ISOCLEAN® Certified Lubricant with ISOSYN® Advanced Technology is a premium synthetic blend fuel economy and mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API FA-4 or SN service category and SAE 10W-30 viscosity grade are recommended. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo 400 ZFA SAE 10W-30 (Synblend) ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is an API FA-4 heavy duty engine oil specifically formulated for on highway applications, including certain 2017 greenhouse gas (GHG 17) compliant diesel engines with lower CO_2 emissions and improved fuel economy, in addition to certain EPA 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems calling for SAE 10W-30 heavy duty motor oil.

Delo 400 ZFA SAE 10W-30 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is formulated to protect new generation GHG'17 model diesel engines.

Delo 400 ZFA SAE 10W-30 ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Improved Fuel Economy** — Up to 1.3% improvement vs. SAE 15W-40 oils in Class 8 vehicle diesel engine bench testing programs.
- **Better Low Temperature Pumpability** — Excellent cold flow properties help with rapid oil circulation to minimize wear during cold temperature starting.
- **Exceptional Deposit Control** — Superb oxidation resistance, thermal stability and detergency minimize piston and turbocharger deposits.
- **Minimized Operating Costs** — Exceptional anti-wear, deposit and soot control. Cylinders, pistons, rings and valve train components are well protected against wear and corrosion, providing optimum service life and minimal maintenance. Contributes to maximum vehicle utilization and minimal downtime.
- **Excellent Emission Control System Life** — Provides optimum Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing maintenance costs.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

20 June 2018
HDMO-75 ISOCLEAN

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- **Managed Inventory Costs** — Suitable for use in four-stroke gasoline and naturally aspirated turbocharged and modern electronically controlled/ low emission diesel engines where API FA-4 or SN performance oils are required. Allows users with a wide mix of engine brands to enjoy simplified inventory and dispensing systems that may contribute to saving money, space and handling time.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's Lubrication and Industry Knowledge** — Helps maximize your bottom line business results.

FEATURES

Delo® 400 ZFA SAE 10W-30 ISOCLEAN® Certified Lubricant with ISOSYN® Advanced Technology is formulated using advanced additive technology to provide outstanding protection and improved fuel economy for on-highway diesel engine applications that allow the use of an API FA-4 SAE 10W-30.

Delo 400 ZFA SAE 10W-30 ISOCLEAN Certified Lubricant is formulated with ISOSYN Advanced Technology, which is the combination of Chevron's industry-leading formulating expertise with unique, high performance additive chemistry to help extend the durability of critical engine parts.

ISOSYN ADVANCED TECHNOLOGY

ISOSYN Advanced Technology is the combination of Chevron's outstanding formulating expertise, unique high performance additive chemistry and premium base oils that helps extend the durability of critical diesel engine parts.

Delo 400 products formulated with ISOSYN Advanced Technology can provide improved engine longevity, extended oil drain performance, and excellent diesel component parts protection, helping to extend vehicle life and minimize total cost of ownership when compared with previous generation Chevron HDMO formulations.

ISOSYN Advanced Technology benefits customers by helping to provide:

- Up to 35% improved oil oxidation control*
- Up to 68% improved wear protection*
- Up to 64% improved piston deposit control*

*Results will vary based on the Delo 400 product, operating conditions, and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

FUNCTIONS

Delo 400 ZFA SAE 10W-30 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology helps to keep rings clean and free for maximum combustion pressure and minimal wear. It minimizes valve and piston crown land deposits, thus managing oil consumption. Its high level of ashless dispersants keeps fuel soot in suspension and thus helps to avoid filter plugging, heavy cylinder head sludge, abrasive polishing wear, high viscosity increase, and oil gelling. These problems can result in excessive engine wear and bearing failure on startup, without prior indication to the operator.

Specially selected oxidation inhibitors control oxidation, sludge, and undue thickening. Its unique blend of extreme pressure anti-wear additives protect against valve train wear and scuffing of highly loaded parts operating under boundary lubrication. A specially selected viscosity index improver ensures easy flow at low temperatures and excellent film protection in hot engine areas. A defoaming additive protects against air entrainment.

The combination of premium dispersant additives and ISOSYN Advanced Technology allows Delo 400 ZFA SAE 10W-30 ISOCLEAN Certified Lubricant to effectively disperse soot and keep it in suspension. This minimizes the risk of valve train wear and filter plugging.

1 See Warranty Plus for details and restrictions.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

APPLICATIONS

Delo® 400 ZFA SAE 10W-30 ISOCLEAN® Certified Lubricant with ISOSYN® Advanced Technology is a fuel economy and mixed fleet engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines and four-stroke gasoline engines in which the API FA-4 or SN service categories and SAE 10W-30 viscosity grade are recommended. It is formulated for engines operating under severe service and in a wide range of climatic conditions.

Delo 400 ZFA SAE 10W-30 ISOCLEAN Certified Lubricant with ISOSYN Advanced Technology is formulated for exceptional performance with ultra low sulfur diesel (ULSD) and other low sulfur diesel fuels.

Delo 400 ZFA SAE 10W-30 ISOCLEAN Certified Lubricant is approved for:

- **API Service Categories** FA-4, SN
- **Cummins** CES 20087
- **Detroit Fluids Specification (DFS)** 93K223

Delo 400 ZFA SAE 10W-30 ISOCLEAN Certified Lubricant is recommended for:

- **Ford F150** diesel engines where Ford WSS-M2C214-B1 or API FA-4 SAE 10W-30 is specified
- **MB 228.61**

It is also recommended for today's most modern on-highway low emission designs, as well as some previous generation model diesel engines (Detroit Diesel DD15/DD13 EPA 13 and EPA 10 model diesel engines) that are authorized to use API FA-4 SAE 10W-30 engine oils.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

SAE Grade	10W-30
Product Number	*278086*
SDS Number *U.S.* *Canada* *Mexico*	 *42683* *43553* *43554*
Density at 15°C, kg/L	0.867
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 65 9.8
Viscosity, Cold Crank, °C/mPa.s	-25/5100
Viscosity, MRV, °C/mPa.s	-30/15,400
Viscosity Index	135
Flash Point, °C(°F)	232(450)
Pour Point, °C(°F)	-48(-54)
Sulfated Ash, mass %	0.96
Base Number, mgKOH/g, ASTM D2896	10.3
Phosphorus, mass %	0.076
Sulfur, mass %	0.28
Zinc, mass %	0.083

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

URSA® SUPER PLUS
SAE 30, 40

PRODUCT DESCRIPTION

Ursa® Super Plus monograde motor oils are recommended for use in two and four-cycle gasoline and diesel engines where the appropriate API service category and SAE 30 or 40 viscosity grade is specified by the OEM.

CUSTOMER BENEFITS

Ursa Super Plus monograde heavy duty motor oils deliver value through:

- **Managed oil costs** — Minimal piston crownland deposits and strong oxidation stability promote low oil consumption.
- **Long engine life** — resulting from additives that protect highly loaded parts from scuffing and wear optimizing engine overhaul intervals.
- **Outstanding engine cleanliness** — High detergency provides excellent deposit and sludge control in the piston ring belt area.
- **Access to Chevron's lubrication and industry knowledge** — Helps maximize your bottom line business results.

FEATURES

Ursa Super Plus monograde oils are quality, mixed fleet motor oils manufactured using selected high viscosity index base oils and additives that provide protection against sludge, varnish, ash deposits, wear, oxidation, foam, corrosion, and rust.

Ursa Super Plus monograde oils utilize technology to help provide excellent performance in older model engines.

FUNCTIONS

Ursa Super Plus monograde oils are strong performing crankcase oils for older diesel engines requiring SAE 30 or 40 monograde engine oil.

They are manufactured using selected paraffinic base oils in combination with detergent, dispersant, wear control, antioxidant, corrosion inhibitor and foam suppressant additives.

APPLICATIONS

Ursa Super Plus monograde oils are ideal for older diesel engines in mixed commercial fleets, farm machinery, construction equipment, marine and other off-highway applications specifying an SAE 30 or 40 monograde engine oil.

They may also be used in four-cycle gasoline engines where this product is recommended by the OEM.

Ursa Super Plus meets the requirements of:

- **API Service Categories**
  - — CF*, CF-2*
- **Detroit Diesel Corporation** 2-cycle engine recommendations (71, 92) (SAE 40)

* Obsolete specification.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

SAE Grade	30	40
Product Number	*271203*	*271204*
SDS Number	*23578*	*23578*
API Gravity	29.4	28.7
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 96 11.5	 141 14.7
Viscosity Index	107	104
Flash Point, °C(°F)	232(450)	254(489)
Pour Point, °C(°F)	-27(-17)	-24(-11)
Sulfated Ash, wt %	0.95	0.98
Base Number, ASTM D2896	 6.3	 6.3
Phosphorus, wt %	0.069	0.069
Zinc, wt %	0.072	0.072

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

URSA® SUPER PLUS EC
SAE 10W-30

PRODUCT DESCRIPTION

Ursa® Super Plus EC SAE 10W-30 is a heavy duty engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines in which the API CK-4 service category and SAE 10W-30 viscosity grade are recommended.

CUSTOMER BENEFITS

Ursa Super Plus EC SAE 10W-30 is an API CK-4 heavy duty engine oil specifically formulated for 2017 greenhouse gas (GHG 17) compliant diesel engines designed to meet lower CO_2 emissions and improved fuel economy, in addition to 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems. It is fully compatible with previous engine models and previous API Oil Service Categories.

Ursa Super Plus EC SAE 10W-30 delivers value through:

- **Good Engine Protection** — Delivers soot dispersancy and wear control. Cylinders, pistons, rings, and valve train components are well protected against wear and corrosion, providing long engine service life and minimal maintenance. Contributes to optimal vehicle utilization and minimal downtime.
- **Appropriate Emission Control System Life** — Helps protect Diesel Particulate Filters (DPF) for minimal downtime and cleaning, thus managing maintenance costs.
- **Managed Inventory Costs** — Backward compatible with all previous API Oil Service Categories and engine models. Good for services in naturally aspirated turbocharged and modern electronically controlled/low emission diesel engines calling for an SAE 10W-30 heavy duty engine oil.
- **Minimized Operating Costs** — Provides up to 0.7% improved fuel economy performance versus SAE 15W-40 engine oil in Class 8 trucks.[1]
- **Access to Chevron's Lubrication and Industry Knowledge** — Helps maximize your bottom line business results.

FEATURES

Ursa Super Plus EC SAE 10W-30 is a market general heavy duty engine oil formulated to provide appropriate protection in normal operating conditions. It is designed to be a cost-effective formulation for multiple types of applications.

APPLICATIONS

Ursa Super Plus EC SAE 10W-30 is a heavy duty engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines in which the API CK-4 service category and SAE 10W-30 viscosity grade are recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

This product is recommended for use in on-highway diesel engines that require API CK-4 service category and allow the use of an SAE 10W-30 viscosity grade. It can also be used in cold weather environments to facilitate engine start up performance.

1 Fuel Economy comparison to SAE 15W-40 engine oils based on SAE J1321 track testing for Class 6 trucks and based on Volvo D12D engine testing for Class 8 trucks.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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Ursa Super Plus EC SAE 10W-30 is approved for:

- **API Service Categories** CK-4, CJ-4, CI-4 PLUS, CI-4 and CH-4
- **Cummins** CES 20081
- **Mack** EO-O Premium Plus
- **Volvo** VDS-4

Ursa Super Plus EC SAE 10W-30 is recommended for:

- **Caterpillar** ECF-3

TYPICAL TEST DATA

SAE Grade	10W-30
Product Number	*257006*
SDS Number *U.S.* *Canada* *Mexico*	 *43293* *43294* *43295*
Density at 15°C, kg/L	0.8706
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 81 12.2
Viscosity, Cold Crank, °C/mPa.s	 -25/6400
Viscosity, MRV, °C/mPa.s	-30/18,800
Viscosity, HTHS, mPa.s at 150°C	3.6
Viscosity Index	145
Flash Point, °C(°F)	225(437)
Pour Point, °C(°F)	-38(-36)
Sulfated Ash, mass %	1.0
Base Number, mgKOH/g, ASTM D2896	 8.8
Sulfur, mass %	0.24
Phosphorus, mass %	0.075
Zinc, mass %	0.085

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

URSA® SUPER PLUS EC
SAE 15W-40

PRODUCT DESCRIPTION

Ursa® Super Plus EC SAE 15W-40 is a heavy duty engine oil recommended for all naturally aspirated and turbocharged four-stroke diesel engines in which the API CK-4 service category and SAE 15W-40 viscosity grade are recommended.

CUSTOMER BENEFITS

Ursa Super Plus EC SAE 15W-40 is an API CK-4 heavy duty engine oil specifically formulated for 2017 greenhouse gas (GHG 17) compliant diesel engines designed to meet lower CO_2 emissions and improved fuel economy, in addition to 2010 compliant low emission diesel engines with Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF) and Exhaust Gas Recirculation (EGR) systems calling for SAE 15W-40 heavy duty engine oil. It is fully compatible with previous engine models and previous API Oil Service Categories.

Ursa Super Plus EC SAE 15W-40 delivers value through:

- **Good Engine Protection** — Disperses soot and helps control wear. Cylinders, pistons, rings, and valve train components are well protected against wear and corrosion, providing good service life and minimal maintenance.
- **Appropriate Emission Control System Life** — Provides appropriate Diesel Particulate Filter (DPF) life for minimal downtime and cleaning, thus managing maintenance costs.
- **Managed Inventory Costs** — Backward compatible with all previous API Oil Service Categories and engine models. Good for service in naturally aspirated turbocharged and modern electronically controlled/low emission diesel engines calling for an SAE 15W-40 heavy duty engine oil.
- **Access to Chevron's Lubrication and Industry Knowledge -** Helps maximize your bottom line business results.

FEATURES

Ursa Super Plus EC SAE 15W-40 is a cost effective fleet heavy duty engine oil formulated to provide appropriate protection in normal operating conditions. It is designed to be a cost effective formulation for multiple types of applications.

APPLICATIONS

Ursa Super Plus EC SAE 15W-40 is a heavy duty engine oil recommended for naturally aspirated and turbocharged four-stroke diesel engines in which the API CK-4 service category and SAE 15W-40 viscosity grade are recommended. It is formulated for engines operating under severe service and a wide range of climatic conditions.

Ursa Super Plus EC SAE 15W-40 is approved for:

- **API Service Categories** CK-4, CJ-4, CI-4 PLUS, CI-4 and CH-4
- **Cummins** CES 20081
- **Mack** EO-O Premium Plus
- **Volvo** VDS-4

Ursa Super Plus EC SAE 15W-40 is recommended for:

- **Caterpillar** ECF-3

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

SAE Grade	15W-40
Product Number	*257005*
SDS Number *U.S.* *Canada* *Mexico* *Colombia*	 *43290* *43291* *43292* *46317*
Density at 15°C, kg/L	0.8779
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 105.3 14.5
Viscosity, Cold Crank, °C/mPa.s	 -20/5700
Viscosity, MRV, °C/mPa.s	-25/15,600
Viscosity, HTHS, mPa.s at 150°C	4.1
Viscosity Index	140
Flash Point, °C(°F)	230(446)
Pour Point, °C(°F)	-36(-33)
Sulfated Ash, mass %	1.0
Base Number, ASTM D2896, mgKOH/g	 8.7
Sulfur, mass %	0.259
Phosphorus, mass %	0.077
Zinc, mass %	0.086

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

PASSENGER CAR MOTOR OILS

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HAVOLINE® HIGH MILEAGE MOTOR OIL

SAE 0W-20, 5W-20, 5W-30, 10W-30

PRODUCT DESCRIPTION

Havoline® High Mileage Motor Oils with Deposit Shield® Technology are designed to help extend the life of engines. These are synthetic blend motor oils designed with special anti-wear, cleaning and seal conditioning agents, and contain added friction modifiers to help minimize oil leaks in higher mileage vehicles. They are outstanding at controlling deposits, sludge and varnish that can hinder performance and fuel economy in an engine of any age. Havoline High Mileage Motor Oils with Deposit Shield Technology are also recommended for use in lower-mileage vehicles, including new cars under warranty.

They can be added to or mixed with other conventional, part synthetic and full synthetic motor oils. Formulated with a combination of premium synthetic and conventional base oils, they provide very good cold temperature performance. Havoline High Mileage Motor Oils with Deposit Shield Technology also work well in turbocharged gasoline and flex-fuel passenger car engines, light duty trucks, vans and SUVs where ILSAC GF-5 or API SN motor oil is specified.

CUSTOMER BENEFITS

Havoline High Mileage Motor Oils with Deposit Shield Technology deliver the following value:

- Helps prevent oil consumption through the use of special conditioners for seals and gaskets
- Additional cleansing agents that help maintain engine performance over time
- Helps control evaporative oil losses at high temperatures relative to conventional motor oils
- Meets "Resource Conserving" requirements for fuel economy improvement, emission system and turbocharger protection
- Excellent protection against thermal breakdown and oxidation
- Outstanding anti-wear protection against engine deposits, sludge and varnish formation that can result from heavy load and stop-and-go driving conditions
- Very good low-temperature pumpability for protection during cold starts
- Satisfies warranty requirements of cars, light trucks, vans and sport utility vehicles that specify an API SN Resource Conserving or ILSAC GF-5 motor oil

FEATURES

Havoline High Mileage Motor Oils with Deposit Shield Technology are premium, synthetic blend automotive engine oils formulated to provide outstanding protection against harmful engine deposits, while providing excellent oxidation protection and volatility control. They are especially suited for the unique needs of higher mileage engines, older and newer cars, pickup trucks and SUVS that have accumulated 75,000 miles or more. They can be added to and mixed with other full synthetic, part synthetic and conventional motor oils.

As vehicles accumulate more miles, oil consumption can increase due to gradual degradation of engine seals and gaskets. Regular use of Havoline High Mileage Motor Oil with Deposit Shield Technology can help to maintain the condition of seals and gaskets so as to minimize oil leaks and control oil consumption by managing evaporative losses at high temperatures.

SAE 0W-20 exceeds the requirements of API SN Resource Conserving and ILSAC GF-5. It provides best fuel economy compared to other ILSAC viscosity grades, while maintaining great protection in all driving conditions, varying operating temperatures and climates. It is specifically formulated to meet the needs of newer Japanese, Korean and U.S. OEMS, such as:

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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Acura, FCA (formerly Chrysler), Ford, Honda, Lexus, Nissan, Toyota and others with models that call for this modern viscosity grade.

SAE 5W-20 exceeds the requirements of API SN Resource Conserving and ILSAC GF-5. It provides excellent protection in extended driving conditions.

SAE 5W-30 exceeds the requirements of API SN Resource Conserving and ILSAC GF-5. It provides excellent protection in extreme cold temperatures.

SAE 10W-30 exceeds the requirements of API SN Resource Conserving and ILSAC GF-5. It provides excellent year-round performance.

APPLICATIONS

Havoline High Mileage Motor Oils with Deposit Shield Technology are recommended for four-stroke gasoline engines used in passenger cars, light trucks, sport utility vehicles, powerboats, motorcycles, and other mobile and stationary equipment where an API SN or previous API "S" category oil, and the appropriate viscosity grade, is recommended. They are excellent for high-revving engines in small cars and light trucks, and work well in turbocharged gasoline engines.

APPLICATIONS, SPECIFICATIONS, MANUFACTURER APPROVALS

Specifications	0W-20	5W-20	5W-30	10W-30
API SN	X	X	X	X
API Resource Conserving	X	X	X	X
ILSAC GF-5	X	X	X	X
FCA US LLC MS-6395	X	X	X	X
Ford WSS-M2C930-A		X		
Ford WSS-M2C945-A		X		
Ford WSS-M2C946-A			X	
Ford WSS-M2C947-A	X			
GM6094M[a]		X	X	X

a Obsolete specification.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

SAE Grade	0W-20	5W-20	5W-30	10W-30
Product Number	*254642*	*254644*	*254645*	*254646*
SDS Number	*43982*	*31331*	*31331*	*31331*
API Gravity	35.3	33.2	34.1	31.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 45.0 8.4	 48.5 8.8	 72.3 11.8	 72.0 12
Viscosity, Cold Crank, °C/Poise	-35/56	-30/50	-30/50	-25/54
Viscosity Index	165	145	156	163
Flash Point, °C(°F)	>200(>392)	>200(>392)	>200(>392)	>200(>392)
Pour Point, °C(°F)	-42(-44)	-39(-38)	-33(-27)	-33(-27)
Sulfated Ash, wt %	0.9	0.9	0.9	0.9
Base Number, mgKOH/g, ASTM D2896	8.5	8.5	8.5	8.5
Phosphorus, wt %	0.077	0.077	0.077	0.077
Zinc, wt %	0.088	0.088	0.088	0.088

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® MOTOR OIL

SAE 5W-20, 5W-30, 10W-30, 10W-40, 20W-50, 30

PRODUCT DESCRIPTION

Premium automotive motor oil with Deposit Shield® Technology protects against deposit and sludge formation and provides excellent wear protection of critical engine parts.

CUSTOMER BENEFITS

Havoline® Motor Oils with Deposit Shield® Technology deliver value through:

- **Excellent antiwear protection**
- **Protection against thermal breakdown**
- **Clean engines** and clean positive crankcase ventilation systems resulting from minimal deposit formation under heavy load and stop-and-go driving conditions.
- **Meets or exceeds warranty requirements** of car and light truck manufacturers relying on an API SN motor oil.
- **Excellent high temperature control**

FEATURES

Havoline Motor Oils with Deposit Shield Technology are premium quality automotive engine oils.

All grades are formulated with high quality base stocks and contain detergent, dispersant, wear control, antioxidant, corrosion inhibitor, and foam suppressant additives. Multigrades contain a shear stable viscosity index improver.

Their antiwear additives provide excellent wear protection of critical engine parts.

A high level of dispersancy in Havoline Motor Oils with Deposit Shield Technology protects against deposit and sludge formation in stop-and-go driving and sustained high temperature operation, and protects against corrosion.

Their excellent high temperature oxidation stability helps prevent viscosity increase and oil gelling in the crankcase. They help keep PCV systems clean to maintain smooth engine performance.

APPLICATIONS

Havoline Motor Oils with Deposit Shield Technology are suitable for use in four-stroke gasoline engines used in passenger cars, light trucks, powerboats, motorcycles, and other mobile and stationary equipment. They are excellent for high-revving engines in small cars and light trucks. Havoline Motor Oils with Deposit Shield Technology are suitable for use in both new and high-mileage cars, and in turbocharged as well as normally aspirated engines. They may also be suitable for use in natural gas engines in small cars and light trucks after consulting with the appropriate original equipment manufacturer's lubrication recommendations.

SAE 5W-20 provides optimum fuel economy and durability performance. This synthetic blend engine oil, carrying the API Resource Conserving designation, is suitable for use in domestic and import passenger cars, trucks and SUVs specifying this viscosity grade.

SAE 5W-30 is recommended by the majority of later model domestic and import passenger cars, trucks and SUVs under a wide variety of weather conditions. This synthetic blend engine oil is also suitable for use at low temperatures involving cold starting, and for exceptional fuel economy.

SAE 10W-30 is suitable for use in many older vehicles and a few late model cars and trucks, often those with larger 6-cylinder and V-8 and/or high performance engines. SAE 10W-30 promotes increased fuel economy relative to heavier viscosity grades.

SAE 10W-40 is still a popular viscosity grade in warmer climates, though it is not recommended by most auto manufacturers for their late model North American vehicles. It is often used in older model cars that see regular high temperature operation.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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SAE 20W-50 is suitable primarily for older engines for use in high temperature and heavy duty operations such as towing heavy trailers at highway speeds or up inclines for long periods of time. It is also recommended for some high performance engines used in racing and rallying.

SAE 30 can be used in engine applications where an SAE 30 passenger car motor oil of API SN or any previous "S" category is recommended. It performs exceptionally well in small four-stroke engines found in lawn mowers, garden tractors, and snow blowers, and in refrigeration or air-conditioning engines on trucks and buses.

Note: Always consult your owner's manual regarding viscosity grade.

Havoline® Motor Oils meet:

- **API Service Categories**
  - SN
  - SM, SL, SJ and all previous API "S" categories
  - Resource Conserving for API SN (SAE 5W-20, 5W-30, 10W-30)
  - ILSAC GF-5 (SAE 5W-20, 5W-30, 10W-30)
- **manufacturers' performance requirements**
  - **FCA US LLC** (formerly known as Chrysler Group LLC)
    MS-6395 (SAE 5W-20, 5W-30, 10W-30)
  - **FIAT**
    9.55535-CR-1 (SAE 5W-30)
  - **Ford**
    WSS-M2C945-A (SAE 5W-20)
    WSS-M2C946-A (SAE 5W-30)
  - **General Motors**
    GM 6094M (SAE 5W-20, 5W-30, 10W-30)

TYPICAL TEST DATA

SAE Grade	5W-20	5W-30	10W-30
Product Number	*223393*	*223394*	*223395*
SDS/MSDS Number *USA* *Colombia* *El Salvador*	 *17808* — —	 *17808* — —	 *17808* *31063* *31407*
Density at 15°C, kg/L	0.861	0.860	0.873
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 50.4 8.4	 60.6 10.0	 68.0 10.0
Viscosity, Cold Crank, °C/mPa.s	-30/6000	-30/6000	-25/6400
Viscosity Index	142	151	131
Flash Point, °C(°F)	226(439)	230(446)	224(435)
Pour Point, °C(°F)	-42(-44)	-37(-35)	-36(-33)
Sulfated Ash, mass %	0.9	0.9	0.9
Base Number, ASTM D2896, mg KOH/g	7.4	7.4	7.4
Phosphorus, mass %	0.066	0.066	0.066
Zinc, mass %	0.075	0.075	0.075
Magnesium, mass %	0.004	0.004	0.004

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

SAE Grade	10W-40	20W-50	30
Product Number	*223396*	*223397*	*223391*
SDS/MSDS Number *USA* *Colombia* *El Salvador*	 *17808* — —	 *17808* *31063* *31407*	 *17808* — —
Density at 15°C, kg/L	0.873	0.880	0.880
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 102.0 14.4	 157.2 17.5	 97.0 11.6
Viscosity, Cold Crank, °C/mPa.s	-25/6400	-15/7200	—
Viscosity Index	145	122	108
Flash Point, °C(°F)	>205(>401)	>205(>401)	250(482)
Pour Point, °C(°F)	-30(-22)	-24(-11)	-30(-22)
Sulfated Ash, mass %	0.9	0.9	0.9
Base Number, ASTM D2896, mg KOH/g	7.4	7.4	7.4
Phosphorus, mass %	0.066	0.066	0.066
Zinc, mass %	0.075	0.075	0.075
Magnesium, mass %	0.004	0.004	0.004

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® PRODS® FULL SYNTHETIC MOTOR OIL

SAE 0W-20, 5W-20, 5W-30, 10W-30

PRODUCT DESCRIPTION

Havoline® ProDS® Full Synthetic Motor Oil provides outstanding protection for grueling stop-and-go driving, extended oil drain intervals, heavy loads and for vehicles with turbo chargers and those that require a synthetic motor oil.

FEATURES

Havoline ProDS Full Synthetic Motor Oil with Deposit Shield® technology is specially engineered for the highest level of protection demanded by high-performance engines. It exhibits outstanding protection against heat, pressure, corrosion, acid, abrasion - all the things that can prematurely age today's smaller, higher output engines.

Havoline ProDS Full Synthetic Motor Oil with Deposit Shield technology meets or exceeds the requirements of API SN Plus Resource Conserving and ILSAC GF-5. It provides:

- Outstanding protection against wear[1]
- Outstanding protection against sludge and deposits to keep your engine clean[2]
- Outstanding protection against piston varnish in the industry's toughest high-temperature stress test[3]
- Improved fuel economy[4]
- Improved thermal stability for smaller and hotter engines
- Excellent degradation control for long automaker-recommended oil change intervals
- Extremely fast lubrication during start up
- Outstanding results in latest industry test for preventing engine super knock[5]

SAE 0W-20 is licensed under the dexos1™ Gen 2 specification[6] (License no. D10216GL089). It is recommended for use in FCA, Ford, GM, Honda, Mazda, Mitsubishi, Nissan and Toyota engines for either SAE 0W-20 or SAE 5W-20 applications. It can increase engine efficiency and improve fuel economy up to 2% compared with other common lubricant grades and provides excellent engine protection in applications recommending SAE 0W-20 or 5W-20 motor oils.[7]

SAE 5W-20 is recommended for use in Acura, Chrysler, FCA, Ford, Honda and Mazda engines where an SAE 5W-20 viscosity grade is specified. It provides exceptional performance in extreme cold temperatures.

SAE 5W-30 is licensed under the dexos1 Gen 2 specification (License no. D10168GJ089). It is recommended for Acura, Chrysler, FCA, Ford, GM, Honda, Mazda, Nissan and Toyota engines calling for this grade. It provides exceptional performance in extreme cold temperatures.

1 Demonstrated in the Sequence IVA Wear Test for SAE 0W-20, 5W-20, 10W-30, and in the Peugeot TU3M Pad Wear Performance parameter for 5W-30.
2 Demonstrated in the Sequence VG Test for SAE 0W-20, 5W-20, 10W-30, and in the Sequence VG Rocker Cover Sludge Performance for 5W-30.
3 Demonstrated in the GM GMOD oxidation test for SAE 0W-20 and 5W-30.
4 Demonstrated in industry standard Sequence VID test for SAE 0W-20 and 5W-30, and in API SN Plus Resource Conserving and ILSAC GF-5 for SAE 5W-20 and 10W-30.
5 Demonstrated in the GM SPI Pre-Ignition Test for SAE 5W-30.
6 dexos1 is a registered trademark of General Motors LLC.
7 Actual savings are dependent upon vehicle/engine type, outside temperature, driving conditions, and your current engine oil viscosity.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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SAE 10W-30 provides good performance in a wide variety of weather conditions in the most popular viscosity grade. It is an ideal choice for legacy engines calling for this SAE viscosity grade.

APPLICATIONS

Havoline® ProDS® Full Synthetic Motor Oil with Deposit Shield® technology is engineered for use in:

- Advanced engines with turbochargers, gasoline direct injection, and high power density
- Extreme hot or cold climate conditions
- Most domestic and import passenger cars, pickup trucks, SUVs and working vans
- New and older vehicles

APPROVALS AND SPECIFICATIONS

Meets or exceeds the following OEM specifications and industry standards:

SAE Grade	0W-20	5W-20	5W-30	10W-30
Acura/Honda HTO-06			X	
API SN/SN Plus/Resource Conserving	X	X	X	X
ILSAC GF-5	X	X	X	X
Chrysler MS-6395	X	X	X	X
Fiat 9.55535-CR-1	X	X	X	X
Ford WSS-M2C945-A		X		
Ford WSS-M2C946-A			X	
Ford WSS-M2C947-A	X			
GM dexos1 Generation 2[a]	dexos1 APPROVED - GEN 2		dexos1 APPROVED - GEN 2	
GM4718M			X	X
GM6094M	X	X	X	X

a 0W-20 dexos1™ Generation 2 License No. D10216GL089. 5W-30 dexos1 Generation 2 License No. D10168GJ089.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

SAE Grade	0W-20	5W-20	5W-30	10W-30
Product Number	*223508*	*223509*	*223510*	*223511*
SDS/MSDS Number				
USA	*47956*	*47959*	*47962*	*47965*
Canada	*47957*	*47960*	*47963*	*47966*
Mexico	*47958*	*47961*	*47964*	*47967*
Colombia	*44191*	*44191*	*44191*	*44191*
Density at 15°C, kg/L	0.85	0.85	0.85	0.85
Viscosity, Kinematic				
cSt at 40°C	42.3	46.6	62.1	62.3
cSt at 100°C	8.2	8.5	10.7	10.2
Viscosity, Cold Crank, °C/Poise	-35/4900	-30/3700	-30/3900	-25/3680
Viscosity Index	172	175	165	152
Pour Point, °C(°F)	-40(-40)	-41(-42)	-45(-49)	-39(-38)
Volatility, NOACK, 250°C, 1 h				
Evaporation Loss, %	12.1	11	12.3	10
Phosphorus, wt %	0.076	0.076	0.076	0.076
Zinc, wt %	0.089	0.089	0.089	0.089

Minor variations in product typical test data are to be expected in normal manufacturing.

To find the right Chevron Havoline product for your vehicles, please consult www.Havoline.com to find the right motor oil using our Product Selector tool.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® PRODS® FULL SYNTHETIC MOTOR OIL

SAE 5W-40, Euro 5W-40

PRODUCT DESCRIPTION

Fully synthetic motor oils formulated to provide exceptional wear protection in hot or cold operating temperatures. They provide protection for extended oil drains, heavy loads and for vehicles requiring a synthetic motor oil.

CUSTOMER BENEFITS

Havoline® ProDS® Full Synthetic Motor Oils with Deposit Shield® Technology deliver value through:

- **Easy cold weather starting** due to excellent low temperature properties of the synthetic base oils.
- **Minimized engine deposit and emissions** under heavy duty and stop-and-go driving conditions.
- **Long engine life** due to extremely fast lubrication during starting, and outstanding wear protection during all other engine operating conditions.

FEATURES

Havoline ProDS Full Synthetic Motor Oils with Deposit Shield Technology are specially engineered for the highest level of protection demanded by high-performance engines. They exhibit outstanding thermal and shear stability to control viscosity and performance during extended oil drain intervals. They provide an extra measure of protection for your investment in a sport utility vehicle and high performance European luxury car. Havoline ProDS Full Synthetic Motor Oils deliver advanced protection for high output, supercharged and turbocharged performance vehicles.

Havoline ProDS Full Synthetic Motor Oils with Deposit Shield Technology are formulated using 100% synthetic base stocks for top performance and durable service. The exceptional resistance to volatility and lasting stability of synthetic base stocks promotes low oil consumption, fast engine starting (especially in cold weather), and extremely rapid lubrication of all moving parts. In addition, a special blend of advanced additive technology protects the engine against harmful deposits and premature wear in high performance or extended service.

SAE 5W-40 provides a broad range of protection in the Havoline ProDS Full Synthetic Motor Oils family. It offers European long drain service capability with exceptional TBN retention (acid neutralization). It is specifically formulated to provide outstanding oxidation stability and excellent wear protection. Havoline ProDS Full Synthetic Motor Oil protects the engine over a wide range of extreme temperatures, particularly in super-hot operating areas such as the turbocharger. Havoline ProDS Full Synthetic Motor Oil meets demanding European specifications. It is approved for select BMW, Mercedes-Benz and Volkswagen specifications. It meets or exceeds the requirements of API SN and ACEA A3/B3, A3/B4.

Euro SAE 5W-40 offers superior formulating technology using select European synthetic base fluids, and its advanced additives system puts Havoline ProDS Full Synthetic Euro in a premium class of engine oils. Its lower levels of Sulfated Ash, Phosphorus and Sulfur (SAPS) fully protect emissions reduction systems while providing outstanding protection of the engine's

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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mechanical components.

Havoline ProDS Full Synthetic Euro is an ideal choice for gasoline engines equipped with three-way catalytic converters and newer, light duty diesel engines equipped with Diesel Particulate Filters (DPF) in passenger or commercial service. It is also licensed under the dexos2™ specification (License no. GB2E0601089).[1]

Havoline ProDS Full Synthetic Euro Motor Oil SAE 5W-40 provides a broad range of engine protection for most newer passenger car and light duty diesel applications ranging from SUVs, luxury and high performance vehicles to mid-size sedans and hybrid vehicles. It has specifically been formulated to meet the most demanding needs of the latest model European cars and is approved for BMW, Mercedes-Benz, Porsche, and Volkswagen service applications. It meets or exceeds the requirements of API SN and ACEA C3.

FUNCTIONS

Havoline ProDS Full Synthetic Motor Oils are formulated with advanced antiwear additives that provide a protective layer on metal surfaces. This combination of synthetic base stocks and advanced anti-wear chemistry keep a lasting film that protects against wear and promotes long engine life.

Havoline ProDS Full Synthetic Motor Oils effectively control sludge that can restrict oil passages and intake screens and cause piston rings to stick. The superior stability of synthetic base oils allows them to resist degradation during high temperature operation and the exceptional level of detergent additives keep sludge and varnish deposits from forming in the engine, they also work to minimize ring and piston deposits that cause early oil consumption and power loss.

Havoline ProDS Full Synthetic Motor Oils provide excellent performance in both extreme cold and hot conditions. In cold temperatures, Havoline ProDS Full Synthetic Motor Oils flow easily, allowing for fast starts and quick lubrication. In today's high power density hotter running engines, Havoline ProDS Full Synthetic Motor Oils maintain their viscosity which is critical for engine fuel economy and resist oxidation better than conventional mineral oils.

1 dexos2 is a registered trademark of General Motors LLC.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

SAE Grade	5W-40	Euro 5W-40
Product Number	*223726*	*223504*
SDS/MSDS Number *U.S.* *Canada* *Mexico* *Colombia*	 *36693* *36710* *36711* *41483*	 *36238* *36239* *36240* *41482*
API Gravity	34.3	35.1
Density @15°C, kg/L	0.853	0.856
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 83.6 13.4	 83.1 13.8
Viscosity, Cold Crank, mPa.s @ -30°C	5600	5800
Viscosity Index	163	171
Pour Point, °C(°F)	-45(-49)	-45(-49)
Volatility, NOACK, 250°C, 1 h Evaporation Loss, %	 9	 9
Phosphorus, mass %	0.096	0.082
Zinc, mass %	0.105	0.093

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

APPLICATIONS, SPECIFICATIONS, MANUFACTURER APPROVALS

Havoline® ProDS® Full Synthetic Motor Oils are recommended for European four-stroke gasoline and light duty diesel engines in passenger cars, sport utility vehicles, and light trucks.

Specifications	5W-40	Euro 5W-40
API CF†	Recommended	
API SM	Exceeds	Exceeds
API SN	Exceeds	Exceeds
ACEA A3/B3, A3/B4	Exceeds	Meets
ACEA C3		Meets
BMW Longlife-01	Approved	
BMW Longlife-04		Approved
FCA US LLC (formerly known as Chrysler Group LLC) MS-12991	Meets	
GM dexos2™ (License no. GB2E0601089)		Licensed
Daimler-MB Approval 229.30	Approved	
Daimler-MB Approval 229.50	Approved	
Daimler-MB Approval 229.51		Approved
Porsche A40	Meets	Approved
VW 501.01†	Recommended	
VW 502 00	Approved	Approved
VW 505 00	Approved	Approved
VW 505 01		Approved

† Obsolete specification.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® SYNTHETIC BLEND MOTOR OIL

SAE 0W-20, 5W-20, 5W-30, 10W-30

PRODUCT DESCRIPTION

Havoline® Synthetic Blend Motor Oils with Deposit Shield® Technology are formulated with a combination of premium synthetic and conventional base oils to provide better cold temperature performance than conventional motor oils. Works well in turbocharged gasoline and flex-fuel passenger car engines, light duty trucks and SUVs where ILSAC GF-5 or API SN performance engine oil is specified.

CUSTOMER BENEFITS

Havoline Synthetic Blend Motor Oils with Deposit Shield Technology deliver value through:

- **Strong antiwear protection**
- **Excellent protection against thermal breakdown**
- **Better low-temperature pumpability** than conventional motor oils for protection during cold starts
- **Excellent protection for turbocharged engines**
- **Outstanding protection against engine deposits and sludge and varnish formation that can result from** heavy load and stop-and-go driving conditions.
- **Satisfies warranty requirements** of cars, light trucks, and sports-utility vehicles specifying an API SN Resource Conserving or ILSAC GF-5 motor oil.

FEATURES

Havoline Synthetic Blend Motor Oils with Deposit Shield Technology are premium quality automotive engine oils. They are formulated to provide outstanding protection against harmful engine deposits, while providing excellent oxidation protection and volatility control.

SAE 0W-20 exceeds the requirements of API SN Resource Conserving and ILSAC GF-5. It provides best fuel economy compared to other ILSAC viscosity grades, while maintaining great protection in all driving conditions, varying operating temperature and climates. *It is specially formulated to meet the needs of newer Japanese and U.S. OEMs like: Acura, FCA (formerly Chrysler), Ford, Honda, Lexus, Nissan, Toyota and others with models that specifically call for this modern viscosity grade*.

SAE 5W-20 exceeds the requirements of API SN Resource Conserving and ILSAC GF-5. It provides excellent protection in extended driving conditions.

SAE 5W-30 exceeds the requirements of API SN Resource Conserving and ILSAC GF-5. It provides exceptional performance in extreme cold temperatures.

SAE 10W-30 exceeds the requirements of API SN Resource Conserving and ILSAC GF-5. It provides excellent year-round performance.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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APPLICATIONS

Havoline® Synthetic Blend Motor Oils with Deposit Shield® Technology are recommended for four-stroke gasoline engines used in passenger cars, light trucks, sports-utility vehicles, powerboats, motorcycles, and other mobile and stationary equipment where an API SN or previous API "S" category oil, and the appropriate viscosity grade, is recommended. They are excellent for high-revving engines in small cars and light trucks. They are specially formulated for use in turbocharged engines.

Havoline Synthetic Blend Motor Oils with Deposit Shield Technology meet or exceed:

- **API Service Categories**
  - SN and all previous API "S" categories
  - Resource Conserving for API SN
- **ILSAC** GF-5
- **Manufacturers' performance requirements**
  - **FCA US LLC** (formerly known as Chrysler Group LLC) MS-6395
  - **FIAT** 9.55535-CR-1 (SAE 5W-30)
  - **Ford**
    WSS-M2C947-A (SAE 0W-20)
    WSS-M2C945-A (SAE 5W-20)
    WSS-M2C946-A (SAE 5W-30)
  - **General Motors** GM6094M (SAE 5W-20, 5W-30, 10W-30)

TYPICAL TEST DATA

SAE Grade	0W-20	5W-20	5W-30	10W-30
Product Number	*223703*	*223700*	*223728*	*223702*
SDS Number *Canada* *Mexico* *Colombia* *El Salvador*	*37720* *37721* *37722* - -	*31086* *31087* *33132* *33134* *33133*	*31086* *31087* *33132* *33134* *33133*	*31086* *31087* *33132* *33134* *33133*
API Gravity	35.3	33.2	34.1	31.8
Viscosity, Kinematic cSt at 40°C cSt at 100°	 45.0 8.4	 48.5 8.4	 65.6 11.2	 62.0 9.9
Viscosity, Cold Crank, °C/Poise	-35/56	-30/56	-30/46	-25/45
Viscosity Index	165	145	156	140
Flash Point, °C(°F)	> 200(> 392)	> 200(> 392)	> 200(> 392)	> 200(> 392)
Pour Point, °C(°F)	-42(-44)	-39(-38)	-42(-44)	-39(-38)
Sulfated Ash, wt %	0.9	0.9	0.9	0.9
Base Number, ASTM D2896	8.5	8.5	8.5	8.5
Phosphorus, wt %	0.077	0.077	0.077	0.077
Zinc, wt %	0.088	0.088	0.088	0.088

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

APPLICATIONS, SPECIFICATIONS, MANUFACTURER APPROVALS

Specifications	0W-20	5W-20	5W-30	10W-30
API SN	X	X	X	X
FCA US LLC MS-6395	X	X	X	X
FIAT 9.55535-CR-1			X	
Ford WSS-M2C945-A		X		
Ford WSS-M2C946-A			X	
Ford WSS-M2C947-A	X			
GM6094M			X	X
ILSAC GF-5	X	X	X	X

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® 2-CYCLE ENGINE OIL TC-W3®

PRODUCT DESCRIPTION

Havoline® 2-Cycle Engine Oil TC-W3® is a general purpose oil for air and water cooled 2-cycle engines.[1]

CUSTOMER BENEFITS

Havoline 2-Cycle Engine Oil TC-W3 delivers value through:

- **Exceptionally clean engines** with minimum combustion chamber deposits, negligible port clogging, clean ring grooves, and free rings.
- **Excellent rust protection**
- **Long spark plug life**
- **Easy mixing and stable mixtures with gasolines** even at low ambient temperatures.

FEATURES

Havoline 2-Cycle Engine Oil TC-W3 is a high quality two stroke engine lubricant that delivers excellent performance in water-cooled and air-cooled applications. It is formulated to provide excellent lubrication and deposit control in a wide range of applications.

Havoline 2-Cycle Engine Oil TC-W3 contains a special ashless detergent designed to help keep piston rings from sticking promoting smooth and efficient engine operation. Havoline 2-Cycle Engine Oil TC-W3 will help keep the engine clean of deposits and will also protect the pistons from scuffing and preignition problems.

To enhance storage and transportation safety, Havoline 2-Cycle Engine Oil TC-W3 contains a high flash solvent. This solvent also allows good mixing with gasoline at very low temperatures.

It is dyed teal blue for easy identification of fuel-oil mixtures in pre-mixed applications.

APPLICATIONS

Havoline 2-Cycle Engine Oil TC-W3 is recommended for use in two-stroke engines where TC-W3 or earlier general purpose lubricants are recommended. These applications include outboard engines, motorcycles, lawn mowers, scooters, golf carts, chain saws, and other two-stroke powered equipment.

Havoline 2-Cycle Engine Oil TC-W3 is well suited for engines using oil injection systems with fuel/oil mixture ratios of up to 150:1.

Havoline 2-Cycle Engine Oil TC-W3 has excellent low temperature mixing characteristics that make it suitable for use in cold climate conditions.

Havoline 2-Cycle Engine Oil TC-W3:

- is licensed under the NMMA TC-W3 performance standard. Registration #RL-99060T.
- is recommended for API TC requirements for use in air-cooled two-stroke applications

The mixing chart below is a guide for correct fuel-blend ratios as recommended by engine manufacturers.

Ounces of oil to add:

Gallons of Gasoline	1	2	3	4	5	6
16:1 Ratio	8	16	24	32	40	48
24:1 Ratio	5	11	16	21	27	32
32:1 Ratio	4	8	12	16	20	24
50:1 Ratio	3	5	8	11	13	16
100:1 Ratio	2	3	4	6	7	8

1 TC-W3 is a registered trademark of The National Marine Manufacturers Association.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

Product Number	*221896*
SDS/MSDS Number *USA* *Colombia* *El Salvador*	 *8629* *33698* *33699*
Density at 15°C, kg/L	0.87
Viscosity, Kinematic, cSt at 100°C	8.4
Viscosity, Brookfield, cP at -25°C	7440
Flash Point PM, °C(°F)	107(225)
Pour Point, °C(°F)	-33(-27)
Sulfated Ash, wt %	0
Base Number, ASTM D2896	5.0

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON SUPREME MOTOR OIL

SAE 5W-20, 5W-30, 10W-30, 10W-40, 20W-50, 30, 40

PRODUCT DESCRIPTION

Premium automotive motor oil that protects against deposit and sludge formation and provides excellent wear protection to critical engine parts.

CUSTOMER BENEFITS

Chevron Supreme Motor Oils deliver value through:

- **Excellent antiwear protection**
- **Protection against thermal breakdown**
- **Clean engines** and positive crankcase ventilation systems resulting in minimal deposits under heavy load and stop-and-go driving conditions.
- **Meets or exceeds warranty requirements** of car and light truck manufacturers relying on an API SN, SM, SL or SJ service category motor oil.
- **Energy Savings** — API Resource Conserving designation for SAE 5W-20, 5W-30 and 10W-30 grades

FEATURES

Chevron Supreme Motor Oils are premium quality automotive engine oils.

All grades are formulated with high quality base stocks, and robust additive packages including shear-stable viscosity index improvers, detergents, dispersants, anti-wear agents, corrosion inhibitors, antioxidants and foam inhibitors.

Their anti-wear additives provide excellent wear protection of critical engine parts.

A high level of dispersancy in Chevron Supreme Motor Oils protects against deposit and sludge formation in stop-and-go driving, sustained high temperature operation, and protects against corrosion.

Their excellent high temperature oxidation stability helps prevent viscosity increase and oil gelling in the crankcase. They help keep PCV systems clean to maintain smooth engine performance.

APPLICATIONS

Chevron Supreme Motor Oils are suitable for use in four-stroke gasoline engines used in passenger cars, light trucks, powerboats, motorcycles, and other mobile and stationary equipment. They are excellent for high-revving engines in small cars and light trucks. All grades are suitable for use in turbocharged engines. They may also be suitable for use in natural gas engines in small cars and light trucks after consulting with the appropriate original equipment manufacturer's lubrication recommendations.

SAE 5W-20 provides optimum fuel economy and durable performance. This synthetic blend engine oil, carrying the API Resource Conserving designation, is suitable for use in domestic and import passenger cars, trucks and SUVs specifying this viscosity grade.

SAE 5W-30 is recommended by the majority of later model domestic and import passenger cars, trucks and SUVs under a wider variety of weather conditions. This synthetic blend engine oil provides excellent cold weather performance and carries the API Resource Conserving designation.

SAE 10W-30 is suitable for use in many older vehicles and a few late model cars and trucks, often those with larger 6-cylinder and V-8 and/or high performance engines. SAE 10W-30 is also designated as a Resource Conserving lubricant by API.

SAE 10W-40 is still a very popular viscosity grade in warmer climates, though it is not recommended by most auto manufacturers for their late model North American vehicles. It is often used in older model cars that see regular high temperature operation.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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SAE 20W-50 is suitable primarily for older engines for use in high temperature and heavy duty operations such as towing heavy trailers at highway speeds or up inclines for long periods of time. It is commonly used in high performance engines for racing and rallying.

Chevron Supreme Motor Oils **SAE 30** and **SAE 40** can be used in engine applications where an SAE 30 or SAE 40 passenger car motor oil of API SN or any previous "S" category is recommended. They perform exceptionally well in small four-stroke engines found in lawn mowers, garden tractors, snow blowers, and in refrigeration or air-conditioning engines on trucks and buses.

Note: Always consult your owner's manual regarding viscosity grade for your application.

Chevron Supreme Motor Oils meet:

- **API Service Categories**
  - SN
  - SM, SL, SJ and all previous API "S" categories
  - Resource Conserving for API SN (SAE 5W-20, 5W-30, 10W-30)
  - ILSAC GF-5 (SAE 5W-20, 5W-30, 10W-30)
- **manufacturers' performance requirements**
  - **FCA US LLC** (formerly known as Chrysler Group LLC)
    MS-6395 (SAE 5W-20, 5W-30, 10W-30)
  - **FIAT**
    9.55535-CR-1 (SAE 5W-30)
  - **Ford**
    WSS-M2C945-A (SAE 5W-20)
    WSS-M2C946-A (SAE 5W-30)
  - **General Motors**
    GM 6094M (SAE 5W-20, 5W-30, 10W-30)

TYPICAL TEST DATA

SAE Grade	5W-20	5W-30	10W-30	10W-40
Product Number	*220135*	*220013*	*220155*	*220059*
SDS Number	*17483*	*17483*	*17483*	*6717*
API Gravity	32.4	32.6	30.5	30.4
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 49.3 8.4	 63.1 10.2	 68.4 10.3	 102.2 14.7
Viscosity, Cold Crank, °C/Poise	-30/60	-30/58	-25/62	-25/64
Viscosity Index	146	157	137	148
Flash Point, °C(°F)	> 200(392)	> 200(392)	> 200(392)	> 205(401)
Pour Point, °C(°F)	-36(-33)	-36(-33)	-36(-33)	-30(-22)
Sulfated Ash, wt %	0.9	0.9	0.9	0.9
Base Number, ASTM D2896	8.4	8.4	8.4	8.5
Phosphorus, wt %	0.076	0.076	0.076	0.077
Zinc, wt %	0.085	0.085	0.085	0.088

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

SAE Grade	20W-50	30	40
Product Number	*220060*	*220002*	*220011*
SDS Number	*6717*	*6717*	*6717*
API Gravity	29.0	29.3	28.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 157.8 17.3	 88.8 11.0	 127.1 13.8
Viscosity, Cold Crank, °C/Poise	-15/75	—	—
Viscosity Index	119	107	107
Flash Point, °C(°F)	> 205(401)	> 205(401)	> 205(401)
Pour Point, °C(°F)	-24(-11)	-30(-22)	-30(-22)
Sulfated Ash, wt %	0.9	0.9	0.9
Base Number, ASTM D2896	8.5	8.5	8.5
Phosphorus, wt %	0.077	0.077	0.077
Zinc, wt %	0.088	0.088	0.088

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TRANSMISSION AND TORQUE FLUIDS

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CHEVRON 1000 THF

PRODUCT DESCRIPTION

Chevron 1000 THF is a high quality, multifunctional tractor hydraulic fluid, specially formulated for use in transmissions, final drives, wet brakes, and hydraulic systems of tractors and other equipment employing a common fluid reservoir.

CUSTOMER BENEFITS

Chevron 1000 THF delivers value through:

- **Low operating costs** — Chevron 1000 THF meets or exceeds fluid performance requirements of most OEM's, maintaining efficiency and reliability while minimizing overall operating costs.
- **Long equipment life** — Special additives protect metal surfaces against scuffing and wear even under severe operating conditions leading to maximum equipment life.
- **Low inventory cost** — One fluid does the job of a full range of tractor hydraulic systems. Can replace multiple products and free up shelf space too!
- **Minimizing weather and storage concerns** — Protects against rust and corrosion of highly finished precision parts when operating in humid conditions and during seasonal shutdown periods.
- **Minimal downtime** — Good compatibility with seals, O-rings, and packing materials maintains their good condition and keeps leakage at a minimum.
- **Smooth operation** — Formulated to suppress brake "chatter" and transmission "slip" for quiet and efficient action of brakes and transmission.
- **Reliable operation** — Formulation helps keep metal parts clean and free of varnish and sludge deposits that could result in premature breakdown.
- **Fast service time** — Orange color helps identify origin point of incidental leaks for easy detection and quick remedy.

FEATURES

Chevron 1000 THF is a high quality, multifunctional tractor hydraulic fluid, specially formulated for use in transmissions, final drives, wet brakes, and hydraulic systems of tractors and other equipment employing a common fluid reservoir.

It is formulated with highly refined base stocks, a viscosity index improver, oxidation and corrosion inhibitors, antiwear and film strength additives, an antifoaming agent, and a pour point depressant.

Its distinctive orange color allows for easy product identification and leak detection.

Chevron 1000 THF meets the needs of modern tractors for a multi-functional lubricant. It is designed for many uses, such as lubrication of the transmission and final drive, and serves as a hydraulic fluid to operate power steering units, brakes, implements, and attachments.

Chevron 1000 THF is formulated to suppress brake "chatter" and excessive brake facing wear. It offers smooth operation of clutch packs and wet brakes, provides excellent shifting action, provides exceptional rust and corrosion protection for vital parts, and minimizes leakage because of good compatibility with seals, O-rings, and packing materials.

It helps prevent sludge and varnish formation, protects metal surfaces against scuffing and wear, and provides outstanding lubrication for spur, helical, and spiral bevel final drive gears.

Chevron 1000 THF is compatible with equipment manufacturer's proprietary fluids and other fluids of this type.

APPLICATIONS

Chevron 1000 THF is recommended for use:

- in ABB Dodge controlled start-up transmissions
- in non-hypoid API GL-4 applications.
- in Hitachi mid-sized wheel loader axle applications, transfer case and hydraulics

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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1 July 2016
TTF-3

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- as a multifunctional fluid in many types of farm tractors and equipment.
- in applications which call for the following OEM lubricant specifications:
  - — **AGCO** — improved power fluid 821XL
  - — **Case Corporation** — JIC-143, JIC-145, MS 1206, MS 1207, MS 1209, MS 1210 (TCH)
  - — **Case New Holland** — MAT 3525, MAT 3505
  - — **Caterpillar** TO-2
  - — **Ford New Holland** — ESN-M2C134-D, FNHA 2 C 201
  - — **International Harvester** B6
  - — **John Deere** — J20C
  - — **Kubota** UDT
  - — **Massey Ferguson** — M1135, M1141, M1143, M1145
  - — **Minneapolis-Moline** — Q-1766, Q-1722, Q-1766B
  - — **Oliver** — Q-1705
  - — **Renk Doromat** — 874A and 874B
  - — **Volvo** WB 101
  - — **White Farm Equipment** — Q-1826
  - — **ZF** — TE-ML 03E, TE-ML 05F, TE-ML 06K, TE-ML 17E, TE-ML 21F

Chevron 1000 THF is also an excellent hydraulic fluid for many types of hydraulic systems requiring an anti-wear hydraulic fluid in this viscosity range. It passes the High Pressure Vane Pump Test, ASTM D2882, with less than 15 mg steel weight loss.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

Product Number	*226606*
SDS/MSDS Number	
USA	*7648*
Colombia	*33702*
El Salvador	*33703*
API Gravity	29.9
Viscosity, Kinematic	
cSt at 40°C	58.4
cSt at 100°C	9.5
Viscosity, Saybolt	
SUS at 100°F	298
SUS at 210°F	58.3
Viscosity, Brookfield	
cP at -35°C	40,000
Viscosity Index	145
Flash Point, °C(°F)	235(455)
Pour Point, °C(°F)	-42(-44)
Color	Orange

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON 1000 THF ISOCLEAN® Certified Lubricant

PRODUCT DESCRIPTION

Chevron 1000 THF ISOCLEAN® Certified Lubricant is a high quality, multifunctional tractor hydraulic fluid, specially formulated for use in transmissions, final drives, wet brakes, and hydraulic systems of tractors and other equipment employing a common fluid reservoir. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Chevron 1000 THF ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Low operating costs** — Chevron 1000 THF meets or exceeds fluid performance requirements of most OEM's, maintaining efficiency and reliability while minimizing overall operating costs.
- **Long equipment life** — Special additives protect metal surfaces against scuffing and wear even under severe operating conditions leading to maximum equipment life.
- **Low inventory cost** — One fluid does the job of a full range of tractor hydraulic systems. Can replace multiple products and free up shelf space too!
- **Minimizing weather and storage concerns** — Protects against rust and corrosion of highly finished precision parts when operating in humid conditions and during seasonal shutdown periods.
- **Minimal downtime** — Good compatibility with seals, O-rings, and packing materials maintains their good condition and keeps leakage at a minimum.
- **Smooth operation** — Formulated to suppress brake "chatter" and transmission "slip" for quiet and efficient action of brakes and transmission.
- **Reliable operation** — Formulation helps keep metal parts clean and free of varnish and sludge deposits that could result in premature breakdown.
- **Fast service time** — Orange color helps identify origin point of incidental leaks for easy detection and quick remedy.

FEATURES

Chevron 1000 THF ISOCLEAN Certified Lubricant is a high quality, multifunctional tractor hydraulic fluid, specially formulated for use in transmissions, final drives, wet brakes, and hydraulic systems of tractors and other equipment employing a common fluid reservoir.

It is formulated with highly refined base stocks, a viscosity index improver, oxidation and corrosion inhibitors, antiwear and film strength additives, an antifoaming agent, and a pour point depressant.

Its distinctive orange color allows for easy product identification and leak detection.

Chevron 1000 THF ISOCLEAN Certified Lubricant meets the needs of modern tractors for a multi-functional lubricant. It is designed for many uses, such as lubrication of the transmission and final drive, and

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

1 July 2016
TTF-3 ISOCLEAN

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serves as a hydraulic fluid to operate power steering units, brakes, implements, and attachments.

Chevron 1000 THF ISOCLEAN® Certified Lubricant is formulated to suppress brake "chatter" and excessive brake facing wear. It offers smooth operation of clutch packs and wet brakes, provides excellent shifting action, provides exceptional rust and corrosion protection for vital parts, and minimizes leakage because of good compatibility with seals, O-rings, and packing materials.

It helps prevent sludge and varnish formation, protects metal surfaces against scuffing and wear, and provides outstanding lubrication for spur, helical, and spiral bevel final drive gears.

Chevron 1000 THF ISOCLEAN Certified Lubricant is compatible with equipment manufacturer's proprietary fluids and other fluids of this type.

APPLICATIONS

Chevron 1000 THF ISOCLEAN Certified Lubricant is recommended for use:

- in ABB Dodge controlled start-up transmissions
- in non-hypoid API GL-4 applications.
- in Hitachi mid-sized wheel loader axle applications, transfer case and hydraulics
- as a multifunctional fluid in many types of farm tractors and equipment.
- in applications which call for the following OEM lubricant specifications:
  - — **AGCO** — improved power fluid 821XL
  - — **Case Corporation** — JIC-143, JIC-145, MS 1206, MS 1207, MS 1209, MS 1210 (TCH)
  - — **Case New Holland** — MAT 3525, MAT 3505
  - — **Caterpillar** TO-2
  - — **Ford New Holland** — ESN-M2C134-D, FNHA 2 C 201
  - — **International Harvester** B6
  - — **John Deere** — J20C
  - — **Kubota** UDT
  - — **Massey Ferguson** — M1135, M1141, M1143, M1145
  - — **Minneapolis-Moline** — Q-1766, Q-1722, Q-1766B
  - — **Oliver** — Q-1705
  - — **Renk Doromat** — 874A and 874B
  - — **Volvo** WB 101
  - — **White Farm Equipment** — Q-1826
  - — **ZF** — TE-ML 03E, TE-ML 05F, TE-ML 06K, TE-ML 17E, TE-ML 21F

Chevron 1000 THF ISOCLEAN Certified Lubricant is also an excellent hydraulic fluid for many types of hydraulic systems requiring an anti-wear hydraulic fluid in this viscosity range. It passes the High Pressure Vane Pump Test, ASTM D2882, with less than 15 mg steel weight loss.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

Product Number	*278021*
SDS/MSDS Number	
USA	*7648*
Canada	*7468CAN*
Mexico	*7468MEX*
Colombia	*33702*
El Salvador	*33703*
API Gravity	29.9
Viscosity, Kinematic	
cSt at 40°C	58.4
cSt at 100°C	9.5
Viscosity, Saybolt	
SUS at 100°F	298
SUS at 210°F	58.3
Viscosity, Brookfield	
cP at -35°C	40,000
Viscosity Index	145
Flash Point, °C(°F)	235(455)
Pour Point, °C(°F)	-42(-44)
Color	Orange

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON ATF HD 389

PRODUCT DESCRIPTION

Chevron ATF HD 389 is designed for Allison on-highway, heavy-duty transmissions which require the TES-389 Schedule One ATF. It is also suitable for use in most pre-2006 automatic transmissions built by General Motors, Ford Motor Company and other makes which need a high-performance, multi-purpose, power transmission fluid.

CUSTOMER BENEFITS

Chevron ATF HD 389 delivers value through:

- **Protection** against the formation of lacquers, sludge, or other harmful deposits.
- **Exceptional stability** provided by high-quality base oil and oxidation inhibitors.
- **Compatibility with seals** — Especially effective in protecting fluoroelastomer seals used in Allison heavy-duty transmissions.
- **Fast circulation during cold weather** and excellent lubricating body when hot.
- **Easy identification** — Dyed red in color.

FEATURES

Chevron ATF HD 389 is formulated with Group II base stocks and additives that help provide oxidation and thermal stability, friction control, load-carrying ability, corrosion and wear protection. It helps protect against the formation of deposits, sludge, varnish, and foam.

Chevron ATF HD 389 provides outstanding durability.

Under the most severe operating conditions, Chevron ATF HD 389:

- maintains friction control for smooth shift action.
- protects against cracking of fluoroelastomer seals used in Allison transmissions.
- retains low temperature fluidity and high temperature stability for long operating periods.
- protects automatic transmission fluid coolers from corrosion.
- minimizes the chances of a transmission overhaul due to sludge, corrosion, and wear.

APPLICATIONS

Chevron ATF HD 389 is designed for Allison on-highway, heavy-duty transmissions which require the TES-389 Schedule One ATF. It is also suitable for use in most pre-2006 automatic transmissions built by General Motors, Ford Motor Company and other makes which need a high-performance, multi-purpose, power transmission fluid.

Chevron ATF HD 389 meets or exceeds the performance requirements of:

— **Allison** TES-389

Chevron ATF HD 389 is recommended for:

— **Allison** C-4 Fluid

— **Ford** MERCON®[1]

— **General Motors** DEXRON®[2]-III H

Allison transmissions manufactured in 2007 and beyond can use either a DEXRON-VI or TES-389 fluid. Allison models built in 2006 or earlier should use only a TES-389 fluid to ensure seal compatibility.

Chevron ATF HD 389 has the following qualifications:

	West	Central	East
Allison TES-389	AA-33902015	AA-33832015	AA-34052015

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

1 MERCON is a registered trademark of Ford Motor Company.
2 DEXRON is a registered trademark of General Motors LLC.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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Do not use in a breathing apparatus or medical equipment.

TYPICAL TEST DATA

SAE Grade	10W
Product Number	*226534*
SDS Number	*20495*
API Gravity	33.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 34.3 7.1
Viscosity, Brookfield cP at -40°C	 17,000
Viscosity Index	176
Flash Point, °C(°F)	206(403)
Pour Point, °C(°F)	-48(-54)
Color	Red

Minor variations in product typical test data are to be expected in normal manufacturing.

Chevron Automatic Transmission Fluid MD-3

Product Description

Formulated for applications that call for the former DEXRON®-III H, MERCON®, and Allison C-4 fluids.[1]

Customer Benefits

Chevron Automatic Transmission Fluid MD-3 delivers value through:

- **Protection** against the formation of lacquers, sludge, or other harmful deposits.
- **Exceptional stability** provided by excellent base oil and extra oxidation inhibitors.
- **Quiet performance** — Especially effective in minimizing transmission "chatter." Helps ensure smooth, quiet action at all speeds.
- **Fast circulation during cold weather** and excellent lubricating body when hot.

Features

Chevron Automatic Transmission Fluid MD-3 is a passenger car and light truck automatic transmission fluid for most pre-2006 automatic transmissions built by General Motors, Ford Motor Company and other makes requiring a high-performance, multi-purpose, power transmission fluid.

It is formulated with premium, severely hydroprocessed base stocks and additives that helps provide oxidation and thermal stability, friction control, load-carrying ability, corrosion and wear protection. It helps protect against the formation of deposits, sludge, varnish, and foam.

Chevron Automatic Transmission Fluid MD-3 helps provide outstanding durability.

Under severe operating conditions, this fluid:

- Maintains friction control for smooth shift action.
- Is specially formulated to help prevent shudder.
- Retains low temperature fluidity and high temperature stability for long operating periods.
- Protects automatic transmission fluid coolers from corrosion.
- Helps minimize the chances of a transmission overhaul due to sludge, corrosion, and wear.

Applications

Chevron Automatic Transmission Fluid MD-3 is designed for use in most pre-2006 automatic transmissions built by General Motors, Ford Motor Company and other makes requiring a high performance, multi-purpose, power transmission fluid. It is recommended for applications that call for the former DEXRON-III H, MERCON, and Allison C-4 fluids.

Always check your owners manual to determine the proper automatic transmission fluid for your transmission.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

1 DEXRON is a registered trademark of General Motors Corporation.
MERCON is a registered trademark of Ford Motor Company.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

Product Number	*226502*
SDS Number	*21*
API Gravity	33.4
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 34.1 7.0
Viscosity Index	171
Flash Point, °C(°F)	212(414)
Pour Point, °C(°F)	-50(-58)
Color	Red

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® SYN ATF HD

PRODUCT DESCRIPTON

"Delo. Let's go further.®"

Delo® Syn ATF HD is specially engineered for heavy duty automatic truck and bus transmissions operating in extended service. It is officially approved by Voith and ZF for extended drain intervals.

CUSTOMER BENEFITS

Delo Syn ATF HD delivers value through:

- **Extended drains** of up to six times that of a conventional automatic transmission fluid.
- **Protection** against the formation of lacquers, sludge, or other harmful deposits.
- **Exceptional stability** provided by excellent base oil and extra oxidation inhibitors.
- **Fast circulation during cold weather** and excellent lubricating qualities when hot.
- **Optimized friction characteristics** for smooth shifting and efficient power transfer.

FEATURES

Delo Syn ATF HD is designed for severe duty and extended drain intervals. It is recommended for any application that calls for the Allison TES-295®[1] and Allison TES-389™ performance levels. It has been field tested in several urban transit fleets with excellent results for drain intervals ranging from 50,000 to 100,000 miles.

It is manufactured from synthetic base oils and additives that help provide oxidation and thermal stability, friction control, load-carrying ability, corrosion and wear protection. It helps prevent the accumulation of deposits and the formation of sludge, varnish, and foam.

Delo Syn ATF HD has excellent low temperature flow properties and enhanced protection against viscosity breakdown.

Under the most severe operating conditions, this fluid:

- maintains friction control for smooth shift action.
- retains low temperature fluidity and high temperature stability for long operating periods.
- provides excellent antiwear protection.
- greatly extends the time to transmission overhauls due to sludge, corrosion, wear of clutches and bands, gears and bearings, leakage past seals, and loss of frictional properties compared to a conventional automatic transmission fluid.

APPLICATIONS

Delo® Syn ATF HD is specially engineered for heavy duty automatic truck and bus transmissions operating in extended service. It is officially approved by Voith and ZF for extended drain intervals. It is also approved for Volvo 97341 applications.

It is suitable for Allison TES-389 standard drain and Allison TES-295 extended drain service; however, it is not approved by Allison for these applications.

It is also an excellent choice for passenger cars and light trucks requiring General Motors DEXRON®-III,[2] as well as Ford MERCON®and MERCON® V,[3] especially for those vehicles in moderate to severe service. Examples of severe service applications include police cars,

1 TES-295 is a registered trademark and TES-389 is a trademark of Allison Transmission, Inc.

2 DEXRON is a registered trademark of General Motors LLC.

3 MERCON is a registered trademark of Ford Motor Company. Although Delo Syn ATF HD is suitable for use in transmissions that require MERCON and MERCON V fluids, this product is not officially licensed or approved by Ford for such applications and its use may void Ford's warranty. For applications that require a MERCON V licensed product, please use Chevron ATF MERCON V.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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taxicabs, pickup & delivery trucks, recreational vehicles, and tow trucks.

Delo Syn ATF HD has the following qualifications:

- **MAN** 339 V-2, 339 Z-2
- **Voith** H55.6336.XX
- **Volvo** 97341
- **ZF** TE-ML 03D, TE-ML 04D, TE-ML 14B, TE-ML 16L, TE-ML 17C, TE-ML 20B

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

TYPICAL TEST DATA

Product Number	*223040*
SDS Number	*35581*
API Gravity	35.2
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 35.3 7.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 179 51
Viscosity, Brookfield mPa.s at -40°C	 11,400
Viscosity Index	183
Flash Point, °C(°F)	216(421)
Pour Point, °C(°F)	-49(-56)
Color	Red
FZG Gear Wear Test, Failure Load Stage	 12

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® SYN ATF HD ISOCLEAN® CERTIFIED LUBRICANT

PRODUCT DESCRIPTON

"Delo. Let's go further.®"

Delo® Syn ATF HD ISOCLEAN® Certified Lubricant is specially engineered for heavy duty automatic truck and bus transmissions operating in extended service. It is officially approved by Voith and ZF for extended drain intervals. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo Syn ATF HD ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Extended drains** of up to six times that of a conventional automatic transmission fluid.
- **Protection** against the formation of lacquers, sludge, or other harmful deposits.
- **Exceptional stability** provided by excellent base oil and extra oxidation inhibitors.
- **Fast circulation during cold weather** and excellent lubricating qualities when hot.
- **Optimized friction characteristics** for smooth shifting and efficient power transfer.

FEATURES

Delo Syn ATF HD ISOCLEAN Certified Lubricant is designed for severe duty and extended drain intervals. It is recommended for any application that calls for the Allison TES-295®[1] and Allison TES-389™ performance levels. It has been field tested in several urban transit fleets with excellent results for drain intervals ranging from 50,000 to 100,000 miles.

It is manufactured from synthetic base oils and additives that help provide oxidation and thermal stability, friction control, load-carrying ability, corrosion and wear protection. It helps prevent the accumulation of deposits and the formation of sludge, varnish, and foam.

Delo Syn ATF HD ISOCLEAN Certified Lubricant has excellent low temperature flow properties and enhanced protection against viscosity breakdown.

Under the most severe operating conditions, this fluid:

- maintains friction control for smooth shift action.
- retains low temperature fluidity and high temperature stability for long operating periods.
- provides excellent antiwear protection.
- greatly extends the time to transmission overhauls due to sludge, corrosion, wear of clutches and bands, gears and bearings, leakage past seals, and loss of frictional properties compared to a conventional automatic transmission fluid.

1 TES-295 is a registered trademark and TES-389 is a trademark of Allison Transmission, Inc.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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APPLICATIONS

Delo® Syn ATF HD ISOCLEAN® Certified Lubricant is specially engineered for heavy duty automatic truck and bus transmissions operating in extended service. It is officially approved by Voith and ZF for extended drain intervals. It is also approved for Volvo 97341 applications.

It is suitable for Allison TES-389 standard drain and Allison TES-295 extended drain service; however, it is not approved by Allison for these applications.

It is also an excellent choice for passenger cars and light trucks requiring General Motors DEXRON®-III,[2] as well as Ford MERCON®and MERCON® V,[3] especially for those vehicles in moderate to severe service. Examples of severe service applications include police cars, taxicabs, pickup & delivery trucks, recreational vehicles, and tow trucks.

Delo Syn ATF HD ISOCLEAN Certified Lubricant has the following qualifications:

- **MAN** 339 V-2, 339 Z-2
- **Voith** H55.6336.XX
- **Volvo** 97341
- **ZF** TE-ML 03D, TE-ML 04D, TE-ML 14B, TE-ML 16L, TE-ML 17C, TE-ML 20B

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

Product Number	*223081*
SDS Number	*35581*
API Gravity	35.2
Viscosity, Kinematic mm²/s at 40°C mm²/s at 100°C	 35.3 7.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 179 51
Viscosity, Brookfield mPa.s at -40°C	 11,400
Viscosity Index	183
Flash Point, °C(°F)	216(421)
Pour Point, °C(°F)	-49(-56)
Color	Red
FZG Gear Wear Test, Failure Load Stage	 12

Minor variations in product typical test data are to be expected in normal manufacturing.

2 DEXRON is a registered trademark of General Motors LLC.

3 MERCON is a registered trademark of Ford Motor Company. Although Delo Syn ATF HD ISOCLEAN Certified Lubricant is suitable for use in transmissions that require MERCON and MERCON V fluids, this product is not officially licensed or approved by Ford for such applications and its use may void Ford's warranty. For applications that require a MERCON V licensed product, please use Chevron ATF MERCON V.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® SYN-AMT XDT

SAE 75W-90

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® Syn-AMT XDT is a heavy duty truck synthetic automated manual transmission (AMT) fluid specially formulated for extended drain and severe service operations, and recommended for both factory and service fill of Daimler DT-12 Automated Manual Transmissions installed on most Freightliner or Western Star trucks that have DD15 or DD13 diesel engines.

CUSTOMER BENEFITS

Delo Syn-AMT XDT delivers value through:

- **Extended drain capabilities** — Provides on-highway drain intervals of up to 300,000 miles[1] in on-highway Daimler DT-12 Heavy Duty automated manual transmissions (AMT).
- **Extended transmission warranty coverage** — Delo Syn-AMT XDT SAE 75W-90 is approved for use in maintaining Daimler's 750,000 extended warranty coverage for DT-12 transmissions when used for either top-off or service fill.
- **Extreme pressure protection** — Helps protect against transmission gear scuffing, pitting and adhesive wear, even at this lower viscosity level, allowing for excellent parts protection.
- **Superb thermal and oxidation stability** — Formulated for high temperature performance and excellent oxidation resistance to protect against sludge, varnish, lacquer and harmful deposit buildup in critical transmission components.
- **High viscosity index and low pour point** — Excellent low temperature performance allowing for rapid circulation of the fluid for easier start up and reduced stress on the transmission components.
- **Wide seal compatibility** — Compatible with a wide range of seal elastomers helping to prevent seal deterioration and fluid loss.
- **Excellent shear stability** — Robust viscosity retention, which contributes to system protection throughout the fluid's service life.
- **Fuel economy performance** — Provides up to 2% fuel economy savings, compared to higher viscosity full synthetic SAE 50 transmission lubricants to help minimize vehicle operating costs.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drivetrain that covers lubricant-related damage to your equipment, including parts and labor.[2] Includes problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Helps maximize the bottom line business results of trucking industry professionals.

FEATURES

Delo Syn-AMT XDT SAE 75W-90 is a premium, heavy duty transmission fluid engineered to provide excellent fluid shear stability and superb frictional characteristics to promote smooth, easy shifting. The high performance additives allow for excellent resistance to rust and corrosion, and are compatible with various types of ferrous and yellow metals.

1 When extending oil drains, always follow OEM recommendations and utilize used oil analysis.

2 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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APPLICATIONS

Delo Syn-AMT XDT SAE 75W-90 is recommended for factory and service fill for Daimler DT-12 automated manual transmissions when operating under severe conditions and in extremely cold or hot environments.

Delo Syn-AMT XDT SAE 75W-90 meets or exceeds the performance requirements of **API Service Category GL-4**.

TYPICAL TEST DATA

SAE Grade	**75W-90**
Product Number	*223078*
SDS Number *U.S.* *Canada* *Mexico*	 *41488* *41489* *42092*
API Gravity	0.849
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 96.5 14.5
Viscosity Index	158
Flash Point, PM, °C(°F)	215(419)
Pour Point, °C(°F)	-51(-60)

Minor variations in product typical test data are to be expected in normal manufacturing.

Delo Syn-AMT XDT SAE 75W-90 is approved for:

- **Daimler MB-Approval** 235.11
- **MAN** 341 Type MB

Delo Syn-AMT XDT SAE 75W-90 is recommended for:

- **ZF TE-ML 08**

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® SYN-TRANS HD

SAE 50

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® Syn-Trans HD is a heavy duty truck manual transmission fluid recommended for service fill of heavy duty manual transmissions, such as those manufactured by **Eaton, Meritor**, and **Mack**.

CUSTOMER BENEFITS

Delo Syn-Trans HD delivers value through:

- **Extended drain capabilities** — Proven field performance for on-highway drain intervals of 500,000 miles and greater.
- **Excellent thermal and oxidation stability** — The synthetic hydrocarbon base oil used in this product provides outstanding stability.
- **A high viscosity index and low pour point** — The performance of the synthetic hydrocarbon base stock provides extremely broad operating temperature ranges when compared with conventional mineral oil based lubricants.
- **Protection against gear wear and copper corrosion** — The unique additive package can protect gears without using the "active sulfur" agents commonly found in automotive axle oils. This results in little to no corrosion and long life for copper-containing parts, such as oil coolers, bushings, and thrust washers.

FEATURES

Delo Syn-Trans HD is a heavy duty truck manual transmission fluid.

It is manufactured from synthesized hydrocarbon base fluids which have excellent thermal and oxidation stability, a high natural viscosity index, and a low pour point.

Delo Syn-Trans HD's outstanding low temperature flow properties and natural high viscosity index provides exceptional all-climate, year-round performance in heavy duty truck transmissions. Its use permits easy shifting in extremely cold weather and minimal drag and gear wear during startup.

APPLICATIONS

Delo Syn-Trans HD is recommended for service fill of heavy duty manual transmissions, such as those manufactured by **Eaton**, **Meritor,** and **Mack**.

This product is not recommended for use as an engine crankcase oil.

Delo Syn-Trans HD

- meets the performance requirements of:
  - **API Service Category** MT-1
  - **Meritor** O-81

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

SAE Grade	**50**
Product Number	*223039*
SDS Number	*35590*
API Gravity	32.5
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 141 18.3
Viscosity Index	144
Flash Point, °C(°F)	136(277)
Pour Point, °C(°F)	-42(-44)
FZG Scuff Test, Passing Load Stage	12
ASTM D1500 Color	1.5 (light pale)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® SYN-TRANS XV
SAE 75W-80

PRODUCT DESCRIPTION

Delo® Syn-Trans XV SAE 75W-80 is a premium full synthetic, heavy duty, automated manual transmission fluid formulated specifically for Volvo iShift and Mack *m*Drive® transmissions.

CUSTOMER BENEFITS

"Delo. Let's go further.®"

Delo Syn-Trans XV SAE 75W-80 delivers exceptional value through:

- **Extended drain capabilities** — Provides extended life service up to 500,000 miles in Volvo and Mack automated manual transmissions.
- **Extreme pressure protection** — Protects against transmission gear scuffing, pitting and adhesive wear even at a lower viscosity level allowing for excellent parts protection.
- **Superb thermal and oxidation stability** — Formulated for high temperature performance and excellent oxidation resistance to protect against sludge, varnish, lacquer and harmful deposit buildup in critical transmission components.
- **High viscosity index and low pour point** — Excellent low temperature performance allowing for rapid circulation of the fluid for easier start up and reduced stress on the transmission components.
- **Wide seal compatibility** — This product is compatible with a wide range of seal elastomers helping to prevent seal deterioration and fluid loss.
- **Excellent shear stability** — Contributes to robust viscosity retention and system protection throughout fluid service life.
- **Fuel economy performance** — Provides fuel economy savings compared to more viscous full synthetic SAE 50 and SAE 75W-90 transmission lubricants to help minimize vehicle operating costs.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drivetrain that covers lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Maximizes the bottom line business results of trucking industry professionals.

FEATURES

Delo Syn-Trans XV SAE 75W-80 is a premium heavy duty, automated manual transmission fluid engineered to provide excellent fluid shear stability and superb frictional characteristics to promote smooth, easy shifting. The high performance additives allow for excellent resistance to rust and corrosion and are compatible with various types of ferrous and yellow metals.

APPLICATIONS

Delo Syn-Trans XV SAE 75W-80 is recommended for use in heavy duty on-road automated manual transmissions when operating under severe conditions and in extremely cold or hot environments. Delo Syn-Trans XV meets and exceeds the requirements of API Service Categories GL-4. In addition, it is approved against:

- **MAN** 341 Type E4
- **Volvo** 97305, 97307, 97318

These approvals allow the use of Delo Syn-Trans XV SAE 75W-80 at extended drain intervals and for use in top-off applications without loss of manufacturer's warranty for these specific transmissions.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

SAE Grade	75W-80
Product Number	*223080*
SDS Number	*35726*
API Gravity	35.6
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 54.1 9.17
Viscosity, Brookfield cP at -26°C cP at -40°C	 3,670 19,300
Viscosity Index	151
Flash Point, °C(°F)	244(471)
Pour Point, °C(°F)	-54(-65)

Minor variations in product typical test data are to be expected in normal manufacturing.

DELO® SYN-TRANS XE

SAE 75W-90

(Replaces Delo® Syn-Trans XE SAE 50)

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® Syn-Trans XE is a heavy duty truck synthetic automated manual transmission (AMT) fluid specially formulated for extended drain and severe service operations, and recommended for both factory and service fill of Eaton Ultra Shift Automated Manual Transmissions utilized by the main North American Truck Manufacturers when coupled with Cummins, PACCAR MX or Navistar diesel engines.

CUSTOMER BENEFITS

Delo Syn-Trans XE delivers value through:

- **Extended drain capabilities** — Provides on-highway drain intervals of 500,000 miles in on-highway Eaton medium and heavy duty transmissions, including automated manual transmissions (AMT), and 500,000 miles for older model Eaton Heavy Duty Manual Transmissions.
- **Extreme pressure protection** — Protects against transmission gear scuffing, pitting and adhesive wear, even at this lower viscosity level, allowing for excellent parts protection.
- **Superb thermal and oxidation stability** — Formulated for high temperature performance and excellent oxidation resistance to protect against sludge, varnish, lacquer and harmful deposit buildup in critical transmission components.
- **High viscosity index and low pour point** — Excellent low temperature performance allowing for rapid circulation of the fluid for easier start up and reduced stress on the transmission components.
- **Wide seal compatibility** — Compatible with a wide range of seal elastomers helping to prevent seal deterioration and fluid loss.
- **Excellent shear stability** — Robust viscosity retention, which contributes to system protection throughout the fluid's service life.
- **Fuel economy performance** — Provides up to 2% fuel economy savings, compared to higher viscosity full synthetic SAE 50 transmission lubricants (PS 164, rev 7 type fluids), to help minimize vehicle operating costs.
- **Warranty plus protection** — Bumper-to-bumper warranty protection from the engine to the drivetrain that covers lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Maximizes the bottom line business results of trucking industry professionals.

1. See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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FEATURES

Delo® Syn-Trans XE SAE 75W-90 is a premium, heavy duty transmission fluid engineered to provide excellent fluid shear stability and superb frictional characteristics to promote smooth, easy shifting. The high performance additives allow for excellent resistance to rust and corrossion, and are compatible with various types of ferrous and yellow metals.

APPLICATIONS

Delo Syn-Trans XE SAE 75W-90 is recommended for factory and service fill for Eaton heavy duty on-road automated manual transmissions when operating under severe conditions and in extremely cold or hot environments. It has also been formulated for use in older generation Eaton manual transmissions that require PS-164, rev 7 performance to allow for consolidated use at truck workshops.

Delo Syn-Trans XE SAE 75W-90 should not be used in axles as it is designed for AMT transmissions and has friction modifiers, which do not work well in axle lubrication.

Delo Syn-Trans XE SAE 75W-90 meets or exceeds the performance requirements of:

- **API Service Category MT-1**

Delo Syn-Trans XE SAE 75W-90 is approved for:

- **Eaton** PS-386

Delo Syn-Trans XE SAE 75W-90 is recommended for use in:

- **Eaton** PS-164, rev 7
- **Mack** TO-A PLUS
- **Meritor** O-81
- **Navistar** MPAPS B-6816
- **Volvo** 97305
- **ZF Freedomline**

TYPICAL TEST DATA

SAE Grade	75W-90
Product Number	*223079*
SDS Number	*39693*
API Gravity	34.9
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 95.1 14.8
Viscosity Index	163
Flash Point, °C(°F)	238(460)
Pour Point, °C(°F)	-42(-43)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® TORQFORCE®

SAE 10W, 30, 50, 60

PRODUCT DESCRIPTION

Delo® TorqForce® products are high performance lubricants designed for use in transmissions, final drives, and hydraulic systems in Allison, Caterpillar, Dana Powershift, Komatsu, Komatsu Dresser, Tremec / TTC, Vickers and ZF equipment.

CUSTOMER BENEFITS

Delo TorqForce products deliver value through:

- **Long equipment life** — Special additives help protect metal surfaces against scuffing and wear even under severe operating conditions of high temperature and high load.
- **Smooth operation** — Excellent frictional control helps prevent clutch slippage and offers quiet and efficient action of transmission and brakes while minimizing wear.
- **Minimal downtime** — Good compatibility with seals, O-rings, and packing materials maintains their good condition and keeps leakage at a minimum.
- **Improved filterability** — Delo TorqForce is formulated with special additive chemistry that allows for ultra-fine filtration which provides exceptional fluid cleanliness and equipment reliability performance.
- **Long oil life** — Outstanding ability of the base stock to withstand oxidation at high operating temperatures results in maximum service life for the oil.
- **Reliable operation** — Formulated to keep metal parts clean and free of varnish and sludge deposits that could result in premature breakdown.
- **Minimizing weather and storage concerns** — Protects against rust and corrosion of highly finished precision parts when operating in humid conditions and during seasonal shutdown periods.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.

FEATURES

Delo TorqForce products are high performance lubricants designed for use in transmissions, final drives, and hydraulic systems requiring a fluid meeting Caterpillar TO-4 or Allison C-4 requirements. They are also recommended for transmission and hydraulic systems manufactured by Dana Powershift, Komatsu, Komatsu Dresser, Tremec/TTC, Vickers and ZF.

They are manufactured using highly refined base oils, detergents, dispersants, oxidation and corrosion inhibitors, antiwear and extreme pressure agents, and a foam suppressant.

Delo TorqForce products are designed for both newly developed and older model drive train components.

They offer excellent friction retention, wear control, seal compatibility, oxidation stability, and viscosity stability.

The frictional characteristics of the fluid are retained over the life of the lubricant.

Delo TorqForce products are formulated to help protect against wear, even in severe service conditions and under high loads. They help protect precision parts against wear under high load conditions by controlling the formation of corrosion, varnish, and sludge.

Delo TorqForce products are compatible with new and traditional seal and clutch materials.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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APPLICATIONS

Delo® TorqForce® products are recommended for use in Caterpillar, Komatsu, transmissions, final drives, and wet brakes, and in Allison, Dana Powershift, Tremec/ TTC, Vickers and ZF transmissions, torque converters, and hydraulic systems.

Under normal ambient temperatures, **hydraulic systems will use the SAE 10W** viscosity grade. SAE 10W and 30 are recommended for mobile hydraulic systems where operating requirements are severe.

Transmissions will use the SAE 30 viscosity grade. Delo TorqForce products are also recommended for heavy duty off highway automatic transmissions requiring an SAE 10W, 30, 50 or 60 fluid.

Final drives will use the SAE 50 viscosity grade at normal temperatures and SAE 60 at high ambient temperatures.

In order to meet Caterpillar specifications, Delo TorqForce products are not friction modified. Thus, they are not recommended for equipment made by other OEMs who require friction modified fluids in order to assure smooth and quiet brake operation. For example, many farm tractor OEMs require fluids such as Chevron 1000 THF in order to eliminate brake noise.

Delo TorqForce products are approved for:

- **ZF** TE-ML 03C (SAE 10W, 30)
- **ZF** TE-ML 07F (SAE 30)

Delo TorqForce products meet:

- requirements of **Allison** C-4 (SAE 10W, 30)
- service requirements of **Caterpillar** TO-4

Delo TorqForce products are recommended for:

- **Dana Powershift** (SAE 10W, 30)
- **Komatsu** KES 07.868.1
- **Komatsu Dresser**
- **Tremec/TTC**
- **Vickers** 35VQ25 (SAE 10W, 30)

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

SAE Grade	10W	30	50	60
Product Number	*293105*	*293106*	*293107*	*293108*
SDS/MSDS Number				
USA	*38351*	*38351*	*38351*	*38351*
Colombia	*38355*	*38355*	*38355*	*38355*
El Salvador	*39331*	*39331*	*39331*	—
API Gravity	30.0	28.7	26.5	25.0
Viscosity, Kinematic				
cSt at 40°C	43.8	87.5	199	319
cSt at 100°C	6.8	10.9	18.5	25.0
Viscosity, Cold Crank, °C/Poise	-25/60	—	—	—
Viscosity Index	110	110	103	101
Flash Point, °C(°F)	238(460)	266(511)	266(511)	266(511)
Pour Point, °C(°F)	-33(-27)	-27(-17)	-27(-17)	-15(+5)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® TORQFORCE® ISOCLEAN® CERTIFIED LUBRICANT

SAE 10W, 30, 50, 60

PRODUCT DESCRIPTION

Delo® TorqForce® ISOCLEAN® Certified Lubricants are high performance lubricants designed for use in transmissions, final drives, and hydraulic systems in Allison, Caterpillar, Dana Powershift, Komatsu, Komatsu Dresser, Tremec /TTC, Vickers and ZF equipment. Chevron ISOCLEAN Certified Lubricants, which have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo TorqForce ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Long equipment life** — Special additives help protect metal surfaces against scuffing and wear even under severe operating conditions of high temperature and high load.
- **Smooth operation** — Excellent frictional control helps prevent clutch slippage and offers quiet and efficient action of transmission and brakes while minimizing wear.
- **Minimal downtime** — Good compatibility with seals, O-rings, and packing materials maintains their good condition and keeps leakage at a minimum.
- **Improved filterability** — Delo TorqForce ISOCLEAN Certified Lubricant is formulated with special additive chemistry that allows for ultra-fine filtration which provides exceptional fluid cleanliness and equipment reliability performance. Delo TorqForce ISOCLEAN Certified Lubricants can achieve cleanliness levels down to 18/16/13 and potentially cleaner with appropriate Chevron approved ISOCLEAN Programs.
- **Long oil life** — Outstanding ability of the base stock to withstand oxidation at high operating temperatures results in maximum service life for the oil.
- **Reliable operation** — Formulated to keep metal parts clean and free of varnish and sludge deposits that could result in premature breakdown.
- **Minimizing weather and storage concerns** — Protects against rust and corrosion of highly finished precision parts when operating in humid conditions and during seasonal shutdown periods.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TTF-31 ISOCLEAN

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FEATURES

Delo® TorqForce® ISOCLEAN® Certified Lubricants are high performance lubricants designed for use in transmissions, final drives, and hydraulic systems requiring a fluid meeting Caterpillar TO-4 or Allison C-4 requirements. They are also recommended for transmission and hydraulic systems manufactured by Dana Powershift, Komatsu, Komatsu Dresser, Tremec/TTC, Vickers and ZF.

They are manufactured using highly refined base oils, detergents, dispersants, oxidation and corrosion inhibitors, antiwear and extreme pressure agents, and a foam suppressant.

Delo TorqForce ISOCLEAN Certified Lubricants are designed for both newly developed and older model drive train components.

They offer excellent friction retention, wear control, seal compatibility, oxidation stability, and viscosity stability.

The frictional characteristics of the fluid are retained over the life of the lubricant.

Delo TorqForce ISOCLEAN Certified Lubricants are formulated to help protect against wear, even in severe service conditions and under high loads. They help protect precision parts against wear under high load conditions by controlling the formation of corrosion, varnish, and sludge.

Delo TorqForce ISOCLEAN Certified Lubricants are compatible with new and traditional seal and clutch materials.

APPLICATIONS

Delo TorqForce ISOCLEAN Certified Lubricants are recommended for use in Caterpillar, Komatsu, transmissions, final drives, and wet brakes, and in Allison, Dana Powershift, Tremec/TTC, Vickers and ZF transmissions, torque converters, and hydraulic systems.

Under normal ambient temperatures, **hydraulic systems will use the SAE 10W** viscosity grade. SAE 10W and 30 are recommended for mobile hydraulic systems where operating requirements are severe.

Transmissions will use the SAE 30 viscosity grade. Delo TorqForce ISOCLEAN Certified Lubricants are also recommended for heavy duty off highway automatic transmissions requiring an SAE 10W, 30, 50 or 60 fluid.

Final drives will use the SAE 50 viscosity grade at normal temperatures.

In order to meet Caterpillar specifications, Delo TorqForce products are not friction modified. Thus, they are not recommended for equipment made by other OEMs who require friction modified fluids in order to assure smooth and quiet brake operation. For example, many farm tractor OEMs require fluids such as Chevron 1000 THF in order to eliminate brake noise.

Delo TorqForce ISOCLEAN Certified Lubricants are approved for:

- **ZF** TE-ML 03C (SAE 10W, 30)
- **ZF** TE-ML 07F (SAE 30)

Delo TorqForce ISOCLEAN Certified Lubricants meet:

- requirements of **Allison** C-4 (SAE 10W, 30)
- service requirements of **Caterpillar** TO-4

Delo TorqForce ISOCLEAN Certified Lubricants are recommended for:

- **Dana Powershift** (SAE 10W, 30)
- **Komatsu** KES 07.868.1
- **Komatsu Dresser**
- **Tremec/TTC**
- **Vickers** 35VQ25 (SAE 10W, 30)

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

SAE Grade	10W	30	50	60
Product Number	*254602*	*254603*	*254601*	*254604*
SDS/MSDS Number				
USA	*38351*	*38351*	*38351*	*41329*
Canada	*38352*	*38352*	*38352*	*41342*
Mexico	*38353*	*38353*	*38353*	*41341*
API Gravity	30.0	28.7	26.5	25.0
Viscosity, Kinematic				
cSt at 40°C	43.8	87.5	199	319
cSt at 100°C	6.8	10.9	18.5	25.0
Viscosity, Cold Crank, °C/Poise	-25/60	—	—	—
Viscosity Index	110	110	103	101
Flash Point, °C(°F)	238(460)	266(511)	266(511)	266(511)
Pour Point, °C(°F)	-33(-27)	-27(-17)	-27(-17)	-15(+5)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® TORQFORCE® MP

PRODUCT DESCRIPTION

Delo® TorqForce® MP is a multipurpose lubricant designed for use in transmissions, wet brakes, and hydraulic systems requiring a fluid meeting Caterpillar TO-4 or TO-4M requirements. It can also be used in Komatsu equipment for hydraulic and transmission requirements in cold climate operations.

CUSTOMER BENEFITS

Delo TorqForce MP delivers value through:

- **Low operational cost** — Excellent performance in a wide range of ambient and operating temperatures. Provides optimum low temperature transmission, wet-brake, and hydraulic responsiveness — helping to minimize seasonal oil changes and operational costs.
- **Smooth operation** — Excellent frictional control helps prevent clutch slippage; formulated for quiet and efficient action of transmission and brakes while minimizing wear.
- **Improved filterability** — Delo TorqForce MP is formulated with special additive chemistry that allows for ultra-fine filtration which provides exceptional fluid cleanliness and equipment reliability performance.
- **Long oil life** — Outstanding ability of the base stock to withstand oxidation at high operating temperatures results in maximum service life for the oil.
- **Cold weather performance** — Very good cold weather pumpability for transmission and hydraulic components that operate in cold climates and need improved flow capability to keep key parts lubricated.
- **Low inventory cost** — One fluid does the job of a full range of mobile hydraulic systems. Can replace multiple products and free up shelf space too!
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.

FEATURES

Delo TorqForce MP is a high performance lubricant designed for use in transmissions, final drives, and hydraulic systems requiring a fluid meeting Caterpillar TO-4 or TO-4M, or Allison C-4 requirements. It is also recommended for transmission and hydraulic systems manufactured by Dana Powershift, Komatsu, Komatsu Dresser, Tremec/TTC, Vickers and ZF.

Delo TorqForce MP is manufactured using a unique blend of base stocks and additive technology. As a result, this product provides both excellent low temperature pumpability and high temperature film thickness.

The fluid is designed for both newly developed and older model drive train components.

Delo TorqForce MP is compatible with new and traditional seal and clutch materials. The frictional characteristics of the fluid are retained over the life of the lubricant. Components are protected from wear, even in severe service and under high loads. It helps protect precision parts against wear under high load conditions by controlling the formation of corrosion, varnish, and sludge.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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APPLICATIONS

Delo® TorqForce® MP is recommended for:

- Allison, Caterpillar, Dana Powershift, Komatsu and Vickers transmissions, wet brakes, torque converters, and hydraulic systems requiring a fluid meeting Caterpillar TO-4/TO-4M or Komatsu requirements
- Lightly loaded final drives — making inventory consolidation possible
- Heavy duty off highway automatic transmissions

Delo TorqForce MP is not recommended for use in combined farm tractor hydraulic and transmission systems where low brake chatter is a requirement.

Delo TorqForce MP meets:

- service requirements **Caterpillar** TO-4 and TO-4M

Delo TorqForce MP is recommended for:

- **Dana Powershift**
- **Komatsu** KES 07.868.1
- **Komatsu Dresser**
- **Tremec/TTC**
- **Vickers** 35VQ25
- **ZF** TE-ML-03C

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

Product Number	*293110*
SDS Number	*38357*
API Gravity	30.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 113 14.3
Viscosity Index	129
Flash Point, °C(°F)	270(518)
Pour Point, °C(°F)	-36(-33)
Mini-Rotary Viscometer cP at -20°C cP at -30°C	 7000 43,000

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® TORQFORCE® MP ISOCLEAN® CERTIFIED LUBRICANT

PRODUCT DESCRIPTION

Delo® TorqForce® MP ISOCLEAN® Certified Lubricant is a multipurpose lubricant designed for use in transmissions, wet brakes, and hydraulic systems requiring a fluid meeting Caterpillar TO-4 or TO-4M requirements. It can also be used in Komatsu equipment for hydraulic and transmission requirements in cold climate operations. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo TorqForce MP ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Low operational cost** — Excellent performance in a wide range of ambient and operating temperatures. Provides optimum low temperature transmission, wet-brake, and hydraulic responsiveness — helping to minimize seasonal oil changes and operational costs.
- **Smooth operation** — Excellent frictional control helps prevent clutch slippage; formulated for quiet and efficient action of transmission and brakes while minimizing wear.
- **Improved filterability** — Delo TorqForce MP ISOCLEAN Certified Lubricant is formulated with special additive chemistry that allows for ultra-fine filtration which provides exceptional fluid cleanliness and equipment reliability performance. Delo TorqForce MP ISOCLEAN Certified Lubricant can achieve cleanliness levels down to 18/16/13 and potentially cleaner with appropriate Chevron approved ISOCLEAN Programs.
- **Long oil life** — Outstanding ability of the base stock to withstand oxidation at high operating temperatures results in maximum service life for the oil.
- **Cold weather performance** — Very good cold weather pumpability for transmission and hydraulic components that operate in cold climates and need improved flow capability to keep key parts lubricated.
- **Low inventory cost** — One fluid does the job of a full range of mobile hydraulic systems. Can replace multiple products and free up shelf space too!
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TTF-32 ISOCLEAN

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FEATURES

Delo® TorqForce® MP ISOCLEAN® Certified Lubricant is a high performance lubricant designed for use in transmissions, final drives, and hydraulic systems requiring a fluid meeting Caterpillar TO-4 or TO-4M, or Allison C-4 requirements. It is also recommended for transmission and hydraulic systems manufactured by Dana Powershift, Komatsu, Komatsu Dresser, Tremec/TTC, Vickers and ZF.

Delo TorqForce MP ISOCLEAN Certified Lubricant is manufactured using a unique blend of base stocks and additive technology. As a result, this product provides both excellent low temperature pumpability and high temperature film thickness.

The fluid is designed for both newly developed and older model drive train components.

Delo TorqForce MP ISOCLEAN Certified Lubricant is compatible with new and traditional seal and clutch materials. The frictional characteristics of the fluid are retained over the life of the lubricant. Components are protected from wear, even in severe service and under high loads. It helps protect precision parts against wear under high load conditions by controlling the formation of corrosion, varnish, and sludge.

APPLICATIONS

Delo TorqForce MP ISOCLEAN Certified Lubricant is recommended for:

- Allison, Caterpillar, Dana Powershift, Komatsu and Vickers transmissions, wet brakes, torque converters, and hydraulic systems requiring a fluid meeting Caterpillar TO-4/TO-4M or Komatsu requirements
- Lightly loaded final drives — making inventory consolidation possible
- Heavy duty off highway automatic transmissions

Delo TorqForce MP ISOCLEAN Certified Lubricant is not recommended for use in combined farm tractor hydraulic and transmission systems where low brake chatter is a requirement.

Delo TorqForce MP ISOCLEAN Certified Lubricant meets:

- service requirements **Caterpillar** TO-4 and TO-4M

Delo TorqForce MP ISOCLEAN Certified Lubricant is recommended for:

- **Dana Powershift**
- **Komatsu** KES 07.868.1
- **Komatsu Dresser**
- **Tremec/TTC**
- **Vickers** 35VQ25
- **ZF** TE-ML-03C

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN® Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

Product Number	*254605*
SDS/MSDS Number	
USA	*38357*
Canada	*38358*
Mexico	*38359*
API Gravity	30.8
Viscosity, Kinematic	
cSt at 40°C	113
cSt at 100°C	14.3
Viscosity Index	129
Flash Point, °C(°F)	270(518)
Pour Point, °C(°F)	-36(-33)
Mini-Rotary Viscometer	
cP at -20°C	7000
cP at -30°C	43,000

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® TORQFORCE® SYN
SAE 5W-20

PRODUCT DESCRIPTION

Delo® TorqForce® Syn SAE 5W-20 is a high performance fully synthetic lubricant designed for use in transmissions and hydraulic systems.

CUSTOMER BENEFITS

Delo TorqForce Syn SAE 5W-20 delivers value through:

- **Long equipment life** — Special additives protect metal surfaces against scuffing and wear even under operating conditions of high temperature and high load.
- **Smooth operation** — Excellent frictional control helps prevent clutch slippage and assures quiet and efficient action of transmission and brakes while minimizing wear.
- **Extreme temperature performance** — Excellent cold weather pumpability in sub-zero/ arctic operating conditions. Very good high operating temperature performance for severe service applications.
- **Improved filterability** — Delo TorqForce Syn SAE 5W-20 is formulated with special additive chemistry that allows for ultra-fine filtration which provides exceptional fluid cleanliness and equipment reliability performance.
- **Minimal downtime** — Good compatibility with seals, O-rings, and packing materials maintains their good condition and keeps leakage at a minimum.
- **Long oil life** — Outstanding ability of the synthetic base stock to withstand oxidation at high operating temperatures resulting in long service life for the oil.
- **Reliable operation** — Formulation helps keep metal parts clean and free of varnish and sludge deposits that could result in premature breakdown.
- **Minimizing weather and storage concerns** — Protects against rust and corrosion of highly finished precision parts when operating in humid conditions and during seasonal shutdown periods.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.

FEATURES

Delo TorqForce Syn SAE 5W-20 is a high performance lubricant designed for use in transmissions and hydraulic systems operating in arctic conditions and requiring a fluid meeting Caterpillar TO-4 or Allison C-4 requirements. It is also recommended for transmission and hydraulic systems manufactured by Dana Powershift, Komatsu, Komatsu Dresser, Tremec/ TTC, Vickers and ZF.

Delo TorqForce Syn SAE 5W-20 is manufactured using fully synthetic base oils, detergents, dispersants, oxidation and corrosion inhibitors, anti-wear and extreme pressure agents, and a foam suppressant.

Delo TorqForce Syn SAE 5W-20 offers excellent friction retention, wear control, seal compatibility, oxidation stability, and viscosity stability. The frictional characteristics of the fluid are retained over the life of the lubricant.

Components are protected from wear, even under high load conditions by controlling the formation of corrosion, varnish, and sludge.

Delo® TorqForce Syn SAE 5W-20 is designed for both newly developed and older model drive train components. Delo TorqForce Syn SAE 5W-20 provides

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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high performance throughout the seasons, maintaining optimal stability in a wide range of ambient temperatures.

APPLICATIONS

Delo® TorqForce® Syn SAE 5W-20 is recommended for use in **Allison, Caterpillar, Dana Powershift, Komatsu, Tremec/TTC, Vickers** and **ZF** transmissions, wet brakes, and hydraulic systems operating in arctic conditions.

Delo TorqForce Syn SAE 5W-20 is not recommended for use in combined farm tractor hydraulic and transmission systems where low brake chatter is a requirement.

Delo TorqForce Syn SAE 5W-20 meets:

- service requirements of **Caterpillar** TO-4

Delo TorqForce Syn SAE 5W-20 is recommended for:

- **Dana Powershift**
- **Komatsu** KES 07.868.1
- **Komatsu Dresser**
- **Tremec/TTC**
- **Vickers** 35VQ25
- **ZF** TE-ML-03C

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

SAE Grade	5W-20
Product Number	*293109*
SDS Number	*38363*
API Gravity	35.2
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 39 7.5
Viscosity, Cold Crank, °C/Poise	-30/39
Viscosity Index	163
Flash Point, °C(°F)	244(471)
Pour Point, °C(°F)	-51(-60)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® TORQFORCE® SYN ISOCLEAN® CERTIFIED LUBRICANT

SAE 5W-20

PRODUCT DESCRIPTION

Delo® TorqForce® Syn SAE 5W-20 ISOCLEAN® Certified Lubricant is a high performance fully synthetic lubricant designed for use in transmissions and hydraulic systems. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo TorqForce Syn SAE 5W-20 ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Long equipment life** — Special additives protect metal surfaces against scuffing and wear even under operating conditions of high temperature and high load.
- **Smooth operation** — Excellent frictional control helps prevent clutch slippage and assures quiet and efficient action of transmission and brakes while minimizing wear.
- **Extreme temperature performance** — Excellent cold weather pumpability in sub-zero/ arctic operating conditions. Very good high operating temperature performance for severe service applications.
- **Improved filterability** — Delo TorqForce Syn SAE 5W-20 ISOCLEAN Certified Lubricant is formulated with special additive chemistry that allows for ultra-fine filtration which provides exceptional fluid cleanliness and equipment reliability performance. Delo TorqForce Syn SAE 5W-20 ISOCLEAN Certified Lubricant can achieve cleanliness levels down to 18/ 16/13 and potentially cleaner with appropriate Chevron approved ISOCLEAN Programs.
- **Minimal downtime** — Good compatibility with seals, O-rings, and packing materials maintains their good condition and keeps leakage at a minimum.
- **Long oil life** — Outstanding ability of the synthetic base stock to withstand oxidation at high operating temperatures resulting in long service life for the oil.
- **Reliable operation** — Formulation helps keep metal parts clean and free of varnish and sludge deposits that could result in premature breakdown.
- **Minimizing weather and storage concerns** — Protects against rust and corrosion of highly finished precision parts when operating in humid conditions and during seasonal shutdown periods.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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FEATURES

Delo® TorqForce® Syn SAE 5W-20 ISOCLEAN® Certified Lubricant is a high performance lubricant designed for use in transmissions and hydraulic systems operating in arctic conditions and requiring a fluid meeting Caterpillar TO-4 or Allison C-4 requirements. It is also recommended for transmission and hydraulic systems manufactured by Dana Powershift, Komatsu, Komatsu Dresser, Tremec/TTC, Vickers and ZF.

Delo TorqForce Syn SAE 5W-20 ISOCLEAN Certified Lubricant is manufactured using fully synthetic base oils, detergents, dispersants, oxidation and corrosion inhibitors, anti-wear and extreme pressure agents, and a foam suppressant.

Delo TorqForce Syn SAE 5W-20 ISOCLEAN Certified Lubricant offers excellent friction retention, wear control, seal compatibility, oxidation stability, and viscosity stability. The frictional characteristics of the fluid are retained over the life of the lubricant.

Components are protected from wear, even under high load conditions by controlling the formation of corrosion, varnish, and sludge.

Delo TorqForce Syn SAE 5W-20 ISOCLEAN Certified Lubricant is designed for both newly developed and older model drive train components. Delo TorqForce Syn SAE 5W-20 provides high performance throughout the seasons, maintaining optimal stability in a wide range of ambient temperatures.

APPLICATIONS

Delo TorqForce Syn SAE 5W-20 ISOCLEAN Certified Lubricant is recommended for use in **Allison, Caterpillar, Dana Powershift, Komatsu, Tremec/TTC, Vickers** and **ZF** transmissions, wet brakes, and hydraulic systems operating in arctic conditions.

Delo TorqForce Syn SAE 5W-20 ISOCLEAN Certified Lubricant is not recommended for use in combined farm tractor hydraulic and transmission systems where low brake chatter is a requirement.

Delo TorqForce Syn SAE 5W-20 ISOCLEAN Certified Lubricant meets:

- service requirements of **Caterpillar** TO-4

Delo TorqForce Syn SAE 5W-20 ISOCLEAN Certified Lubricant is recommended for:

- **Dana Powershift**
- **Komatsu** KES 07.868.1
- **Komatsu Dresser**
- **Tremec/TTC**
- **Vickers** 35VQ25
- **ZF** TE-ML-03C

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

SAE Grade	5W-20
Product Number	*278060*
SDS Number *USA* *Canada* *Mexico*	 *38363* *38364* *38365*
API Gravity	35.2
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 39 7.5
Viscosity, Cold Crank, °C/Poise	-30/39
Viscosity Index	163
Flash Point, °C(°F)	244(471)
Pour Point, °C(°F)	-51(-60)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® TRANS ESI®

SAE 40

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® Trans ESI® is a premium grade transmission fluid recommended for use in Heavy Duty Manual Transmissions, such as those manufactured by **Eaton** and **Meritor**.

CUSTOMER BENEFITS

Delo Trans ESI delivers value through:

- **Minimal wear** — Delo Trans ESI is formulated to offer excellent antiwear properties. It promotes long life for gears, bearings, and seals.
- **Optimal lubricant life** — The outstanding thermal and oxidation stability characteristics of Delo Trans ESI have the potential to increase drain intervals four to eight times longer than for conventional mineral-based transmission lubricants.
- **Potential fuel savings** — The low friction properties of this product contribute to minimal energy consumption and low operating temperatures.
- **Exceptional value** — Delo Trans ESI is comparable to the leading synthetic transmission fluids in critical engine tests without the premium price of synthetics. Its extended-drain performance, relative to conventional transmission lubricants, can result in significant lubricant and labor savings.

FEATURES

Delo Trans ESI is a premium grade, heavy duty truck manual transmission fluid.

It is formulated with ISOSYN® Technology and compounded with a unique extreme pressure additive utilizing an inorganic borate compound. It also contains oxidation, corrosion, rust, and foam inhibitors.

This product is ideally suited for transmissions exposed to high temperatures and loads. It is also designed to be copper friendly and does not cause corrosion in copper oil coolers.

Tests have proven that Delo Trans ESI provides a thick wear protection film composed of compounds that do not adversely react with metal. This film readily forms to provide exceptional gear protection even under extreme high loads.

Delo Trans ESI minimizes friction which typically promotes a cooler operating temperature. This promotes maximum thermal stability for long transmission and lubricant life. Industry standard on-highway fuel economy tests in heavy duty trucks have shown equivalent fuel economy with Delo Trans ESI compared to SAE 50 Synthetic Transmission Lubricants.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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APPLICATIONS

Delo® Trans ESI® is recommended for use in heavy duty manual transmissions, such as those manufactured by **Eaton** and **Meritor**. Its exceptional thermal and oxidation stability, and antiwear performance promote long transmission life and optimal drain intervals.

Delo Trans ESI has undergone extensive bench and field tests which have demonstrated equivalent performance to synthetic transmission fluids in extended-drain, severe-service applications. In particular, this product underwent a grueling, 5-year, on-highway test in more than 150 Class 8 truck transmissions. The oil drain interval was greater than 500,000 miles for all units. End-of-test inspections of 32 transmissions all showed excellent results for gear, bearing, and seal protection.

Delo Trans ESI has met both **Eaton** and **Meritor** critical extended-drain performance requirements of field testing and oxidation stability after 300 hours at 325°F.

This product is not recommended for use in **Mack** manual transmissions. For that application, the preferred product is Delo® Gear ESI®, which is Mack GO-J Plus approved, and can be used as a "one-drum" fluid in both Mack transmissions and axles. Alternatively, you can use Delo® Syn-Trans XE SAE 50 which is Mack TO-A Plus approved.

TYPICAL TEST DATA

SAE Grade	**40**
Product Number	*235062*
SDS Number	*6976*
API Gravity	28.2
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 143.8 14.5
Viscosity Index	99
Flash Point, °C(°F)	210(410)
Pour Point, °C(°F)	-33(-27)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® ATF+4® AUTOMATIC TRANSMISSION FLUID

PRODUCT DESCRIPTION

Formulated for all FCA Automatic Transmissions.

CUSTOMER BENEFITS

Havoline® ATF+4® Automatic Transmission Fluid delivers value through:

- **Warranty coverage** as an officially approved FCA US fluid
- **Correct viscosity and frictional characteristics** to help ensure smooth operation in FCA transmissions
- **Optimal drain intervals** of at least 100,000 miles under normal operating conditions
- **Long-lasting viscosity modifiers** for maximum fluid life.

FEATURES

Havoline ATF+4 Automatic Transmission Fluid is formulated with high purity synthetic base stocks. It is designed to maintain its viscosity through excellent oxidation stability and use of long lasting viscosity modifiers.

It has excellent low temperature fluidity and viscosity breakdown performance over previous generation FCA ATF fluids.

Havoline ATF+4 Automatic Transmission Fluid is specially formulated to give outstanding protection in critical areas of FCA transmission operation.

Havoline ATF+4 Automatic Transmission Fluid:

- lubricates and helps prevent wear in gears, clutches, and bearings.
- transfers engine power effectively
- removes heat efficiently
- operates well over a wide temperature range
- resists thermal and oxidative breakdown
- promotes sufficient viscosity at high temperatures with minimal sheardown
- gives proper friction performance for FCA vehicles (smooth shift feel, no shudder)
- protects seals, gaskets, and other nonferrous components
- helps prevent sludge and varnish formation
- resists foaming

APPLICATIONS

Havoline ATF+4 Automatic Transmission Fluid is designed for use in FCA US automatic transmissions and automatic transaxles where a Mopar ATF PLUS®, ATF+2®, ATF+3® or ATF+4® fluid is specified.[1] The FCA US includes FCA, Dodge, Plymouth, Jeep and Eagle vehicles.

It is not recommended for use in transmissions specifying either DEXRON® or MERCON® type fluids.[2]

Havoline ATF+4 Automatic Transmission Fluid has been registered with FCA US LLC, license number 40630035.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

1 Mopar ATF PLUS, ATF+2, ATF+3 and ATF+4 are registered trademarks of FCA US LLC (formerly known as Chrysler Group LLC).

2 DEXRON is a registered trademark of General Motors Corporation.
MERCON is a registered trademark of Ford Motor Company.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

Product Number	*222270*
SDS Number	*16360*
API Gravity	35.4
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 33.24 7.51
Viscosity, Brookfield cP at -40°C	 8,380
Viscosity Index	204
Flash Point, °C(°F)	198(388)
Pour Point, °C(°F)	-51(-60)
Color	Red

Minor variations in product typical test data are to be expected in normal manufacturing.

HAVOLINE® AUTOMATIC TRANSMISSION FLUID MD-3

PRODUCT DESCRIPTION

Formulated for applications that call for the former DEXRON®-III H, MERCON®, and Allison C-4 fluids.[1]

CUSTOMER BENEFITS

Havoline® Automatic Transmission Fluid MD-3 delivers value through:

- **Protection** against the formation of lacquers, sludge, or other harmful deposits.
- **Exceptional stability** provided by premium base oils and extra oxidation inhibitors.
- **Quiet performance** — Especially effective in minimizing transmission "chatter." Helps ensure smooth, quiet action at all speeds.
- **Fast circulation during cold weather** and excellent film strength when hot.

FEATURES

Havoline Automatic Transmission Fluid MD-3 is a passenger car and light truck automatic transmission fluid for most pre-2006 automatic transmissions built by General Motors, Ford Motor Company and other makes requiring a high-performance, multi-purpose, power transmission fluid.

It is formulated with premium hydroprocessed base stocks and additives that help provide oxidation and thermal stability, friction control, load-carrying ability, corrosion and wear protection. It helps protect against the formation of deposits, sludge, varnish, and foam.

Havoline Automatic Transmission Fluid MD-3 helps provide outstanding durability.

Under severe operating conditions, this fluid:

- Maintains friction control for smooth shift action.
- Is specially formulated to help prevent shudder.
- Retains low temperature fluidity and high temperature stability for long operating periods.
- Protects automatic transmission fluid coolers from corrosion.
- Helps minimize the chances of a transmission overhaul due to sludge, corrosion, and wear.

APPLICATIONS

Havoline Automatic Transmission Fluid MD-3 is designed for use in most pre-2006 automatic transmissions built by General Motors, Ford Motor Company and other makes requiring a high performance, multi-purpose, power transmission fluid. It is recommended for applications that call for the former DEXRON-III H, MERCON, and Allison C-4 fluids.

Always check your owner's manual to determine the proper automatic transmission fluid for your vehicle.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatuses or medical equipment.

1 DEXRON is a registered trademark of General Motors Corporation.
MERCON is a registered trademark of Ford Motor Company.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

Product Number	*221854*
SDS/MSDS Number *USA* *Colombia* *El Salvador*	 *8654* *33101* *33701*
API Gravity	33.4
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 34.1 7.0
Viscosity Index	171
Flash Point, °C(°F)	212(414)
Pour Point, °C(°F)	-50(-58)
Color	Red

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® AUTOMATIC TRANSMISSION FLUID MD-3
ISOCLEAN® CERTIFIED LUBRICANT

PRODUCT DESCRIPTION

Formulated for applications that call for the former DEXRON®-III H, MERCON®, and Allison C-4 fluids.[1]

Chevron ISOCLEAN® Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Havoline® Automatic Transmission Fluid MD-3 ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Protection** against the formation of lacquers, sludge, or other harmful deposits.
- **Exceptional stability** provided by premium base oils and extra oxidation inhibitors.
- **Quiet performance** — Especially effective in minimizing transmission "chatter." Helps ensure smooth, quiet action at all speeds.
- **Fast circulation during cold weather** and excellent film strength when hot.

FEATURES

Havoline Automatic Transmission Fluid MD-3 ISOCLEAN Certified Lubricant is a passenger car and light truck automatic transmission fluid for most pre-2006 automatic transmissions built by General Motors, Ford Motor Company and other makes requiring a high-performance, multi-purpose, power transmission fluid.

It is formulated with premium hydroprocessed base stocks and additives that help provide oxidation and thermal stability, friction control, load-carrying ability, corrosion and wear protection. It helps protect against the formation of deposits, sludge, varnish, and foam.

Havoline Automatic Transmission Fluid MD-3 ISOCLEAN Certified Lubricant helps provide outstanding durability.

Under severe operating conditions, this fluid:

- Maintains friction control for smooth shift action.
- Is specially formulated to help prevent shudder.
- Retains low temperature fluidity and high temperature stability for long operating periods.
- Protects automatic transmission fluid coolers from corrosion.
- Helps minimize the chances of a transmission overhaul due to sludge, corrosion, and wear.

1 DEXRON is a registered trademark of General Motors Corporation.
MERCON is a registered trademark of Ford Motor Company.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TTF-90 ISOCLEAN

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APPLICATIONS

Havoline® Automatic Transmission Fluid MD-3 ISOCLEAN® Certified Lubricant is designed for use in most pre-2006 automatic transmissions built by General Motors, Ford Motor Company and other makes requiring a high performance, multi-purpose, power transmission fluid. It is recommended for applications that call for the former DEXRON-III H, MERCON, and Allison C-4 fluids.

Always check your owner's manual to determine the proper automatic transmission fluid for your vehicle.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatuses or medical equipment.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

Product Number	*223082*
SDS/MSDS Number	
USA	*8654*
Canada	*33097*
Mexico	*38663*
Colombia	*33101*
El Salvador	*33701*
API Gravity	33.4
Viscosity, Kinematic	
cSt at 40°C	34.1
cSt at 100°C	7.0
Viscosity Index	171
Flash Point, °C(°F)	212(414)
Pour Point, °C(°F)	-50(-58)
Color	Red

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® ATF MERCON® V

PRODUCT DESCRIPTION

Havoline® ATF MERCON® V is for use in automatic transmissions requiring a MERCON V approved fluid.[1]

CUSTOMER BENEFITS

Havoline ATF MERCON V delivers value through:

- **Protection** against the formation of lacquers, sludge, or other harmful deposits.
- **Exceptional stability** provided by excellent base oil and extra oxidation inhibitors.
- **Fast circulation during cold weather** and excellent lubricating body when hot.
- **Optimized friction characteristics** for smooth shifting and efficient power transfer.

FEATURES

Havoline ATF MERCON V is designed specifically for use in Ford Motor Company transmissions that require a MERCON V fluid. It also provides premium performance in Ford MERCON and General Motors DEXRON®-III H applications.[2]

It is manufactured from premium, severely hydroprocessed base stocks and select additives that provide oxidation and thermal stability, friction control, load-carrying ability, corrosion and wear protection. It helps prevent the accumulation of deposits and the formation of sludge, varnish and foam.

Compared to MERCON fluids, Havoline ATF MERCON V has exceptionally low temperature flow properties and enhanced protection against viscosity breakdown.

Under severe operating conditions, Havoline ATF MERCON V:

- Maintains friction control for smooth shift action.
- Retains low temperature fluidity and high temperature stability for long operating periods.
- Protects automatic transmission fluid coolers from corrosion.
- Helps minimize the chances of a transmission overhaul due to sludge, corrosion, wear of clutches and bands, gears and bearings, leakage past seals, and loss of frictional properties.

APPLICATIONS

Havoline ATF MERCON V is fully approved for MERCON V applications. In addition, it is recommended for applications that call for the former MERCON or DEXRON-III H fluids.

Havoline ATF MERCON V has the following qualifications:

Ford	MV130910
Voith	H55.6335.xx (G607)
ZF	TE-ML 14B

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

Always check your owner's manual to determine the proper automatic transmission fluid for your transmission.

1 MERCON and MERCON V are registered trademarks of Ford Motor Company.
2 DEXRON is a registered trademark of General Motors Corporation.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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Havoline® ATF MERCON V is not suitable for the following applications:

- Ford transmissions manufactured before 1977 and some pre-1982 transmissions require a Type F fluid such as Chevron ATF Type F.
- Vehicles with continuously variable transmissions (CVTs) require special fluids.

TYPICAL TEST DATA

Product Number	*226975*
SDS Number	*34437*
API Gravity	32.5
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 36.0 7.7
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 182 52
Viscosity, Brookfield cP at -40°C	 11,500
Viscosity Index	191
Flash Point, °C(°F)	178(352)
Pour Point, °C(°F)	-45(-49)
Color	Red

Minor variations in product typical test data are to be expected in normal manufacturing.

HAVOLINE® AUTOMATIC TRANSMISSION FLUID TYPE F

PRODUCT DESCRIPTION

Havoline® Automatic Transmission Fluid Type F is a high performance lubricating fluid for pre-1977 (and some 1977 to 1981) automatic transmissions built by Ford Motor Company and other makes requiring a high friction Type F fluid.

CUSTOMER BENEFITS

Havoline Automatic Transmission Fluid Type F delivers value through:

- **Protection** against the formation of lacquers and other harmful deposits.
- **Exceptional stability** provided by premium base oils and extra oxidation inhibitors.
- **Quiet performance** — Especially effective in helping to ensure proper action in Ford, Lincoln, and Mercury transmissions at all speeds.
- **Fast circulation during cold weather** and excellent film strength when hot.

FEATURES

Havoline Automatic Transmission Fluid Type F is manufactured using selected highly refined base oils and additives that promote oxidation and thermal stability, friction control, cleanliness, load-carrying ability, corrosion and wear protection, and help prevent the formation of foam.

It is red in color for identification and leakage control.

Havoline Automatic Transmission Fluid Type F protects against deposits, corrosion and wear, promotes proper shifting action, resists oxidation and viscosity increase, and helps ensure long transmission life.

APPLICATIONS

Havoline Automatic Transmission Fluid Type F is recommended for automatic transmissions in Ford, Mercury, and Lincoln passenger cars and light trucks manufactured by Ford Motor Company and certain other makes prior to 1977, and some makes from 1977 to 1981 (consult the vehicle owners manual).

This fluid is not to be used in Ford transmissions that require a fluid meeting Ford specification M2C138-CJ. Havoline® or Chevron Automatic Transmission Fluid MD-3 is the recommended fluid in this case.

Havoline Automatic Transmission Fluid Type F meets the requirements of former **Ford** specification M2C33-F.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

Product Number	*221855*
SDS Number	*8653*
API Gravity	32.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 37.2 7.3
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 189 50.6
Viscosity, Brookfield cP at -18°C	 1400
Viscosity Index	165
Flash Point, °C(°F)	214(417)
Pour Point, °C(°F)	-45(-49)
Color	Red

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® GLOBAL MULTI-VEHICLE ATF

PRODUCT DESCRIPTION

Havoline® Global Multi-Vehicle ATF is a premium, synthetic blend transmission fluid specifically designed for use in automatic transmissions in most passenger cars, SUVs, light duty trucks, and vans.

Havoline Global Multi-Vehicle ATF is designed to meet the fluid needs of a wide range of modern automatic transmissions in North American, Japanese and European vehicles. This product also enables professional installers to consolidate their inventories, while eliminating the use of ATF supplements that, when added to another Havoline ATF, change the chemistry and may harm transmissions.

CUSTOMER BENEFITS

Havoline Global Multi-Vehicle ATF delivers value through:

- **Versatility** — Can be used in most passenger cars, SUVs, light duty trucks and vans.
- **Reduced inventory carrying cost** — Helps eliminate the need for stocking supplemental additives or top treats which may harm transmissions.
- **Maximum equipment life** — Advanced formula protects against wear, corrosion, and the formation of lacquers, sludge, or other harmful deposits.
- **Long oil life** — Premium base oil combined with more effective oxidation inhibitors, resulting in maximum oil service life.
- **Excellent cold flow properties** — Synthetic blend formulation ensures better low temperature fluidity than conventional fluids.
- **Improved fuel economy** — Due to lower viscous drag, compared to conventional fluids.
- **Smooth operation** — Carefully chosen friction modifiers allow for smooth shifting, efficient power transfer, and anti-shudder protection.

FEATURES

Havoline Global Multi-Vehicle ATF is an advanced, high performance, multi-purpose power transmission fluid. It has been tested for use in the latest generation of low-viscosity ATF applications and is also backward compatible with most high-viscosity applications.

Havoline Global Multi-Vehicle ATF is formulated with a synthetic blend of premium, severely hydroprocessed base stocks and carefully crafted additives that help provide friction control, load-carrying ability, corrosion and wear protection. It provides good foam resistance and helps protect against the formation of sludge, varnish, and other harmful deposits.

Havoline Global Multi-Vehicle ATF has exceptional low temperature flow properties and enhanced protection against viscosity breakdown at high temperatures, as well as exceptional oxidation and thermal stability, prolonging oil life up to two times that of conventional high-viscosity ATFs.

Under severe operating conditions, this fluid:

- Maintains friction control for smooth shift action and protection against shudder.
- Operates well over a wide temperature range.
- Retains high temperature viscosity resulting in maximum oil film thickness and excellent wear protection.
- Helps minimize the chances of a transmission overhaul due to sludge, corrosion, or wear of gears, bearings, and clutches.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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APPLICATIONS

Havoline® Global Multi-Vehicle ATF can be used in a wide variety of North American, Japanese and European passenger cars, SUVs and light duty trucks. It has passed the **JASO** 1A-LV_{13} (M315) standard tests for performance in Japanese vehicles. The product delivers the shifting performance and exceptional anti-shudder durability desired by Japanese and Korean automakers.

Havoline Global Multi-Vehicle ATF is recommended for the following applications:

- **Aisin Warner** AW-1
- **Allison** TES-389*, C-4
- **Apolloil/Kia** ATF Red-1K
- **BMW** LT 71141, LA2634, M-1375.4, 7045-E, ETL-8072B
- **Esso** Type LT 71141 ATF
- **Ford** MERCON®* (in California, use Havoline ATF MD-3)
- **Ford** MERCON® V* (in California, use Havoline ATF MERCON V)
- **Ford** MERCON® SP* and MERCON® LV[1]*
- **General Motors** DEXRON®-II(E), DEXRON-III(G,H), DEXRON-VI[2]
- **Honda/Acura** DW-1, ATF-Z1
- **Hyundai/Kia** SP-IV, SPH-IV/SP4-M
- **Hyundai/Kia/Mitsubishi** Diamond SP, SP-II, SP-III
- **Idemitsu** ATF HP, K17
- **Isuzu** ATF-II, ATF-III, Genuine ATF
- **JASO M315** Class 1A* and 2013, 1A-LV
- **Mazda** ATF 3317, F-1, FZ/S-1/N-1, M-III, M-V
- **Mercedes** MB 236.41/5/6/7/8/9/91/10/11, NAG-1
- **Mercedes** MB 236.12*, MB 236.14*, MB 236.15*
- **Mitsubishi** ATF-J2, ATF-J3
- **Nissan** 402, Matic D/J/K/S
- **Shell** ATF 134, 3353, M-1375.4/6, LA2634
- **Shell/Audi** M-L 12108
- **Subaru** ATF, ATF 5AT, ATF-HP
- **Texaco** 7045-E, ETL-8072 B, N402
- **Toyota/Lexus** Type T, T-III, T-IV (JWS 3309), WS (JWS 3324)
- **Voith** H55.6335.xx (G607)
- **Volkswagen/Audi** TL 52162, TL 52533, ZF 5HP (18FL, 30)
- **Volvo** 1161521, 1161540, 1161640, STD 1273.40 (97340), STD 1273.41 (97341)
- **ZF** TE-ML 11A/B
- Hybrid vehicles with electronic, continuously variable transmissions (eCVTs) where the OEM specifies a Toyota Type WS fluid

Chevron does not recommend Havoline Full Synthetic Multi-Vehicle ATF for use in vehicles with continuously variable transmissions (CVTs) or dual clutch transmissions (DCTs) unless indicated above, nor in Ford transmissions where Ford Type F fluids are recommended.

Always check your owner's manual to determine the proper automatic transmission fluid for your vehicle.

*California law prohibits all manufacturers of multi-vehicle ATF from recommending products in certain applications where the viscometrics do not match those of the official OEM specification. Therefore, Chevron does not recommend the use of Havoline Global Multi-Vehicle ATF in these applications in California.

Chevron has conducted extensive laboratory evaluations and field testing to support Havoline Global Multi-Vehicle ATF performance, although it may not meet all laboratory test requirements for certain OEM specifications. Its use in transmissions where recommended by Chevron will not void the vehicle's warranty. All Havoline products, including Havoline Global Multi-Vehicle ATF, are backed by Chevron's Limited Product Warranty.

1 MERCON is a registered trademark of Ford Motor Company.
2 DEXRON is a registered trademark of General Motors Corporation.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

Product Number	*226537*
SDS/MSDS Number *USA* *Canada* *Mexico*	 *40639* *40640* *40641*
API Gravity	33.0
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 31.0 6.2
Viscosity, Brookfield cP at -40°C	13,000
Viscosity Index	155
Flash Point, °C(°F)	216(421)
Pour Point, °C(°F)	-54(-65)
Color	Red

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® FULL SYNTHETIC MULTI-VEHICLE ATF

PRODUCT DESCRIPTION

Havoline® Full Synthetic Multi-Vehicle ATF is a premium quality synthetic transmission fluid that is recommended for most modern 6+ speed automatic transmissions. It has been designed and tested for use in a wide range of vehicles manufactured by North American, European and Japanese automakers (refer to owner's manual). It also uses the latest generation technology which is approved by General Motors for automatic transmissions and automatic transaxles where a DEXRON®-VI fluid is specified.*

CUSTOMER BENEFITS

Havoline Full Synthetic Multi-Vehicle ATF delivers value through:

- **Minimized inventory cost** by having one premium ATF that can be used for the vast majority of modern automatic transmissions on the road today, without the need for supplemental additives or top treats
- **Maximum equipment life** with an advanced formula that protects against wear, corrosion, and the formation of lacquers, sludge or other harmful deposits
- **Extended drain intervals** because of improved oxidation resistance
- **Improved fuel economy** relative to conventional fluids because of lower viscous drag
- **Warranty coverage** as an officially approved General Motors DEXRON-VI fluid
- **Backward compatibility** with all previous General Motors DEXRON recommendations

FEATURES

Havoline Full Synthetic Multi-Vehicle ATF is formulated with high purity synthetic base stocks. It is designed to maintain its viscosity through excellent oxidation stability and use of long-lasting viscosity modifiers. It meets the DEXRON-VI standard, which exhibits more than twice the durability and stability in friction tests compared to standard DEXRON-III fluids. This helps ensure consistent and smooth shift performance, even under extreme driving conditions.

Havoline Full Synthetic Multi-Vehicle ATF:

- Maintains friction control for smooth, consistent shifting and protection against shudder
- Operates well over a wide temperature range
- Promotes sufficient viscosity at high temperatures with minimal shear-down
- Protects gears, bearings, clutch plates, seals, bushings and other components from wear and degradation
- Resists foaming and thereby promotes outstanding operability and long equipment life

APPLICATIONS

Havoline® Full Synthetic Multi-Vehicle ATF has been formulated and tested for a wide variety of domestic and import ATF specifications, in both high- and low-viscosity applications. It is approved by General Motors in automatic transmissions and automatic transaxles where a DEXRON®-VI fluid is specified (Model Years 2006 and newer) and is backward compatible in transmissions calling for DEXRON®-II or DEXRON®-III fluids.

* DEXRON is a registered trademark of General Motors Corporation.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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Havoline Full Synthetic Multi-Vehicle ATF is approved for:

- **General Motors** DEXRON®-VI specification GMN10060 (license number J-62300)
- **Voith** H55.6335.xx (G607)

Havoline Full Synthetic Multi-Vehicle ATF meets the requirements of:

- **BMW** Part #83 22 0 397 114
- **Chrysler** Part #68043742AA†
- **JASO 1A-LV$_{13}$ (M315)** performance standard in Japanese vehicles; the product will deliver the shifting performance, shear stability and exceptional anti-shudder durability which is desired by Japanese and Korean automakers
- **Mercedes** MB 236.41

Havoline Full Synthetic Multi-Vehicle ATF is recommended for most late model transmissions manufactured by European, Asian and North American OEMs, including:

- **Aisin Warner** AW-1
- **Apolloil/KIA** ATF Red-1K
- **BMW** LT 71141, LA2634, 7045-E, ETL-8072B
- **Esso** Type LT 71141 ATF
- **Ford** MERCON®* (in California, use Havoline ATF MD-3)
- **Ford** MERCON® V* (in California, use Havoline ATF MERCON V)
- **Ford** MERCON® SP* and MERCON® LV‡*
- **General Motors** DEXRON-II and DEXRON-III
- **Honda/Acura** DW-1 and Z-1
- **Hyundai/Kia** Genuine ATF and SP-II, SP-III, SP-IV/ SPH-IV and NWS-9638 T-5
- **Idemitsu K17**
- **Isuzu** SCS, Genuine ATF
- **Mazda** ATF M-III and ATF M-V
- **Mercedes** MB 236.5/6/7/8/9/10/11
- **Mercedes** MB 236.12*, MB 236.14*, MB 236.15*
- **Mitsubishi** ATF-J2, ATF-J3, SP-II, SP-III, SP-IV
- **Mopar** Part #05189966AA (AS68RC)
- **Nissan/Infiniti** Matic D/K/J, Matic S
- **Shell** ATF 3403-M115, LA2634
- **Subaru** ATF, ATF-HP, ATF 5AT
- **Texaco** 7045-E, ETL-8072B, N402
- **Toyota/Lexus** Type T-III, Type T-IV, Type WS
- **Volkswagen/Audi** Part #G 052 025/540 (A2)
- **Volkswagen/Audi** Part #G 055 025/990 (A2)
- **Volvo** Part No. 1161521, 1161540/1161640
- Hybrid vehicles with electronic continuously variable transmissions (eCVTs) where the OEM specifies a Toyota Type WS fluid.

Chevron does not recommend Havoline Full Synthetic Multi-Vehicle ATF for use in vehicles with continuously variable transmissions (CVTs) or dual clutch transmissions (DCTs) unless indicated above, nor in Ford transmissions where Ford Type F fluids are recommended.

Always check your owner's manual to determine the proper automatic transmission fluid for your vehicle.

*California law prohibits all manufacturers of multi-vehicle ATF from recommending products in certain applications where the viscometrics do not match those of the official OEM specification. Therefore, Chevron does not recommend the use of Havoline Full Synthetic Multi-Vehicle ATF in these applications in California.

Chevron has conducted extensive laboratory evaluations and field testing to support Havoline Full Synthetic Multi-Vehicle ATF performance, although it may not meet all laboratory test requirements for certain OEM specifications. Its use in transmissions where recommended by Chevron will not void the vehicle's warranty. All Havoline products, including Havoline Full Synthetic Multi-Vehicle ATF, are backed by Chevron's Limited Product Warranty.

† For Chrysler ATF+3® and ATF+4® applications, use Havoline® ATF+4® Automatic Transmission Fluid. ATF+3 and ATF+4 are registered trademarks of FCA US LLC (formerly known as Chrysler Group LLC).

‡ MERCON is a registered trademark of Ford Motor Company.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

Product Number	*226536*
SDS Number	*39548*
API Gravity	35.2
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 30.6 6.0
Viscosity, Brookfield cP at -40°C	 11,700
Viscosity Index	147
Flash Point, °C(°F)	217(423)
Pour Point, °C(°F)	-54(-65)
Color	Red

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON SYNTHETIC ALL-WEATHER THF

PRODUCT DESCRIPTION

Chevron Synthetic All-Weather THF is a unique, high quality, multifunctional tractor hydraulic fluid, specially formulated for use in transmissions, final drives, wet brakes, and hydraulic systems of tractors and other equipment employing a common fluid reservoir.

CUSTOMER BENEFITS

Chevron Synthetic All-Weather THF delivers value through:

- **Low operational costs** — Excellent performance in a wide range of ambient and operating temperatures provides year round improved low temperature hydraulic and transmission responsiveness.
- **Long oil life** — Outstanding ability of the base stock to withstand oxidation at high operating temperatures results in maximum service life of the oil.
- **Long equipment life** — Special additives help to protect metal surfaces against scuffing and wear even under severe operating conditions.
- **Low inventory cost** — Chevron Synthetic All-Weather THF has the potential to replace many of the other hydraulic fluids in your inventory which can significantly free up space in your warehouse and minimize your carrying cost. Always confirm that the Chevron product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.
- **Minimalized weather and storage concerns** — Protects against rust and corrosion of highly finished precision parts when operating in humid conditions and during seasonal shutdown periods.
- **Minimal downtime** — Good compatibility with seals, O-rings, and packing materials maintains their good condition and keeps leakage at a minimum.
- **Smooth operation** — By protecting against brake "chatter" and transmission "slip" it maximizes the quiet and efficient action of brakes and transmission.
- **Reliable operation** — Formulation helps keep metal parts clean and free of varnish and sludge deposits that could result in premature breakdown.

FEATURES

Chevron Synthetic All-Weather THF is a unique, high quality, multifunctional fluid, specially formulated for use in transmissions, final drives, wet brakes, and hydraulic systems of tractors and other equipment employing a common fluid reservoir.

Chevron Synthetic All-Weather THF is specially designed for all weather operations and applications — both severe winter cold and extreme summer heat. It meets the requirements of both John Deere J20C and J20D specifications. This, combined with excellent oxidation stability, minimizes the need for seasonal oil changes.

Its distinctive orange color provides for easy product identification and leak detection.

FUNCTIONS

Chevron Synthetic All-Weather THF is a combination lubricant for modern tractors and similar equipment. It performs many functions, such as lubrication of the transmission and final drive, and serves as a hydraulic fluid to operate power steering units, brakes, implements, and attachments.

Chevron Synthetic All-Weather THF has a viscosity index much higher than conventional multifunctional transmission/hydraulic fluids. This provides excellent flow at low temperatures and good oil film protection at high operating temperatures.

Furthermore, Chevron Synthetic All-Weather THF:

- minimizes brake "chatter" and excessive brake facing wear
- assists with the smooth operation of clutch packs and wet brakes

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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- provides excellent shifting action
- provides rust and corrosion protection for vital parts
- minimizes leakage because of good compatibility with seals, O-rings, and packing materials
- minimizes sludge and varnish formation
- protects metal surfaces against scuffing and wear
- provides excellent gear lubrication compared to conventional cold weather, low viscosity tractor hydraulic fluids
- allows for ready leak detection because of its distinctive orange color.

Chevron Synthetic All-Weather THF is compatible with many combination tractor, transmission, and hydraulic fluids.

APPLICATIONS

Chevron Synthetic All-Weather THF is recommended for use:

- as a multifunctional and multi-seasonal fluid in many types of tractors and construction equipment.
- in applications which call for the following OEM lubricant specifications:
  - **AGCO** improved power fluid 821XL
  - **Case IH** JIC-143, JIC-144, JIC-145, MS 1206, MS 1207, MS 1209, MS 1210 (TCH)
  - **Caterpillar** TO-2
  - **Ford New Holland** ESN-M2C134-D, FNHA-2-C-201, FNHA-2-C-200
  - **International Harvester** B6
  - **John Deere** J20C, J20D
  - **Kubota** UDT
  - **Massey Ferguson** M1135, M1141, M1127, M1129A, M1143, M1145
  - **Minneapolis-Moline** Q-1766, Q-1722, Q-1766B
  - **Oliver** Q-1705
  - **Renk Doromat** 874A and 874B
  - **Volvo** WB-101
  - **White Farm Equipment** Q-1826

Chevron Synthetic All-Weather THF is an excellent hydraulic fluid for many types of tractor hydraulic systems. It passes the High Pressure Vane Pump Test, ASTM D2882, with less than 15 mg steel weight loss.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

Product Number	*255237*
SDS Number	*6948*
API Gravity	34.5
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 44.7 9.5
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 225 58.2
Viscosity, Brookfield cP at -40°C	 17,000
Viscosity Index	204
Flash Point, °C(°F)	242(468)
Pour Point, °C(°F)	-45(-49)
Color	Orange

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Chevron Synthetic All-Weather THF ISOCLEAN® Certified Lubricant

Product Description

Chevron Synthetic All-Weather THF ISOCLEAN® Certified Lubricant is a unique, high quality, multifunctional tractor hydraulic fluid, specially formulated for use in transmissions, final drives, wet brakes, and hydraulic systems of tractors and other equipment employing a common fluid reservoir. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanlinessstandards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

Customer Benefits

Chevron Synthetic All-Weather THF ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Low operational costs** — Excellent performance in a wide range of ambient and operating temperatures provides year round improved low temperature hydraulic and transmission responsiveness.
- **Long oil life** — Outstanding ability of the base stock to withstand oxidation at high operating temperatures results in maximum service life of the oil.
- **Long equipment life** — Special additives help to protect metal surfaces against scuffing and wear even under severe operating conditions.
- **Low inventory cost** — Chevron Synthetic All-Weather THF has the potential to replace many of the other hydraulic fluids in your inventory which can significantly free up space in your warehouse and minimize your carrying cost. Always confirm that the Chevron product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.
- **Minimalized weather and storage concerns** — Protects against rust and corrosion of highly finished precision parts when operating in humid conditions and during seasonal shutdown periods.
- **Minimal downtime** — Good compatibility with seals, O-rings, and packing materials maintains their good condition and keeps leakage at a minimum.
- **Smooth operation** — By protecting against brake "chatter" and transmission "slip" it maximizes the quiet and efficient action of brakes and transmission.
- **Reliable operation** — Formulation helps keep metal parts clean and free of varnish and sludge deposits that could result in premature breakdown.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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FEATURES

Chevron Synthetic All-Weather THF ISOCLEAN Certified Lubricant is a unique, high quality, multifunctional fluid, specially formulated for use in transmissions, final drives, wet brakes, and hydraulic systems of tractors and other equipment employing a common fluid reservoir.

Chevron Synthetic All-Weather THF ISOCLEAN Certified Lubricant is specially designed for all weather operations and applications — both severe winter cold and extreme summer heat. It meets the requirements of both John Deere J20C and J20D specifications. This, combined with excellent oxidation stability, minimizes the need for seasonal oil changes.

Its distinctive orange color provides for easy product identification and leak detection.

FUNCTIONS

Chevron Synthetic All-Weather THF ISOCLEAN Certified Lubricant is a combination lubricant for modern tractors and similar equipment. It performs many functions, such as lubrication of the transmission and final drive, and serves as a hydraulic fluid to operate power steering units, brakes, implements, and attachments.

Chevron Synthetic All-Weather THF ISOCLEAN Certified Lubricant has a viscosity index much higher than conventional multifunctional transmission/hydraulic fluids. This provides excellent flow at low temperatures and good oil film protection at high operating temperatures.

Furthermore, Chevron Synthetic All-Weather THF ISOCLEAN Certified Lubricant:

- minimizes brake "chatter" and excessive brake facing wear
- assists with the smooth operation of clutch packs and wet brakes
- provides excellent shifting action
- provides rust and corrosion protection for vital parts
- minimizes leakage because of good compatibility with seals, O-rings, and packing materials
- minimizes sludge and varnish formation
- protects metal surfaces against scuffing and wear
- provides excellent gear lubrication compared to conventional cold weather, low viscosity tractor hydraulic fluids
- allows for ready leak detection because of its distinctive orange color.

Chevron Synthetic All-Weather THF ISOCLEAN Certified Lubricant is compatible with many combination tractor, transmission, and hydraulic fluids.

APPLICATIONS

Chevron Synthetic All-Weather THF ISOCLEAN Certified Lubricant is recommended for use:

- as a multifunctional and multi-seasonal fluid in many types of tractors and construction equipment.
- in applications which call for the following OEM lubricant specifications:
  - **AGCO** improved power fluid 821XL
  - **Case IH** JIC-143, JIC-144, JIC-145, MS 1206, MS 1207, MS 1209, MS 1210 (TCH)
  - **Caterpillar** TO-2
  - **Ford New Holland** ESN-M2C134-D, FNHA-2-C-201, FNHA-2-C-200
  - **International Harvester** B6
  - **John Deere** J20C, J20D
  - **Kubota** UDT
  - **Massey Ferguson** M1135, M1141, M1127, M1129A, M1143, M1145
  - **Minneapolis-Moline** Q-1766, Q-1722, Q-1766B
  - **Oliver** Q-1705
  - **Renk Doromat** 874A and 874B
  - **Volvo** WB-101
  - **White Farm Equipment** Q-1826

Chevron Synthetic All-Weather THF ISOCLEAN Certified Lubricant is an excellent hydraulic fluid for many types of tractor hydraulic systems. It passes the High Pressure Vane Pump Test, ASTM D2882, with less than 15 mg steel weight loss.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

Product Number	*278062*
SDS/MSDS Number *USA* *Canada* *Mexico*	 *6948* *15279* *27090*
API Gravity	34.5
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 44.7 9.5
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 225 58.2
Viscosity, Brookfield cP at -40°C	 17,000
Viscosity Index	204
Flash Point, °C(°F)	242(468)
Pour Point, °C(°F)	-45(-49)
Color	Orange

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON TRACTOR FLUID

PRODUCT DESCRIPTION

Chevron Tractor Fluid is a universal tractor hydraulic fluid for use in transmissions, final drives, wet brakes, and the hydraulic systems of tractors and other equipment employing a common fluid reservoir.

CUSTOMER BENEFITS

Chevron Tractor Fluid offers:

- **Oxidation protection** — Provides oxidation stability to control the generation of sludge and other deposits, minimizing viscosity increase.
- **Wear protection** — Meets the requirements of John Deere J20C performance and quality standards to reduce wear and improve product life.
- **Responsive hydraulic performance** — Maintains lubricant viscosity control over a wide operating-temperature range.
- **Compatibility with elastomers** — Compatible with seals, gaskets, and packing materials, helping to keep those components in good condition.

FEATURES

Chevron Tractor Fluid is a universal tractor hydraulic fluid that lubricates and protects hydraulic systems, transmissions, final drives, wet brakes, and power take-off (PTO) equipment that use a common fluid reservoir.

All product is tested against production specifications for quality and consistency.

The fluid provides good oxidation stability and sludge control.

Chevron Tractor Fluid also offers good wear protection for prolonged equipment life.

It is fully compatible with equipment manufacturers' proprietary fluids and other fluids of this type.

APPLICATIONS

Chevron Tractor Fluid is recommended for use as a universal tractor hydraulic fluid in common fluid reservoir systems, lubricating and protecting hydraulic equipment, transmissions, final drives, wet brakes, and PTO equipment in agricultural, construction, and forestry applications.

It meets all John Deere J20C performance specifications and can be used in most applications where universal tractor hydraulic fluids are specified. These include but are not limited to equipment manufactured by John Deere, Case, New Holland, Massey-Ferguson, Ford, and Agco-Allis.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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21 November 2013
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TYPICAL TEST DATA

Product Number	*221880*
SDS/MSDS Number *USA* *Colombia* *El Salvador*	 *34428* *35224* *35223*
Density kg/L at 15°C lb/gal at 60°F	 0.875 7.29
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 60.0 9.5
Viscosity, Brookfield cP at -35°C	 50,000
Viscosity Index	140
Flash Point, °C(°F)	235(455)
Pour Point, °C(°F)	-39(-38)
Color	Amber

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

URSA® HYDRAULIC OIL 10W

PRODUCT DESCRIPTION

Ursa® Hydraulic Oil 10W is a heavy duty on- and off-highway hydraulic oil that is recommended for SAE 10W applications and for equipment with Caterpillar TO-2 requirements.

CUSTOMER BENEFITS

Ursa Hydraulic Oil 10W delivers value through:

- **Meets many major pump manufacturer's requirements** — For antiwear-type hydraulic fluids in heavy duty on- and off-highway mobile hydraulic systems. Excellent Eaton-Vickers 35VQ25A performance.
- **Foam inhibition** — Contains special foam suppressant to minimize both foaming and aeration problems.
- **Excellent antiwear properties** — Formulated with anti-wear performance additives.
- **Excellent thermal stability** — In the presence of copper and steel.
- **Excellent filterability** — Thermal and hydrolytic stability helps prevent formation of deposits which may interfere with filtration in equipment with close tolerances.

FEATURES

Ursa Hydraulic Oil 10W is a premium hydraulic oil specifically designed to give maximum hydraulic pump protection in on- and off-highway heavy duty hydraulic applications where an SAE 10W engine oil is specified.

Ursa Hydraulic Oil 10W provides excellent antiwear protection, oxidation and corrosion inhibition, as well as foam and aeration suppression.

The antiwear additives in Ursa Hydraulic Oil 10W create a protective film on the metal surfaces. This protective film minimizes metal-to-metal contact, which is most severe in vane- and piston-type pumps.

Ursa Hydraulic Oil 10W is fully compatible with engine oils that may typically be used in hydraulic applications.

APPLICATIONS

Ursa Hydraulic Oil 10W is recommended for:

- Heavy duty on- and off-highway mobile hydraulic systems where an SAE 10W engine oil is specified.
- Caterpillar hydraulic systems where a **Caterpillar TO-2** fluid is required.
- Caterpillar hydraulic systems where a minimum of 0.09 percent (900 ppm) of zinc additive is specified.
- Pump applications requiring an **Eaton-Vickers 35VQ25A** hydraulic oil.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

Product Number	*273270*
SDS/MSDS Number *USA* *Colombia* *El Salvador*	 *23575* *33075* *33074*
API Gravity	31.2
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 40 6.5
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 184.7 48
Viscosity Index	114
Flash Point, °C(°F)	234(452)
Pour Point, °C(°F)	-33(-27)
Zinc, wt %	0.094

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

URSA® HYDRAULIC OIL 10W ISOCLEAN® CERTIFIED LUBRICANT

PRODUCT DESCRIPTION

Ursa® Hydraulic Oil 10W ISOCLEAN® Certified Lubricant is a heavy duty on- and off-highway hydraulic oil that is recommended for SAE 10W applications and for equipment with Caterpillar TO-2 requirements. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Ursa Hydraulic Oil 10W ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Meets many major pump manufacturer's requirements** — For antiwear-type hydraulic fluids in heavy duty on- and off-highway mobile hydraulic systems. Excellent Eaton-Vickers 35VQ25A performance.
- **Foam inhibition** — Contains special foam suppressant to minimize both foaming and aeration problems.
- **Excellent antiwear properties** — Formulated with anti-wear performance additives.
- **Excellent thermal stability** — In the presence of copper and steel.
- **Excellent filterability** — Thermal and hydrolytic stability helps prevent formation of deposits which may interfere with filtration in equipment with close tolerances.

FEATURES

Ursa Hydraulic Oil 10W ISOCLEAN Certified Lubricant is a premium hydraulic oil specifically designed to give maximum hydraulic pump protection in on- and off-highway heavy duty hydraulic applications where an SAE 10W engine oil is specified.

Ursa Hydraulic Oil 10W ISOCLEAN Certified Lubricant provides excellent antiwear protection, oxidation and corrosion inhibition, as well as foam and aeration suppression.

The antiwear additives in Ursa Hydraulic Oil 10W ISOCLEAN Certified Lubricant create a protective film on the metal surfaces. This protective film minimizes metal-to-metal contact, which is most severe in vane- and piston-type pumps.

Ursa Hydraulic Oil 10W ISOCLEAN Certified Lubricant is fully compatible with engine oils that may typically be used in hydraulic applications.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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APPLICATIONS

Ursa® Hydraulic Oil 10W ISOCLEAN® Certified Lubricant is recommended for:

- Heavy duty on- and off-highway mobile hydraulic systems where an SAE 10W engine oil is specified.
- Caterpillar hydraulic systems where a **Caterpillar TO-2** fluid is required.
- Caterpillar hydraulic systems where a minimum of 0.09 percent (900 ppm) of zinc additive is specified.
- Pump applications requiring an **Eaton-Vickers 35VQ25A** hydraulic oil.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

Product Number	*278061*
SDS Number	*23575*
API Gravity	31.2
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 40 6.5
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 184.7 48
Viscosity Index	114
Flash Point, °C(°F)	234(452)
Pour Point, °C(°F)	-33(-27)
Zinc, wt %	0.094

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

NATURAL GAS ENGINE OILS

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CHEVRON COMPRESSOR OIL 260

PRODUCT DESCRIPTION

Chevron Compressor Oil 260 is used to lubricate compressors in hydrocarbon service.

CUSTOMER BENEFITS

Chevron Compressor Oil 260 delivers value through:

- **Oxidation resistance** — Contains an oxidation inhibitor that helps to resist varnish formation in the system.
- **Good deposit control**
- **Good oil-water separability**

FEATURES

Chevron Compressor Oil 260 is a high viscosity index lubricant for use in natural gas compressors.

It is formulated from a carefully selected blend of base oils and additives that help provide protection against rust, corrosion, and wear.

APPLICATIONS

Chevron Compressor Oil 260 is used to lubricate the cylinders of reciprocating gas compressors.

Chevron Compressor Oil 260 is recommended for use in:

- Natural gas compressors.
- Dry natural gas compressors, or natural gas compressors containing carbon dioxide or hydrogen sulfide.

Do not use in breathing air apparatus or medical equipment.

TYPICAL TEST DATA

Product Number	*231809*
SDS Number	*7312*
API Gravity	27.6
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 260 20.9
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 1380 106
Viscosity Index	95
Flash Point, °C(°F)	275(527)
Pour Point, °C(°F)	-16(+3)
Color	4.5
Calcium, wt %	0.078

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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HDAX® 3100 Ashless Gas Engine Oil

SAE 15W-40, 40

Product Description

HDAX® 3100 Ashless Gas Engine Oils are high performance, bright stock free, ashless, dispersant-type natural gas engine oils.

Customer Benefits

HDAX 3100 Ashless Gas Engine Oils deliver value through:

- **Low ring and cylinder liner wear**
- **Minimal ash deposits** — Minimizes deposits on valves, piston heads, combustion chambers, spark plugs, and port surfaces, thereby minimizing the risk of pre-ignition and detonation.
- **Clean engines** — The ashless dispersant inhibits sludge formation and piston deposits in naturally aspirated or turbocharged two-stroke engines.
- **Long oil life** — Oxidation inhibitors minimize oil degradation and provide long oil life.
- **Ease in starting** — SAE 15W-40 provides good startup and lubricant pumpability in cold weather.

Features

HDAX 3100 Ashless Gas Engine Oils are manufactured using selected paraffinic base oils and an additive package containing a dispersant, wear inhibitor, and oxidation inhibitor.

They are formulated for use in high speed, high output, turbocharged two-stroke and selected four-stroke gas engines operating at full capacity.

Minimal ash content in HDAX 3100 Ashless Gas Engine Oils help protect combustion chamber and spark plug from deposit formation that can result in pre-ignition, detonation, and loss of engine power.

HDAX 3100 Ashless Gas Engine Oils

- provide long overhaul intervals and filter life in ashless oil applications
- help prevent valve burning or guttering by maintaining clean valve faces
- maximize the lubricant service life by controlling viscosity increase with an effective ashless oxidation inhibitor
- offer excellent wear protection
- protect against engine corrosion

Applications

HDAX 3100 Ashless Gas Engine Oils are recommended for two-stroke high output, turbocharged and naturally aspirated gas engines requiring an ashless oil. They are also suitable for selected naturally aspirated four-stroke engines where minimal ash deposits are desired.

HDAX 3100 Ashless Gas Engine Oil SAE 40 is our preferred lubricant for engines manufactured by

- **Ajax** (SAE 40 or SAE 15W-40)
- **Clark-Dresser**
- **Cooper Bessemer** (two-stroke)
- **Worthington** (two-stroke)

HDAX 3100 Ashless Gas Engine Oil SAE 40 is suitable for engines manufactured by

- **Caterpillar** G3500 NA series
- **Waukesha** VR and **Intermediate/Clinton** series (four-stroke)
- **Fairbanks-Morse**/MEP (two-stroke)

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

SAE Grade	**15W-40**	**40**
Product Number	*235458*	*235456*
SDS Number	*32271*	*32271*
Density at 15°C, kg/L	0.8806	0.8762
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 134 15.6	 121 13.0
Viscosity Index	122	100
Flash Point, °C(°F)	236(457)	258(496)
Pour Point, °C(°F)	-25(-13)	-16(3)
Sulfated Ash, wt %	<0.1	<0.1
Acid Number, ASTM D664	1.0	1.0
Base Number, ASTM D2896	0.8	0.8
Phosphorus, ppm	700	700
Zinc, ppm	380	380

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HDAX® 9200 Low Ash Gas Engine Oil

SAE 40

Product Description

HDAX® 9200 Low Ash Gas Engine Oil is a premium performance, low ash, dispersant/detergent type gas engine oil. It offers robust component protection even under heavy loads, and is designed for use in natural gas applications.

Customer Benefits

HDAX 9200 Low Ash provides the following benefits:

- **Long oil life** — Formulated with a combination of premium base oils and high performance additives for extended oil drains*. Excellent oxidation and nitration resistance, with a strong alkaline reserve that has the ability to protect against the effects of acidic attack and oxidation, significantly prolonging the service life of the oil.
- **Clean pistons** — Offers combustion chamber and piston deposit control, liner protection, sludge and wear control, and corrosion protection.
- **Minimized valve recession** — The unique ash-producing additives in the oil allow minimal valve recession with low levels of combustion chamber deposits, to minimize the potential for pre-ignition and spark plug fouling.
- **Low fluid volatility** — Helps minimize oil consumption.
- **Low wear** — Provides exceptional protection against piston, ring, and linear scuffing, scoring and wear.

Features

HDAX 9200 Low Ash Gas Engine Oil is our top of the line gas engine oil that has proven field experience in gas engines in gas-gathering operations, offering extremely low sulfur, nitrogen, and aromatics, in combination with ashless dispersant and oxidation inhibitors, with a metallic detergent and anti-wear additive system. It offers reliable corrosion resistance and our most advanced deposit control formulation to control deposits and help prevent ring sticking in today's modern engines, including those with steel piston crowns rated at a high brake mean effective pressure (BMEP).

HDAX 9200 Low Ash Gas Engine Oil oxidation and nitration resistance is designed to minimize viscosity increases in service, while promoting long oil life.

Applications

HDAX 9200 Low Ash Gas Engine Oil is suited to new generation high output, turbocharged, low emission 4-cycle engines requiring low ash lubricants, and is recommended for use in natural gas applications. It is formulated to meet catalyst compatibility requirements with low phosphorus levels.

HDAX 9200 Low Ash Gas Engine Oil is suitable for use with fuels containing low levels of sulfur and chloro-fluoro-carbons (CFC). In sour gas/high CFC applications, lubricants with a higher base reserve, such as HDAX 6500 LFG SAE 40, may be required.

HDAX 9200 Low Ash Gas Engine Oil is approved for:

- **Caterpillar Energy Solutions GmbH** for CG132, CG170 & CG260 series engines
- **GE Jenbacher** all versions of types 2, 3, 4 & 6, including 6 F, G & H burning Class A fuel (natural gas) and with CAT (catalytic converter)

* Results will vary based on operating conditions and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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- **MTU** preliminary approval MTL 5074 for Series 4000 gas engines*
- **MWM** TCG series burning natural gas
- **RMB/Energie** burning natural gas
- **TEDOM** rule 61-0-0281.1 for natural gas and propane-butane
- **Waukesha** VGF, VGP & 220GL Series Engines, Natural Gas, including Cogeneration

*This preliminary approval may be used to carry out a field test which, on successful conclusion, will result in an approval for use in MTU gas engines and listing in their fluids and lubricants specification.

Recommended for four-stroke gas-fueled engines manufactured by:

- **Caterpillar Oil and Gas** G3300, G3400, G3500 and G3600 series
- **Cummins** QSV and QSK series
- **Dresser-Rand Guascor** (Category I and II Engines)
- **MAN Diesel & Turbo** natural gas and dual fuel cogeneration
- **Superior** 4-stroke (Engines now supplied by GE)
- **Wärtsilä** 25SG, 28SG, 34SG, 50SG, 175SG, 220SG, 20DF, 32DF, 34DF & 50DF series, with natural gas as the main fuel

TYPICAL TEST DATA

SAE Grade	40
Product Number	*255275*
SDS Number *U.S.* *Canada* *Mexico*	 *43629* *43630* *43631*
Density at 15°C, kg/L	0.881
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 125 13.5
Viscosity Index	103
Flash Point, °C(°F)	278(532)
Pour Point, °C(°F)	-18(0)
Sulfated Ash, mass % ASTM D874	0.50
Base Number, mg KOH/g ASTM D2896	 4.2
Phosphorus, ppm	270
Zinc, ppm	320

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HDAX® 3200 Low Ash Gas Engine Oil

SAE 30, 40

Product Description

HDAX® 3200 Low Ash Gas Engine Oils are high performance, low ash, dispersant/detergent type engine oils designed to be used primarily in four-stroke stationary engines fueled by natural or synthetic gas.

Customer Benefits

HDAX 3200 Low Ash Gas Engine Oils deliver value through:

- **Low wear** — Provide excellent protection against piston, ring, and liner scuffing, scoring, and wear.
- **Minimal valve recession** — The level and type of ash producing additives in the oils controls valve recession with low levels of combustion chamber deposits to minimize the potential for pre-ignition and spark plug fouling.
- **Minimum oil viscosity increase** — Oxidation inhibited and nitration resistant to help ensure minimum viscosity increase and low wear rates.
- **Clean pistons** — Excellent piston cleanliness to help prevent ring sticking and maintain clean, varnish-free piston skirts.
- **Clean crankcases and top decks** — Minimize the formation of sludge in the crankcase and in the valve rocker cover/top deck area.
- **Catalyst compatibility** — Formulated to be compatible with exhaust emissions reduction systems.

Features

HDAX 3200 Low Ash Gas Engine Oils are formulated with high quality base stocks and an additive package containing ashless dispersant, oxidation inhibitors, metallic detergents, and a metallic antiwear agent.

HDAX 3200 Low Ash Gas Engine Oils provide excellent oxidation and nitration resistance, which minimize the buildup of insolubles. HDAX 3200 Low Ash Gas Engine Oils give excellent protection against ring/liner scuffing and wear. They also minimize valve recession in four-stroke engines, provide excellent piston/ring belt deposit control and effectively protect against the formation and buildup of engine sludge.

Applications

HDAX 3200 Low Ash Gas Engine Oils are recommended for four-stroke and selected two-stroke stationary engines fueled by natural or synthetic gas.

Recommended for four-stroke gas-fueled engines manufactured by:

- **Caterpillar**
- **Delaval Enterprise**
- **Dresser-Rand** Categories I, II, and III (SAE 30)
- **Superior**
- **Waukesha**
- **Worthington**

HDAX 3200 Low Ash Gas Engine Oils are formulated to meet catalyst compatibility requirements and are especially suited for installations requiring low phosphorus oil to prevent exhaust catalyst poisoning.

HDAX 3200 Low Ash Gas Engine Oils are suitable for use with fuels containing low levels of sulfur. In sour gas applications, an oil such as HDAX 5300 Medium Gas Engine Oil SAE 40 with higher base reserve may be required.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

SAE Grade	30	40
Product Number	*232310*	*232311*
SDS Number	*32277*	*32277*
Density at 15°C, kg/L	0.8773	0.8794
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 97.3 11.4	 124 13.5
Viscosity Index	104	104
Flash Point, °C(°F)	222(432)	230(446)
Pour Point, °C(°F)	-27(-17)	-27(-17)
Sulfated Ash, wt %	0.45	0.45
Acid Number, ASTM D664	1.0	1.0
Base Number, ASTM D2896	4.0	4.0
Phosphorus, ppm	280	280
Zinc, ppm	320	320

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HDAX® 5100 Ashless Gas Engine Oil

SAE 15W-40, 30, 40

Product Description

HDAX® 5100 Ashless Gas Engine Oils are advanced performance, premium quality, ashless, natural gas engine oils.

Customer Benefits

HDAX 5100 Ashless Gas Engine Oils deliver value through:

- **Excellent low temperature performance** — HDAX 5100 Ashless Gas Engine Oil SAE 15W-40 is less viscous than SAE 30 and 40 oils at low temperatures, so it provides easy startup and improved cold temperature lubrication as compared to straight grades.
- **Promotes low maintenance cost and long engine life**
- **Minimizes ash deposits** — Protects against spark plug fouling from lubricating oil ash deposits. Minimizes ash deposits on valves, piston heads, combustion chamber surfaces, spark plugs, and port surfaces, minimizing the risk of pre-ignition and detonation.
- **Low ring and cylinder liner wear**
- **Exceptional engine cleanliness** — Minimizes engine deposits at both high and low operating temperatures through the use of an ashless dispersant.
- **Minimum viscosity increase in severe service** — Ashless oxidation inhibitor minimizes viscosity increase allowing for long oil drain intervals.
- **Proven performance** in older four-stroke naturally aspirated and turbocharged engines.

Features

HDAX 5100 Ashless Gas Engine Oils are formulated with Group II base stocks and a carefully balanced ashless package of dispersant, antioxidant, extreme pressure, and corrosion inhibitor additives.

HDAX 5100 Ashless Gas Engine Oils are formulated without bright stock for all two-stroke and selected four-stroke high speed, high output, turbocharged natural gas engines operating at full capacity.

HDAX 5100 Ashless Gas Engine Oils help provide exceptionally clean engine parts, even under severe operating conditions and extended overhaul intervals. They help protect against the formation of crankcase sludge and help to maintain clean exhaust ports in two-stroke engines.

Applications

HDAX 5100 Ashless Gas Engine Oils are recommended for all two-stroke and selected four-stroke stationary engines that require a completely ashless-type engine oil and which use natural or synthetic fuel gas.

They are the recommended lubricant for two-stroke gas engines with high compression ratios and turbochargers, and two-stroke engines known to be sensitive to combustion chamber and port deposits.

They are also recommended for engines with bearing corrosion problems.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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HDAX® 5100 Ashless Gas Engine Oils are recommended for gas fueled engines manufactured by:

- **Ajax**
- **Caterpillar** (except 3400, 3500, 3600)
- **Clark-Dresser**
- **Cooper Bessemer** (two-stroke)
- **Dresser-Rand (Ingersoll-Rand)** Categories I and II
- **Fairbanks-Morse**/MEP
- **Waukesha** VR and Intermediate/Clinton
- **Worthington** (two-stroke)

SAE 15W-40 oils may not be appropriate for large medium speed gas engines. Consult Chevron at 1-800-LUBE-TEK or lubetek@chevron.com before using HDAX 5100 Ashless Gas Engine Oil SAE 15W-40 in these applications.

TYPICAL TEST DATA

SAE Grade	15W-40	30	40
Product Number	*232308*	*232373*	*232307*
SDS Number	*26850*	*26850*	*7050*
Density at 15°C, kg/L	0.8746	0.8773	0.8790
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 118.3 15.6	 104 11.4	 134 13.5
Viscosity Index	137	95	95
Flash Point, °C(°F)	230(446)	252(486)	260(500)
Pour Point, °C(°F)	-33(-27)	-30(-22)	-27(-17)
Sulfated Ash, wt %	nil	nil	nil
Acid Number, ASTM D664	1.0	1.0	1.0
Base Number, ASTM D2896	3.0	3.1	3.1
Phosphorus, ppm	670	670	670
Zinc, ppm	<10	<10	<10

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HDAX® 5200 Low Ash Gas Engine Oil

SAE 15W-40, 30, 40

Product Description

HDAX® 5200 Low Ash Gas Engine Oils are advanced performance, premium quality, bright stock free, low ash, dispersant/detergent type engine oils.

Customer Benefits

HDAX 5200 Low Ash Gas Engine Oils deliver value through:

- **Low maintenance cost and long engine life**
- **Low wear** — Provide excellent protection against piston, ring, and liner scuffing, scoring, and wear.
- **Valve protection** — The level and type of ash producing additives in the oils provide minimum valve recession with low levels of combustion chamber deposits to minimize the potential for pre-ignition and spark plug fouling.
- **Clean pistons** — Provides piston cleanliness to help prevent ring sticking and maintain clean, varnish-free piston skirts.
- **Clean crankcases and top decks** — Minimizes the formation of crankcase and valve cover/top deck sludge.
- **Catalyst compatibility** — Formulated to be compatible with exhaust emissions reduction systems.
- **Excellent low temperature performance** — HDAX 5200 Low Ash Gas Engine Oil SAE 15W-40 provides maximum oil flow to engine components for better lubrication during cold startup, compared to straight grades.

Features

HDAX 5200 Low Ash Gas Engine Oils are formulated with premium base oil technology and an additive package containing ashless dispersant, oxidation inhibitors, metallic detergents and a metallic antiwear agent.

HDAX 5200 Low Ash Gas Engine Oils provide outstanding oxidation and nitration resistance, which minimize the buildup of insolubles and help provide long oil and filter life. HDAX 5200 Low Ash Gas Engine Oils give excellent protection against ring and liner scuffing and wear. They also minimize valve recession in four-stroke engines and provide excellent piston and ring belt deposit control and effectively protect against the formation and buildup of engine sludge.

HDAX 5200 Low Ash Gas Engine Oil SAE 15W-40 helps provide easy engine startup, maximum oil flow in low temperatures, and can reduce oil consumption compared to straight grades.

Applications

HDAX 5200 Low Ash Gas Engine Oils are recommended for four-stroke and selected two-stroke stationary engines fueled by natural gas.

HDAX 5200 Low Ash Gas Engine Oil SAE 40 is approved for:

- **Caterpillar Energy Solutions GmbH** for CG132, CG170 & CG260 gas engines.
- **GE Jenbacher** Type 2, 3, and 4 (versions A & B) gas engines burning fuel class A (natural gas), including engines with oxidation catalytic converters. Type 4 (version C) gas engines burning fuel class A (natural gas), B (biogas) and C (landfill gas), including engines with oxidation catalytic converters. Type 6 (versions C & E) gas engines burning fuel class A (natural gas), including engines with oxidation catalytic converters. Type 6 (version F) gas engines burning fuel class A (natural gas), B (biogas) and C (landfill gas), including engines with oxidation catalytic converters.
- **MAN Diesel & Turbo** engines in operation on natural gas (CNG/LNG).

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

20 June 2018
GEO-60

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- **MWM** gas engines.
- **Wärtsilä** gas engines and dual fuel engines with natural gas as main fuel.
- All **Waukesha** gas engines burning pipeline quality gas.

HDAX® 5200 Low Ash Gas Engine Oils are recommended for four-stroke gas-fueled engines manufactured by:

— **Caterpillar**
— **Delaval Enterprise**
— **Dresser-Rand** (Categories I, II, and III)
— **MWM (DEUTZ)**
— **Superior**
— **Worthington**

HDAX 5200 Low Ash Gas Engine Oils are formulated to meet catalyst compatibility requirements and are especially suited for installations requiring low phosphorus oil to prevent exhaust catalyst poisoning.

HDAX 5200 Low Ash Gas Engine Oils are suitable for use with fuels containing low levels of sulfur. In sour gas applications, a lubricant with higher base reserve such as HDAX 5300 Medium Ash Gas Engine Oil SAE 40 may be required.

HDAX 5200 Low Ash Gas Engine Oil SAE 15W-40 is particularly suited for four-stroke and selected two-stroke gas engines requiring good low temperature startability.

TYPICAL TEST DATA

SAE Grade	15W-40	30	40
Product Number	*232331*	*232327*	*232328*
SDS/MSDS Number *USA* *Colombia*	 *7046* —	 *7046* —	 *7046* *33435*
Density at 15°C, kg/L	0.8752	0.8773	0.8790
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 126 15.6	 97.3 11.4	 124 13.5
Viscosity Index	130	104	104
Viscosity, Cold Crank, °C/Poise	-20/64.0	—	—
Flash Point, °C(°F)	204(399)	215(419)	230(446)
Pour Point, °C(°F)	-30(-22)	-30(-22)	-30(-22)
Sulfated Ash, wt %	0.5	0.5	0.5
Acid Number, ASTM D664	1.0	1.0	1.0
Base Number, ASTM D2896	4.2	4.2	4.2
Phosphorus, ppm	270	270	270
Zinc, ppm	320	320	320

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HDAX® 5200 Low Ash Gas Engine Oil ISOCLEAN® Certified Lubricant

SAE 15W-40, 30, 40

Product Description

HDAX® 5200 Low Ash Gas Engine ISOCLEAN® Certified Lubricants are advanced performance, premium quality, bright stock free, low ash, dispersant/detergent type engine oils. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

Customer Benefits

HDAX 5200 Low Ash Gas Engine ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Low maintenance cost and long engine life**
- **Low wear** — Provide excellent protection against piston, ring, and liner scuffing, scoring, and wear.
- **Valve protection** — The level and type of ash producing additives in the oils provide minimum valve recession with low levels of combustion chamber deposits to minimize the potential for pre-ignition and spark plug fouling.
- **Clean pistons** — Provides piston cleanliness to help prevent ring sticking and maintain clean, varnish-free piston skirts.
- **Clean crankcases and top decks** — Minimizes the formation of crankcase and valve cover/top deck sludge.
- **Catalyst compatibility** — Formulated to be compatible with exhaust emissions reduction systems.

Features

HDAX 5200 Low Ash Gas Engine ISOCLEAN Certified Lubricants are formulated with premium base oil technology and an additive package containing ashless dispersant, oxidation inhibitors, metallic detergents and a metallic antiwear agent.

HDAX 5200 Low Ash Gas Engine ISOCLEAN Certified Lubricants provide outstanding oxidation and nitration resistance, which minimize the buildup of insolubles and help provide long oil and filter life. HDAX 5200 Low Ash Gas Engine ISOCLEAN Certified Lubricants give excellent protection against ring and liner scuffing and wear. They also minimize valve recession in four-stroke engines and provide excellent piston and ring belt deposit control and effectively protect against the formation and buildup of engine sludge.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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25 June 2018
GEO-60 ISOCLEAN

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APPLICATIONS

HDAX® 5200 Low Ash Gas Engine ISOCLEAN® Certified Lubricants are recommended for four-stroke and selected two-stroke stationary engines fueled by natural gas.

HDAX 5200 Low Ash Gas Engine ISOCLEAN Certified Lubricants are approved for:

- **Caterpillar Energy Solutions GmbH** for CG132, CG170 & CG260 gas engines.
- **GE Jenbacher** Type 2, 3, and 4 (versions A & B) gas engines burning fuel class A (natural gas), including engines with oxidation catalytic converters. Type 4 (version C) gas engines burning fuel class A (natural gas), B (biogas) and C (landfill gas), including engines with oxidation catalytic converters. Type 6 (versions C & E) gas engines burning fuel class A (natural gas), including engines with oxidation catalytic converters. Type 6 (version F) gas engines burning fuel class A (natural gas), B (biogas) and C (landfill gas), including engines with oxidation catalytic converters.
- **MAN Diesel & Turbo** gas and dual fuel engines in operation on natural gas (CNG/LNG).
- All **MWM** gas engines.
- **Wärtsilä** gas engines and dual fuel engines with natural gas as main fuel.
- All **Waukesha** gas engines burning pipeline quality gas.

HDAX 5200 Low Ash Gas Engine ISOCLEAN Certified Lubricants are recommended for four-stroke gas-fueled engines manufactured by:

- **Caterpillar**
- **Delaval Enterprise**
- **Dresser-Rand** (Categories I, II, and III)
- **MWM (DEUTZ)**
- **Superior**
- **Worthington**

HDAX 5200 Low Ash Gas Engine ISOCLEAN Certified Lubricants are formulated to meet catalyst compatibility requirements and are especially suited for installations requiring low phosphorus oil to prevent exhaust catalyst poisoning.

HDAX 5200 Low Ash Gas Engine ISOCLEAN Certified Lubricants are suitable for use with fuels containing low levels of sulfur. In sour gas applications, a lubricant with higher base reserve such as HDAX 5300 Medium Ash Gas Engine Oil SAE 40 may be required.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

SAE Grade	15W-40	30	40
Product Number	*274317*	*274318*	*274319*
SDS/MSDS Number *Canada* *Mexico*	7046 *7046CAN* *7046MEX*	7046 *7046CAN* *7046MEX*	7046 *7046CAN* *7046MEX*
Density at 15°C, kg/L	0.8752	0.8773	0.8790
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 126 15.6	 97.3 11.4	 124 13.5
Viscosity Index	130	104	104
Viscosity, Cold Crank, °C/Poise	-20/64.0	—	—
Flash Point, °C(°F)	204(399)	215(419)	230(446)
Pour Point, °C(°F)	-30(-22)	-30(-22)	-30(-22)
Sulfated Ash, wt %	0.5	0.5	0.5
Acid Number, ASTM D664	1.0	1.0	1.0
Base Number, ASTM D2896	4.2	4.2	4.2
Phosphorus, ppm	270	270	270
Zinc, ppm	320	320	320

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HDAX® 5300 Medium Ash Gas Engine Oil
SAE 40

Product Description

HDAX® 5300 Medium Ash Gas Engine Oil is an advanced performance, premium quality, medium ash, dispersant/detergent type gas engine oil formulated especially for four-stroke engines where medium ash oils are preferred.

Customer Benefits

HDAX 5300 Medium Ash Gas Engine Oil delivers value through:

- **Excellent corrosion control** — Specially formulated to protect engines burning high sulfur containing fuels, even under intermittent operating conditions where high levels of acidic condensate form.
- **Valve recession control** — Provides maximum valve recession control over low ash formulations in those engines where medium ash oils are preferred.
- **Minimum viscosity increase** — Excellent oxidation and nitration resistance to ensure minimum viscosity increase.
- **Clean crankcases and top decks** — Minimizes the formation of sludge in the crankcase and in the rocker cover/top-deck area.
- **Low wear** — Provides excellent protection against corrosive wear, adhesive wear, and piston ring and liner scuffing and scoring.

Features

HDAX 5300 Medium Ash Gas Engine Oil is formulated with premium group II base oil technology and an additive package containing ashless dispersant, oxidation inhibitors, metallic detergents, and a metallic antiwear additive.

HDAX 5300 Medium Ash Gas Engine Oil provides a high level of base reserve to control corrosion when high sulfur fuels are used.

Applications

HDAX 5300 Medium Ash Gas Engine Oil is recommended for:

- four-stroke engines fueled by sour gas.
- engines where increased ash levels are preferred for maximum valve recession control and head life.

Typical Test Data

SAE Grade	40
Product Number	*232309*
SDS Number	*17017*
Density at 15°C, kg/L	0.8811
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 125.4 13.5
Viscosity Index	103
Flash Point, °C(°F)	270(518)
Pour Point, °C(°F)	-33(-27)
Sulfated Ash, wt %	0.70
Acid Number, ASTM D664	1.0
Base Number, ASTM D2896	6.2
Phosphorus, ppm	270
Zinc, ppm	310

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
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20 March 2014
GEO-65

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HDAX® 6500 LFG Gas Engine Oil

SAE 40

Product Description

HDAX® 6500 LFG Gas Engine Oil is a premium quality high performance low ash dispersant/detergent type SAE 40 gas engine oil, specifically formulated for landfill gas, biogas, digester gas and sour gas applications.

Customer Benefits

HDAX 6500 LFG Gas Engine Oil delivers value through:

- **Maximizes oil service life** — Combination of high performance premium base fluids and a robust inhibitor package offers extended service protection with oxidation and nitration resistance and good base retention.
- **Minimizes operating costs** — Low oil consumption from excellent piston deposit control with extended drain capability keeps equipment in service longer generating revenue.
- **Long Engine Life** — Formulated to protect from corrosive wear in engines burning harsh landfill and sour gas fuels. Protects against valve train wear and scuffing of highly loaded parts operating under boundary lubrication conditions. Level and type of ash producing additives controls valve recession and potential for pre-ignition.
- **Minimizes maintenance costs** — Exceptional oxidation resistance and dispersancy minimizes sludge formation, protects against filter plugging, abrasive polishing wear and oil thickening. Special formulation gives excellent corrosion control in engines burning high chlorofluorocarbon (CFC) and / or high sulfur containing fuels where high level of acidic condensate form. This exceptional corrosion control ensures maximum liner life even in intermittent operation.
- **Advanced catalyst protection** — Low phosphorus technology formulation promotes reliable catalyst performance and protection.

Features

HDAX 6500 LFG Gas Engine Oil is a premium quality high performance low ash dispersant/detergent type SAE 40 gas engine oil, specifically formulated for landfill gas, biogas, digester gas and sour gas applications. Combination of high performance premium base fluids and a robust inhibitor package provides exceptional protection and extended service protection for engines burning aggressive sour gases.

HDAX 6500 LFG Gas Engine Oil provides excellent corrosion resistance in landfill gas, biogas, digester gas and sour gas applications, even when intermittent operation results in the formation of significant levels of acidic condensate. At 0.55 m% sulfated ash, HDAX 6500 LFG Gas Engine Oil gives this performance without the higher levels of combustion chamber deposits compared to some other products used in these applications.

It also provides excellent valve recession control for four stroke engines where low ash oil is preferred.

HDAX 6500 LFG Gas Engine Oil provides excellent deposit control on pistons minimizing ring sticking; providing scuffing protection to the cylinder liners, minimizing oil consumption and lacquering. Excellent engine cleanliness promotes long component life.

Applications

HDAX 6500 LFG is recommended for:

- Four-stroke engines fueled by landfill gas containing elevated levels of chlorofluorocarbons (CFCs)
- Sour gas applications where corrosive wear is a special concern
- Engines where low ash oils are preferred

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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GEO-100

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HDAX® 6500 LFG is approved for:

- **Caterpillar Energy Solutions GmbH** for Model CG 132, CG 170 and CG 260 engines
- **Cummins QSV** gas engines burning landfill gas
- **GE Jenbacher** gas engine types 2, 3, 4 versions A & B, and 6 versions C & E in fuel classes B (biogas) and C (landfill gas)
- **MAN Truck and Bus** M3271-4 for special gas
- **MWM** Gas Engines
- **TEDOM** rule 61-0-0281.1 for landfill, biogas and sewage gas fuels

HDAX 6500 LFG meets the requirements of these engines burning landfill gas:

- **MTU** MTL 5074

HDAX 6500 LFG is suitable for use in the following engines burning landfill gas or biogas fuels:

- **Caterpillar**
- **Waukesha**

The total base number or TBN retention, excellent deposit control and minimum viscosity increase performance of HDAX 6500 LFG Gas Engine Oil make this premium oil especially suited for extended drain service in four stroke gas engines.

TYPICAL TEST DATA

SAE Grade	**40**
Product Number	*262326*
SDS Number	*34537*
Viscosity Grade	SAE 40
Density at 15°C, kg/L	0.875
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 130 14.7
Viscosity Index	114
Flash Point, °C(°F)	268(514)
Pour Point, °C(°F)	-27(-17)
Sulfated Ash, m %	0.55
Acid Number, ASTM D664, mg KOH/g	1.2
Base Number, ASTM D2896, mg KOH/g	4.5

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HDAX® NG Screw Compressor Oil
68, 100, 150

Product Description

HDAX® NG Screw Compressor Oils are formulated for use in natural gas screw compressors running on dry natural gas, or natural gas containing water or sour gases.

Customer Benefits

HDAX NG Screw Compressor Oils deliver value through:

- **Cost effectiveness —** Provide excellent performance at a significantly lower cost than polyglycol synthetics.
- **Wide range of operating temperatures —** Ability to start compressors in colder environments, and ability to provide ample oil film thickness at operating temperatures.
- **Corrosion protection —** Contain rust and corrosion inhibitors to help protect equipment against water and corrosive effects of sour gases.

Features

HDAX NG Screw Compressor Oils are formulated to

- **meet the lubrication demands of screw compressors in natural gas service.**
- **protect lubricated parts against the corrosive effects of water and sour gas.**

HDAX NG Screw Compressor Oils are formulated with premium Group II base oil technology and ashless additives. The base stocks and selected additives extend the low temperature operating range of the compressor, allowing cold starts and ability to quickly reach operating pressure. Other additives protect against wear, rust, deposits, foaming, and help protect compressor parts from the corrosive effects of sour gas.

High viscosity indices and extremely low pour points allow HDAX NG Screw Compressor Oils to remain fluid at low startup temperatures, helping to protect moving parts when lubrication is most needed.

These ashless oils also stay sufficiently viscous at high operating temperatures to protect bearings during operation.

HDAX NG Screw Compressor Oils have excellent thermal and oxidative stability, minimizing the deposits and sludge which can form due to lubricant degradation in the high temperature environment of the compressor.

Applications

HDAX NG Screw Compressor Oils should not be used in ammonia or air compressors services.

Polyglycol synthetics are frequently recommended for natural gas screw compressors because they are believed to be less susceptible to dilution by natural gas; however, their cost is quite high. HDAX NG Screw Compressor Oils are formulated to provide effective lubrication of natural gas screw compressors, but with a hydroprocessed mineral oil lubricant.

HDAX NG Screw Compressor Oils are recommended for use in screw compressors of all major natural gas compressor manufacturers, including Frick, Howden, FES, Mycom, and Ariel.

HDAX NG Screw Compressor Oil 68 is recommended

- when ambient startup temperatures are very low
- where dilution is minimal
- for higher speed operations

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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GEO-70

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HDAX® NG Screw Compressor Oil 100 is recommended

- when ambient startup temperatures are moderate
- where dilution is significant

HDAX NG Screw Compressor Oil 150 is recommended

- when startup temperatures are moderate to high
- where dilution by liquid hydrocarbons is significant

TYPICAL TEST DATA

ISO Grade	68	100	150
Product Number	*255204*	*259135*	*255205*
SDS Number	*6852*	*6852*	*6852*
API Gravity	30.5	30.1	29.3
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 65 10.4	 95 14.6	 143 18.9
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 330 62	 485 77	 736 96
Viscosity Index	150	150	150
Flash Point, °C(°F)	236(457)	246(475)	256(493)
Pour Point, °C(°F)	-44(-47)	-37(-35)	-32(-26)
Rust Preventive Test Procedure B, Synthetic Sea Water	 Pass	 Pass	 Pass
Four-Ball Wear Scar Diameter, mm	 0.5	 0.5	 0.5
Copper Strip Test 3 h at 121°C	 1a	 1a	 1a

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

MARINE LUBRICANTS

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DELO® 710 LE

SAE 20W-40, 40

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 710 LE is an industry leading, premium diesel engine oil for use in EMD and GE engines in marine, railroad and power generation applications.

CUSTOMER BENEFITS

Delo 710 LE delivers value and long engine life through:

- Excellent Wear Control
- Helps maximize engine cleanliness
- Exhaust system and turbocharger deposit control
- Excellent Oxidation stability, soot dispersancy and base retention for long oil life with newly designed low consumption power assemblies
- SAE 20W-40 helps provide a 15% to 25%[1] oil consumption reduction vs. single grade engine oils
- Formulated specifically for engines using Low Sulfur and Ultra Low Sulfur Fuels

FEATURES

Delo 710 LE is approved by EMD and GE and is specifically formulated for use with Low Sulfur Diesel (LSD) and Ultra Low Sulfur Diesel (ULSD) fuels and new low emission engines.

Delo 710 LE uses premium quality base oils that are exceptionally pure, with extremely low levels of sulfur, nitrogen and aromatics to enhance oxidation resistance.

Delo 710 LE employs newly developed dispersants, detergents and oxidation inhibitors to promote outstanding oil life and minimal ash content. In addition, the 20W-40 viscosity grade can reduce oil consumption 15-25%[1] vs single grade engine oils. All of these features make Delo 710 LE an excellent lubricant for engines using LSD and ULSD fuels with or without exhaust after-treatment equipment.

APPLICATIONS

Delo 710 LE is recommended for diesel engines using LSD or ULSD fuels where Zn-free oils are required in the following applications:

- Railroad
- Marine
- Offshore Drilling and Production
- Stationary Power Generation

Delo 710 LE benefits:

- Designed for low and ultra low sulfur fuels
- Formulated for modern EMD and GE engines used in a wide range of railroad, inland marine and stationary engines
- Uses an optimized additive formulation with reduced ash and advanced dispersant technology
- Helps minimize exhaust system and turbo-charger deposits
- Zinc free, Non-chlorinated
- Compatible with earlier generation EMD and GE approved engine oils
- Miscible with competitive railroad type oils and additive systems when engine manufacturers recommended practices are followed
- Delo 710 LE SAE 20W-40 meets the performance requirements of LMOA Generation 6 and is approved for Electro-Motive Diesel LMOA Generation 5 and General Electric LMOA Generation 4 Long Life.
- Delo 710 SAE 40 meets the performance requirements of LMOA Generation 6 and is approved

1 Oil Consumption reduction will vary depending on engine duty cycle.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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for Electro-Motive Diesel LMOA Generation 5 and General Electric LMOA Generation 4 Long Life.

TYPICAL TEST DATA

SAE Grade	20W-40	40
Product Number	*235080*	*235081*
SDS Number	*24588*	*30472*
Density at 15°C, kg/L	0.880	0.881
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 136.4 15.5	 145.0 15.0
Viscosity Index	118	104
Flash Point, °C(°F)	230(446)	250
Pour Point, °C(°F)	-27(-16.6)	-18(0)
Sulfated Ash, wt %	1.0	1.0
Base Number, ASTM D2896	 9.5	 9.1
Zinc, ppm	< 10	< 10

Minor variations in product typical test data are to be expected in normal manufacturing.

DELO® 1000 MARINE
SAE 30, 40

PRODUCT DESCRIPTION

Delo® 1000 Marine is a high-performance, medium-alkaline, diesel engine oil for medium- and high-speed trunk piston diesel engines.

CUSTOMER BENEFITS

Delo 1000 Marine delivers value through:

- **Wear protection** — Protects against corrosive combustion products and minimizes wear on all moving engine components. Provides excellent protection for cams, camshaft and bearings.
- **Detergent/Dispersant Properties** — Keeps crankcases and oil control rings clean. Reduces deposit formation particularly in the ring belt area and reduces lube oil filter blockage. Effectively handles insolubles.
- **Oxidation stability** — Oxidation inhibitors protect the oil against high thermal stresses, protect engine parts from corrosion and reduce undercrown deposits, while promoting extended lubricant life.
- **Rust protection** — Prevents corrosion of engine parts when the engine is not in operation. Provides excellent rust protection as required in stern tube application.
- **Balanced additive components** — Provides minimal maintenance and down time, long engine life, and economical operating costs.

FEATURES

Delo 1000 Marine is blended from high-quality base oils and selected additives that protect the oil from oxidation and provide excellent detergency and dispersancy.

Delo 1000 Marine has extremely good viscosity control, and its excellent alkalinity retention properties prevent corrosive wear over long periods of time.

Delo 1000 Marine also has good water separation and anti-foam properties.

APPLICATIONS

Delo 1000 Marine 30 and 40 are recommended for all types of trunk piston engines, including the latest high-output, medium-speed engines using high sulphur gas oil or marine diesel oil with a maximum sulphur level of 1.5%.

Delo 1000 Marine is approved by the major builders of trunk piston engines.

The FZG (A/8.3/90) failure load stage 12 permits its use in engine reduction gears and other applications where EP properties are required.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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ML-40

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TYPICAL TEST DATA

SAE Grade	30	40
Product Number	*235096*	*235094*
SDS/MSDS Number *USA* *Colombia*	 *12811* —	 *12811* *32512*
Density at 15°C, kg/L	0.89	0.89
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 102.5 11.6	 135 14.2
Viscosity Index	100	100
Flash Point, °C(°F)	240(464)	240(464)
Pour Point, °C(°F)	-18(-4)	-18(-4)
Sulfated Ash, wt %	1.67	1.67
Base Number, ASTM D2896	12	12
FZG test (A/8.3/90), failure load test	12	12

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON MARINE ENGINE OIL SYMBOL 9250
SAE 40

PRODUCT DESCRIPTION

Chevron Marine Engine Oil Symbol 9250 is a high quality, high performance marine engine oil.

CUSTOMER BENEFITS

Chevron Marine Engine Oil Symbol 9250 delivers value through:

- **Long engine life** due to controlled wear of moving parts
- **Excellent control of engine deposits** by use of effective detergent and dispersant additives
- **Outstanding demulsibility** which its quick water-oil separation quality helps ensure
- **Minimum corrosive wear** controlled by high alkaline reserves, which neutralize potential acidic material
- **Controlled maintenance** costs by minimizing corrosive and mechanical wear
- **Multifunctional performance** which can minimize inventories

FEATURES

Chevron Marine Engine Oil Symbol 9250 is manufactured using highly refined, high viscosity index paraffinic base oils to meet the critical demands of marine trunk piston-type diesel engines using relatively high sulfur diesel fuel.

It is compounded to promote outstanding engine protection and performance in trunk piston marine engines operating under moderate conditions. An effective detergent-dispersant package helps prevent piston lacquering, ring sticking and controls deposits throughout the engine. Rust and oxidation inhibitors are added to help prevent rust and to minimize oxidation of the lubricant. Alkaline reserves neutralize acids which result from fuel combustion by-products.

Chevron Marine Engine Oil Symbol 9250 is designed to minimize piston deposits, especially in critical areas around the ring belt, piston skirts and helps to keep rings free. Debris which could cause problems within the engine are dispersed and kept in suspension until it is drained, or they are removed by filtration. The FZG pass stage (Stage 12) of Chevron Marine Engine Oil Symbol 9250 helps assure excellent antiwear protection in metal-to-metal contacts throughout the engine.

APPLICATIONS

Chevron Marine Engine Oil Symbol 9250 can be used in engines where MIL-PRF-9000L Symbol 9250 oil is required.

It is a multifunctional product that can lubricate the main propulsion engine of landing craft, diesel generators, or in air compressors. The high base number (12.5mgKOH/g) helps assure adequate protection when using the relatively high sulfur levels that are frequently experienced in marine fuels.

Chevron Marine Engine Oil Symbol 9250 is approved for U.S. military specification MIL-PRF-9000L (SH), Symbol 9250, Lubrication Oil, Shipboard Internal Combustion Engine, High Output Diesel.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

SAE Grade	**40**
Product Number	*235404*
SDS Number	*44954*
API Gravity	28.4
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 125 14.0
Viscosity Index	105
Flash Point, °C(°F)	274(525)
Pour Point, °C(°F)	-33(-27)
Sulfated Ash, wt %	1.7
Base Number, ASTM D2896	12.5
Phosphorus, ppm	1180
Zinc, ppm	1310

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TARO® 20 DP

SAE 30(X), 40(X)

PRODUCT DESCRIPTION

Taro® 20 DP are high performance, high alkalinity diesel engine oils for medium and high speed trunk piston diesel engines burning residual fuels with a maximum sulphur content up to 2%. Taro 20 DP can also be used in combination with gas oil or marine diesel oil (MDO).

CUSTOMER BENEFITS

Taro 20 DP deliver value through:

- **Wear protection** — High BN levels control cylinder liner wear effectively and protects bearings from corrosion. High performance antiwear additives provide excellent protection against adhesive wear for cams, camshaft and bearings.
- **Excellent foaming and water tolerance** — Provide a high degree of water tolerance and antifoam protection.
- **Detergent/Deposit Properties** — Keep crankcases and control oil rings clean. Prevents deposit formation throughout the engine. Reduces lube oil filter blockage. Effectively handles insolubles.
- **Oxidation stability** — Oxidation inhibitors protect the oil against high thermal stresses, protect engine parts from corrosion and reduce undercrown deposits, while promoting extended lubricant life.
- **Rust protection** — Prevent corrosion of engine parts when the engine is not in operation.
- **Balanced additive components** — Provide minimal maintenance and down-time, long engine life, and economical operating costs.

FEATURES

Taro 20 DP are blended from high quality base oils and additives that provide an extra margin of protection against ring sticking, piston deposits and wear under severe operating conditions.

Taro 20 DP have very good viscosity control when used in severe high temperature service and its excellent alkalinity retention characteristics prevent corrosive wear over long periods of operation.

The unique detergent and dispersant additive system promotes outstanding piston cleanliness as well as superb heavy fuel related contaminants handling characteristics. This helps reduce both "hot" (piston lands and grooves, piston undercrown, purifier heaters) and "cold" (crankcase, cambox, rocker area, fuel pumps, purifier bowl) deposits. The oil provides a high degree of water tolerance, good water separability and base retention properties.

APPLICATIONS

Taro 20 DP are recommended for trunk piston diesel engines burning MDO or low sulfur heavy fuels with a sulfur content up to 2%.

Taro 20 DP meet the requirements of most major marine diesel engine manufacturers.

Product(s) manufactured in the USA and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

SAE Grade	30(X)	40(X)
Product Number	*293001*	*293002*
SDS/MSDS Number *USA* *El Salvador*	 *26775* —	 *26775* *32505*
API Gravity	25.7	25.7
Density at 15°C, kg/L	0.91	0.91
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 95 11.0	 135 14.0
Viscosity Index	100	100
Flash Point, °C(°F)	240(464)	240(464)
Pour Point, °C(°F)	-12(0)	-12(0)
Sulfated ash, mass %	2.5	2.5
Base Number, ASTM D2896	20	20

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TARO® 30 DP

SAE 30(X), 40(X)

PRODUCT DESCRIPTION

Taro® 30 DP are high performance, high alkalinity diesel engine oils for medium and high speed trunk piston diesel engines burning residual fuels with a maximum sulfur content up to 4%.

CUSTOMER BENEFITS

Taro 30 DP deliver value through:

- **Wear protection** — High BN levels control cylinder liner wear effectively and protects bearings from corrosion. High performance antiwear additives provide excellent protection against adhesive wear for cams, camshaft and bearings.
- **Excellent foaming and water tolerance** — Provides a high degree of water tolerance and antifoam protection.
- **Detergent/Dispersant Properties** — Keeps crankcases and oil control rings clean. Prevents deposit formation throughout the engine. Reduces lube oil filter blockage. Effectively handles insolubles.
- **Oxidation stability** — Oxidation inhibitors protect the oil against high thermal stresses, protect engine parts from corrosion and reduce undercrown deposits, while promoting extended lubricant life.
- **Rust protection** — Prevents corrosion of engine parts when the engine is not in operation.
- **Balanced additive components** — Provides minimal maintenance and downtime, long engine life and economical operating costs.

FEATURES

Taro 30 DP are blended from high quality base oils and additives that provide an extra margin of protection against ring sticking, piston deposits, and wear under severe operating conditions.

Taro 30 DP have very good viscosity control when used in severe high temperature service and its excellent alkalinity retention characteristics prevent corrosive wear over long periods of operation.

The unique detergent and dispersant additive system promotes outstanding piston cleanliness as well as superb heavy fuel related contaminants handling characteristics. This helps reduce both "hot" (piston lands and grooves, piston undercrown, purifier preheaters) and "cold" (crankcase, cambox, rocker area, fuel pumps, purifier bowl) deposits.

APPLICATIONS

Taro 30 DP are recommended for trunk piston diesel engines burning residual fuels with a maximum sulfur level of 4%.

Taro 30 DP meet the requirements of most major marine diesel engine manufacturers.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

SAE Grade	30(X)	40(X)
Product Number	*293003*	*293004*
SDS/MSDS Number *USA* *Colombia* *El Salvador*	 *26775* — —	 *26775* *32506* *32505*
API Gravity	25.7	25.7
Density at 15°C, kg/L	0.91	0.91
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 95 11.0	 135 14.0
Viscosity Index	100	100
Flash Point, °C(°F)	240(464)	240(464)
Pour Point, °C(°F)	-12(0)	-12(0)
Sulfated ash, mass %	3.7	3.7
Base Number, ASTM D2896	30	30

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TARO® 40 XL

SAE 40(X)

PRODUCT DESCRIPTION

Taro® 40 XL is a high performance, very high alkalinity diesel engine oil for medium speed trunk piston diesel engines burning residual fuels with a maximum sulfur level of 4.5%.

CUSTOMER BENEFITS

Taro 40 XL delivers value through:

- **Wear protection** — High BN levels control cylinder liner wear effectively and protects bearings from corrosion. High performance antiwear additives provide excellent protection against adhesive wear for cams, camshaft and bearings.
- **Excellent foaming and water tolerance** — Helps provide a high degree of water tolerance and antifoam protection.
- **Detergent/Dispersant Properties** — Keeps crankcases and oil control rings clean. Prevents deposit formation throughout the engine. Reduces lube oil filter blockage. Effectively handles insolubles.
- **Oxidation stability** — Oxidation inhibitors protect the oil against high thermal stresses, protect engine parts from corrosion and reduce undercrown deposits, while promoting extended lubricant life.
- **Rust protection** — Prevents corrosion of engine parts when the engine is not in operation.
- **Balanced additive components** — Provides minimal maintenance and down-time, long engine life and economical operating costs.

FEATURES

Taro 40 XL is blended from high quality base oils and additives that provide an extra margin of protection against ring sticking, piston deposits, and wear under severe operating conditions.

Taro 40 XL has very good viscosity control when used in severe high temperature service and its excellent alkalinity retention characteristics help prevent corrosive wear over long periods of operation.

The unique detergent and dispersant additive system promotes outstanding piston cleanliness as well as superb heavy fuel related contaminants handling characteristics. This helps reduce both "hot" (piston lands and grooves, piston undercrown, purifier preheaters) and "cold" (crankcase, cambox, rocker area, fuel pumps, purifier bowl) deposits.

Taro 40 XL has good water separation and base retention properties.

APPLICATIONS

Taro 40 XL is recommended for trunk piston diesel engines burning residual fuels with a maximum sulfur level of 4.5%.

Taro 40 XL SAE 40(X) meets the requirements of most major marine diesel engine manufacturers.

Product(s) manufactured in the USA, Colombia and El Salvador.
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TYPICAL TEST DATA

SAE Grade	40(X)
Product Number	*293005*
SDS/MSDS Number *USA* *Colombia* *El Salvador*	 *26684* *32508* *32507*
API Gravity	25.7
Density at 15°C, kg/L	0.91
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 135 14.0
Viscosity Index	100
Flash Point, °C(°F)	240(464)
Pour Point, °C(°F)	-12(0)
FZG Scuffing Test (A/8.3/90), failure load stage, ASTM D5182	12
Sulfated ash, mass %	4.9
Base Number, ASTM D2896	40

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TARO® 50 XL

SAE 40(X)

PRODUCT DESCRIPTION

Taro® 50 XL is a high performance very high alkalinity diesel engine oil for medium speed trunk piston diesel engines burning residual fuels with a maximum sulfur level of 4.5%.

CUSTOMER BENEFITS

Taro 50 XL delivers value through:

- **Wear protection** — High BN levels control cylinder liner wear effectively and protects bearings from corrosion. High performance antiwear additives provide excellent protection against adhesive wear for cams, camshaft and bearings.
- **Excellent foaming and water tolerance** — Helps provide a high degree of water tolerance and antifoam protection.
- **Detergent/Dispersant Properties** — Keeps crankcases and oil control rings clean. Prevents deposit formation throughout the engine. Reduces lube oil filter blockage. Effectively handles insolubles.
- **Oxidation stability** — Oxidation inhibitors protect the oil against high thermal stresses, protect engine parts from corrosion and reduce undercrown deposits, while promoting extended lubricant life.
- **Rust protection** — Prevents corrosion of engine parts when the engine is not in operation.
- **Balanced additive components** — Provides minimal maintenance and down time, long engine life, and economical operating costs.

FEATURES

Taro 50 XL is blended from high quality base oils and additives that provide an extra margin of protection against ring sticking, piston deposits and wear under severe operating conditions.

Taro 50 XL has very good viscosity control when used in severe high temperature service and its excellent alkalinity retention characteristics help prevent corrosive wear over long periods of operation.

The unique detergent and dispersant additive system promotes outstanding piston cleanliness as well as superb heavy fuel related contaminants handling characteristics. This helps reduce both "hot" (piston lands and grooves, piston undercrown, purifier preheaters) and "cold" (crankcase, cambox, rocker area, fuel pumps, purifier bowl) deposits.

Taro 50 XL has good water separation and base retention properties.

APPLICATIONS

Taro 50 XL is recommended for trunk piston diesel engines burning residual fuels with a maximum sulfur level of 4.5% and with low oil consumption.

Taro 50 XL meets the requirements of most major marine diesel engine manufacturers.

Product(s) manufactured in the USA and El Salvador.
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TYPICAL TEST DATA

SAE Grade	**40(X)**
Product Number	*293006*
SDS/MSDS Number *USA* *El Salvador*	 *26730* *32509*
API Gravity	24.6
Density at 15°C, kg/L	0.91
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 135 14.0
Viscosity Index	100
Flash Point, °C(°F)	240(464)
Pour Point, °C(°F)	-12(0)
FZG Scuffing Test (A/8.3/90), failure load stage, ASTM D5182	12
Sulfated ash, mass %	5.9
Base Number, ASTM D2896	50

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TARO® SPECIAL HT 55

SAE 50

PRODUCT DESCRIPTION

Taro® Special HT 55 is a high performance 55 BN SAE 50 cylinder lubricant intended for lubricating slow-speed engines at high mechanical and thermal loads.

CUSTOMER BENEFITS

Taro Special HT 55 delivers value through:

- **Wear protection** — Ensures protection against excessive cylinder liner and piston ring wear.
- **Detergent/dispersant properties** — Prevents ring sticking and minimizes deposit formation throughout the combustion chamber exhaust areas.
- **Excellent lubrication properties** — Maintains an oil film under severe, high load conditions, thereby reducing frictional wear and preventing scuffing of liners, pistons and rings.
- **Storage stability** — Completely stable at many different ambient temperatures and during long-term storage.
- **Compatibility** — Miscible and compatible with single-phase alkaline diesel cylinder lubricants generally known to the international marine trade.

FEATURES

Taro Special HT 55 is blended from highly refined, paraffinic base oils and carefully selected additives to provide excellent ring wear protection, liner wear protection and piston cleanliness in slow-speed crosshead engines. Taro Special HT 55 has been developed specifically for high-pressure and high-temperature applications.

APPLICATIONS

Taro Special HT 55 is recommended for lubricating the cylinders of large low-speed marine diesel engines operating with heavy fuel oil at high power outputs and high thermal loads. Taro Special HT 55 should be used in accordance with the OEM guidelines and recommendations.

Taro Special HT 55 has been approved by **MAN Diesel & Turbo** and **Wärtsilä**.

TYPICAL TEST DATA

SAE Grade	**50**
Product Number	*235020*
MSDS Number *USA* *Canada* *Mexico* *El Salvador*	 *31045* *31414* *41309* *31047*
API Gravity	22.3
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 230 20.0
Viscosity Index	100
Flash Point, °C(°F)	270(518)
Pour Point, °C(°F)	-15(+5)
Sulfated ash, mass %	6.8
Base Number, ASTM D2896	55

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TARO® SPECIAL HT 70

SAE 50

PRODUCT DESCRIPTION

Taro® Special HT 70 is a high performance 70 BN SAE 50 cylinder lubricant intended for lubricating slow-speed engines at very high mechanical and thermal loads.

CUSTOMER BENEFITS

Taro Special HT 70 delivers value through:

- **Wear protection** — Ensures protection against excessive cylinder liner and piston ring wear, thus allowing prolonged service intervals.
- **Detergent/dispersant properties** — Prevents ring sticking and minimizes deposit formation throughout the combustion chamber exhaust areas.
- **Excellent lubrication properties** — Maintains an oil film under severe, high load conditions, thereby reducing frictional wear and preventing scuffing of liners, pistons and rings.
- **Storage stability** — Completely stable at all ambient temperatures. Will not separate or deteriorate in long-term storage.
- **Compatibility** — Fully miscible and compatible with single-phase alkaline diesel cylinder lubricants generally known to the international marine trade.

FEATURES

Taro Special HT 70 is blended from highly refined, paraffinic base oils and carefully selected additives to provide superior ring and liner wear protection and excellent piston cleanliness in slow-speed crosshead engines. Taro Special HT 70 has been developed specifically for high-pressure and high-temperature applications.

APPLICATIONS

Taro Special HT 70 is recommended for lubricating the cylinders of all large slow-speed marine diesel engines operating at high specific power outputs and high thermal loads.

Taro Special HT 70 has been approved by **MAN Diesel & Turbo**, **Wärtsilä** and **Mitsubishi Heavy Industries** for use in the latest generation engine designs.

TYPICAL TEST DATA

SAE Grade	50
Product Number	*235016*
SDS/MSDS Number *USA* *Colombia* *El Salvador*	 *23298* *33353* *33352*
API Gravity	20.7
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 230 20.0
Viscosity Index	100
Flash Point, °C(°F)	270(518)
Pour Point, °C(°F)	-15(+5)
Sulfated ash, mass %	9.0
Base Number, ASTM D2896	70

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TARO® SPECIAL HT LS 40

SAE 50

PRODUCT DESCRIPTION

Taro® Special HT LS 40 is a high performance 40 BN SAE 50 cylinder lubricant particularly intended for lubricating the cylinders of the latest generation slow-speed engines using low sulphur fuel and operating at very high mechanical and thermal loads reaching up to 160 bar in maximum cylinder pressure and up to 270 degrees Celsius in liner temperature at top dead center.

CUSTOMER BENEFITS

Taro Special HT LS 40 delivers value through:

- **Wear protection** — Protects against excessive cylinder liner and piston ring wear, thus allowing prolonged service intervals.
- **Detergent/dispersant properties** — Prevents ring sticking and minimizes deposit formation throughout the combustion chamber areas.
- **Excellent lubrication properties** — Maintains an oil film under severe, high load conditions, thereby reducing frictional wear and preventing scuffing of liners, pistons and rings.
- **Storage stability** — Completely stable at all ambient temperatures. Will not separate or deteriorate in long-term storage.
- **Compatibility** — Fully miscible and compatible with alkaline cylinder lubricants generally known to the international marine trade.

FEATURES

Taro Special HT LS 40 is blended from highly refined, paraffinic base oils and carefully selected additives to provide superior ring and liner wear protection and excellent piston cleanliness in slow-speed crosshead engines. Taro Special HT LS 40 has been developed specifically for high-pressure and high-temperature applications.

APPLICATIONS

Taro Special HT LS 40 is recommended for the cylinder lubrication of all slow-speed marine diesel engines continuously using low sulphur fuel and operating at high specific power outputs and high thermal loads. Running on low sulphur fuel requires the reduction of base introduced into the cylinder. This can be achieved by optimizing the oil feed rate or selecting a diesel cylinder lubricant with a lower base number.

Taro Special HT LS 40 has been approved by **MAN Diesel & Turbo** and **Wärtsilä**.

TYPICAL TEST DATA

SAE Grade	**50**
Product Number	*235018*
SDS/MSDS Number *USA* *El Salvador*	 *22635* *TBD*
API Gravity	22.3
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 230 20.0
Viscosity Index	100
Flash Point, °C(°F)	270(518)
Pour Point, °C(°F)	-15(+5)
Sulfated ash, mass %	5.1
Base Number, ASTM D2896	40

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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VERITAS® 800 MARINE OIL
SAE 20, 30

PRODUCT DESCRIPTION

Veritas® 800 Marine Oil is a premium crankcase lubricant for slow-speed crosshead diesel engines.

CUSTOMER BENEFITS

Veritas 800 Marine Oil delivers value through:

- **Wear protection** — The lubricating oil alkalinity reserve helps protect bearings and bright metals in the engine lubrication systems against corrosive wear from acids formed by combustion.
- **Detergency** — Helps clean crankcases, piston interiors and lubricating oil lines.
- **Corrosion protection** — Helps protect engine parts against rusting.
- **Rust protection** — Helps prevent corrosion of engine parts when the engine is not in operation.
- **Resistance to foaming** — A foam inhibitor helps prevent the formation of foam and ensures smooth operation of lube oil pumps with a continuous feed of oil to all lubricated parts.
- **Easy purification** — The oil can be cleaned with the normal shipboard purifiers. Water washing of Veritas 800 Marine is neither necessary nor recommended.

FEATURES

Veritas 800 Marine Oil is manufactured from highly refined lubricating oil stocks and has very good anti-corrosion and anti-foam properties. The oil has a moderate level of alkalinity to neutralize acidic combustion products that can enter the crankcase. Special additives give the oil detergent properties which helps clean crankcases. The combination of detergency and the excellent oxidation stability promotes clean piston interiors where oil is used for cooling.

APPLICATIONS

Veritas 800 Marine Oil SAE 30 is recommended for the crankcase lubrication of large, slow speed marine diesel engines. Due to ingress of high viscosity cylinder drip oil into the SAE 30 system oil, the viscosity often shows an increase. Using the SAE 20 grade will help to correct such an increase. Veritas 800 Marine Oil meets the **Wärtsilä, MAN B&W**, and **Mitsubishi** crosshead engine system oil requirements.

Product(s) manufactured in the USA.
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TYPICAL TEST DATA

SAE Grade	20	30
Product Number	*251000*	*250035*
SDS Number	*23296*	*23296*
Density at 15°C, kg/L	0.88	0.89
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 68 8.5	 111 11.9
Viscosity Index	100	100
FZG test (A/8.3/90), failure load stage	10	11
Flash Point, °C(°F)	240(464)	240(464)
Pour Point, °C(°F)	-18(0)	-18(0)
Rust test, synthetic seawater	Pass	Pass
Base Number, ASTM D2896	5.4	5.4

Minor variations in product typical test data are to be expected in normal manufacturing.

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RAILROAD LUBRICANTS

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DELO® 710 LE

SAE 20W-40, 40

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 710 LE is an industry leading, premium diesel engine oil for use in EMD and GE engines in marine, railroad and power generation applications.

CUSTOMER BENEFITS

Delo 710 LE delivers value and long engine life through:

- Excellent Wear Control
- Helps maximize engine cleanliness
- Exhaust system and turbocharger deposit control
- Excellent Oxidation stability, soot dispersancy and base retention for long oil life with newly designed low consumption power assemblies
- SAE 20W-40 helps provide a 15% to 25%[1] oil consumption reduction vs. single grade engine oils
- Formulated specifically for engines using Low Sulfur and Ultra Low Sulfur Fuels

FEATURES

Delo 710 LE is approved by EMD and GE and is specifically formulated for use with Low Sulfur Diesel (LSD) and Ultra Low Sulfur Diesel (ULSD) fuels and new low emission engines.

Delo 710 LE uses premium quality base oils that are exceptionally pure, with extremely low levels of sulfur, nitrogen and aromatics to enhance oxidation resistance.

Delo 710 LE employs newly developed dispersants, detergents and oxidation inhibitors to promote outstanding oil life and minimal ash content. In addition, the 20W-40 viscosity grade can reduce oil consumption 15-25%[1] vs single grade engine oils. All of these features make Delo 710 LE an excellent lubricant for engines using LSD and ULSD fuels with or without exhaust after-treatment equipment.

APPLICATIONS

Delo 710 LE is recommended for diesel engines using LSD or ULSD fuels where Zn-free oils are required in the following applications:

- Railroad
- Marine
- Offshore Drilling and Production
- Stationary Power Generation

Delo 710 LE benefits:

- Designed for low and ultra low sulfur fuels
- Formulated for modern EMD and GE engines used in a wide range of railroad, inland marine and stationary engines
- Uses an optimized additive formulation with reduced ash and advanced dispersant technology
- Helps minimize exhaust system and turbo-charger deposits
- Zinc free, Non-chlorinated
- Compatible with earlier generation EMD and GE approved engine oils
- Miscible with competitive railroad type oils and additive systems when engine manufacturers recommended practices are followed
- Delo 710 LE SAE 20W-40 meets the performance requirements of LMOA Generation 6 and is approved for Electro-Motive Diesel LMOA Generation 5 and General Electric LMOA Generation 4 Long Life.
- Delo 710 SAE 40 meets the performance requirements of LMOA Generation 6 and is approved

1 Oil Consumption reduction will vary depending on engine duty cycle.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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for Electro-Motive Diesel LMOA Generation 5 and General Electric LMOA Generation 4 Long Life.

TYPICAL TEST DATA

SAE Grade	20W-40	40
Product Number	*235080*	*235081*
SDS Number	*24588*	*30472*
Density at 15°C, kg/L	0.880	0.881
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 136.4 15.5	 145.0 15.0
Viscosity Index	118	104
Flash Point, °C(°F)	230(446)	250
Pour Point, °C(°F)	-27(-16.6)	-18(0)
Sulfated Ash, wt %	1.0	1.0
Base Number, ASTM D2896	 9.5	 9.1
Zinc, ppm	< 10	< 10

Minor variations in product typical test data are to be expected in normal manufacturing.

DELO® 710 LS

SAE 20W-40

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® 710 LS is an industry leading, premium diesel engine oil for use in GE and EMD Tier 4 engines in marine, railroad and power generation applications, and has received approval of LMOA Generation 7 Designate for use in GE and EMD diesel engines.

CUSTOMER BENEFITS

Delo 710 LS delivers value and long engine life through:

- Excellent Wear Control
- Helps maximize engine cleanliness
- Exhaust system and turbocharger deposit control
- Excellent Oxidation stability, soot dispersancy and base retention for long oil life with newly designed low consumption power assemblies
- SAE 20W-40 helps provide a 15% to 25%[1] oil consumption reduction vs. single grade engine oils
- Formulated specifically for engines using Low Sulfur and Ultra Low Sulfur Fuels

FEATURES

Delo 710 LS is approved by GE and EMD for Tier 4 compliant engines and is backwardly compatible with all previous engines.

Delo 710 LS is approved by GE and is specifically formulated for use with Low Sulfur Diesel (LSD) and Ultra Low Sulfur Diesel (ULSD) fuels and new low emission engines.

Delo 710 LS uses premium quality base oils that are exceptionally pure, with extremely low levels of sulfur, nitrogen and aromatics to enhance oxidation resistance.

Delo 710 LS employs complex detergents, advanced dispersants and superior oxidation and wear inhibitors to effectively address the deleterious effects of lower oil consumption and engine modifications in new and re-manufactured Tier 4, Tier 3, Tier 2+, Tier 1+ and Tier 0+ locomotives. In addition, the 20W-40 viscosity grade can reduce oil consumption 15-25%[1] vs single grade engine oils. All of these features make Delo 710 LS an excellent lubricant for engines using LSD and ULSD fuels with or without exhaust after-treatment equipment.

APPLICATIONS

Delo 710 LS is recommended for diesel engines using LSD or ULSD fuels where Zn-free oils are required in the following applications:

- Railroad
- Marine
- Offshore Drilling and Production
- Stationary Power Generation

Delo 710 LS benefits:

- Designed for low and ultra low sulfur fuels
- Formulated for GE and EMD engines used in a wide range of railroad, inland marine and stationary engines
- Uses an optimized additive formulation with reduced ash and advanced dispersant technology
- Helps minimize exhaust system and turbo-charger deposits
- Zinc free, Phosphorus free, Non-chlorinated
- Compatible with earlier generation GE approved engine oils

1 Oil Consumption reduction will vary depending on engine duty cycle.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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RRL-28

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- Miscible with competitive railroad type oils and additive systems when engine manufacturers recommended practices are followed
- Delo 710 LS SAE 20W-40 is approved for LMOA Generation 7 Designate (which supersedes the performance requirements of LMOA Generation 6) for use in GE and EMD diesel engines, including Tier 4 emission and older generation locomotive engines.

TYPICAL TEST DATA

SAE Grade	20W-40
Product Number	*235084*
SDS Number	*39777*
Density at 15°C, kg/L	0.875
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 135.8 15.5
Viscosity Index	116
Flash Point, °C(°F)	230(446)
Pour Point, °C(°F)	-27(-16.6)
Sulfated Ash, wt %	1.15
Base Number, ASTM D2896	10.5
Zinc, ppm	< 10

Minor variations in product typical test data are to be expected in normal manufacturing.

JOURNALTEX® HD 57

PRODUCT DESCRIPTION

Journaltex® HD 57 is designed for use in lubricating locomotive traction motor suspension bearings and plain railcar journal bearings.

CUSTOMER BENEFITS

Journaltex HD 57 delivers value through:

- **Excellent lubricity characteristics** imparted by the additive package helps minimize friction to help prevent premature bearing failure.
- **Good rust protection** — Effective inhibitor package helps prevent rusting of surfaces exposed to water.
- **Water separability** — Journaltex HD 57 separates readily from water.
- **Good shear stability**
- **Excellent air release** by foam inhibitor helps hasten the release of foam and entrained air.

FEATURES

Journaltex HD 57 is manufactured from high viscosity index, low pour point base oils for use on suspension bearings. It contains an additive package that helps resist rust and corrosion and helps protect journal bearings during the critical break-in period by minimizing friction in heavily loaded bearings.

APPLICATIONS

Journaltex HD 57 is designed to lubricate locomotive traction motor suspension bearings and plain railcar journal bearings. It is also recommended for lubricating tractor motor suspension bearings, truck center plates, plain journal bearing waste saturation and pad lubrication or free oiling.

TYPICAL TEST DATA

Product Number	*273113*
SDS/MSDS Number *USA* *Colombia*	 *23546* *31104*
API Gravity	31.0
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 60.9 8.7
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 320 56
Viscosity Index	117
Flash Point, °C(°F)	237(459)
Pour Point, °C(°F)	-39(-38)

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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CHEVRON TMGL PREMIUM

PRODUCT DESCRIPTION

Chevron TMGL Premium is a black, adhesive, semi-fluid grease specifically designed for lubrication of traction motor gear cases of diesel-electric locomotives.

CUSTOMER BENEFITS

Chevron TMGL Premium delivers value through:

- **Minimized downtime** — High film strength and EP additive package protects heavily loaded gears from wear and scuffing. Good low temperature fluidity offers effective lubrication under cold startup conditions.
- **Long service life** — Excellent oxidation resistance minimizes thickening in high temperature service while high base oil viscosity and adhesiveness minimize the tendency to leak from the gear case.
- **Enhanced equipment protection** — Effective corrosion inhibitors protect gear components from rusting in wet conditions.

FEATURES

Chevron TMGL Premium is a black, adhesive, semi-fluid grease specifically designed for lubrication of traction motor gear cases of diesel-electric locomotives.

Chevron TMGL Premium contains a lithium thickener, very high viscosity base fluid and a special EP additive system.

APPLICATIONS

Chevron TMGL Premium is recommended for:

- Traction motor gear cases (incorporating appropriate seal designs) where semi-fluid grease-type lubricants are specified.
- Older non-sealed traction motor designs that normally use heavy residual-type gear lubricants, where the higher leakage rate that may result is acceptable.
- Slow to medium speed industrial gear applications where an EP semi-fluid grease is specified.

TYPICAL TEST DATA

Product Number	*277117*
SDS Number	*23642*
Color	Dark Brown
Texture	Semi-Fluid Tacky
Base Fluid Viscosity, cSt 100°C	425
Brookfield Apparent Viscosity 200°F, cp, No. 3 spindle at 4 rpm	7,500
Thickener Type	Lithium Soap
Thickener Content, %	1.5
Timken OK Load, lbs	40

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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PAPER AND FOREST PRODUCTS

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CLARITY® SAW GUIDE OIL
46, 100, 150

PRODUCT DESCRIPTION

Clarity® Saw Guide Oils are designed to lubricate saw blades and guides in saw equipment.

CUSTOMER BENEFITS

Clarity Saw Guide Oils deliver value through:

- **Clean cutting** — Helps reduce excessive drag that slows cutting.
- **Exceptional performance** in low water and low oil consumption saw systems.
- **Excellent low temperature properties** — Low pour point and proprietary formulation help keep guide holes, lines and filters free from build-up associated with low temperatures.
- **Excellent rust and corrosion protection**
- **Excellent lubrication** due to oily film on saw blade.
- **Operator comfort** — Low odor.
- **Sufficient tackiness and water mixing** — Allows the oil to cling to saw and guide components.
- **Environmental sensitivity** — Clarity Saw Guide Oil passes stringent EL/LL50 Acute Aquatic Toxicity testing (OECD 201, 202, 203). Tested with fingerling rainbow trout, daphnia, freshwater algae, and Mysid shrimp using a water accommodated fraction up to 5000 mg/liter (fifty times the minimum pass rate of the LL50 test.) The test results were obtained during the development of the product line and are considered representative of any/all commercial samples. Ashless formulation facilitates conventional recycling.
- **Low toxicity** — Inherently biodegradable and has very low acute aquatic toxicity to both fish and invertebrates based on tests of water accommodated fractions.[1] Ashless formulation facilitates conventional recycling programs.

FEATURES

Clarity Saw Guide Oils are designed to promote long saw guide and saw blade life in thin kerf saw equipment, when operating in severe service and reduced cooling water modes.

Clarity Saw Guide Oils are formulated with premium base oil technology and specially selected ashless additives to reduce friction between saw and guide components in thin kerf saw equipment.

The oil's lubricity performance helps minimize rust and corrosion problems, while reducing friction to allow much cooler operation.

Clarity Saw Guide Oils have been formulated with effective rust inhibitors to help prevent rust formation.

Oiliness and EP properties help provide excellent film strength for boundary lubrication and extreme pressure conditions.

Clarity Saw Guide Oils help to allow the correct mixing of oil and water and have tackiness properties to enable the lubricants to cling to saw and guide components.

1. Based on testing of similarly formulated product.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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APPLICATIONS

Clarity Saw Guide Oils are specifically formulated to lubricate modern thin kerf sawing systems. Clarity Saw Guide Oils' performance properties have been field proven to meet the severe requirements of this application.

Clarity Saw Guide Oils are especially recommended for use in many saw systems, including those manufactured by: CAE (Newnes, McGehee), Optimil, Salem, TMT, Ukiah, and USNR (Kockums CanCar, Schurman).

TYPICAL TEST DATA

ISO Grade	46	100	150
Product Number	*255199*	*255201*	*266188*
SDS Number	*6716*	*6716*	*6716*
API Gravity	32.0	30.7	29.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 43.7 7.0	 95.0 11.3	 143 14.5
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 224 50	 494 65	 749 78
Viscosity Index	118	110	100
Flash Point, °C(°F)	242(468)	262(504)	274(525)
Pour Point, °C(°F)	-33(-27)	-33(-27)	-30(-22)
Rust Prevention, ASTM D665 Procedure B, 24 h	 Pass	 Pass	 Pass

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Chevron Paper Machine Oil Premium 150, 220, 320

Product Description

Chevron Paper Machine Oil Premium oils are paper machine circulating oils designed to give excellent performance in centralized lubrication systems of paper machines.

Customer Benefits

Chevron Paper Machine Oil Premium oils deliver value through:

- **Minimized unscheduled downtime** — High oxidation stability provides excellent resistance to deposit formation. The detergent/dispersant additive system enables quick removal of deposits from hot bearing surfaces, and the suspension of small particles, rendering them harmless.
- **Compatibility with ultra-fine filters** — The specially balanced additive package and highly refined base stocks provide the outstanding filterability essential for ultra-fine 6 to 12 micron filters, even in the presence of water.
- **Excellent Water Separability** — Helps permit rapid separation of water in circulating oil system reservoirs - minimizing the chance of premature filter plugging and maximizing bearing life.
- **Long equipment life** — The special antiwear additive system provides excellent protection against wear of heavily loaded bearings and surfaces. Effective corrosion inhibitors resist rust and copper corrosion.
- **Less frequent circulating system changes** — High oxidation stability helps ensure long lubricant service life, particularly in newer design machines with smaller oil reservoirs.

Features

Chevron Paper Machine Oil Premium oils are circulating oils designed for use in the centralized lubrication systems of paper machines, including wet-end systems, dryer bearings, and calender stacks.

They are formulated with a specially balanced additive package containing a barium-free detergent/ dispersant, oxidation, antiwear, rust and copper corrosion inhibitors.

They have excellent demulsibility properties and provide outstanding filterability critical for use with ultra-fine filters of modern paper machines.

Applications

Chevron Paper Machine Oil Premium oils are recommended for use in:

- Circulating oil systems of paper machines, particularly those equipped with ultra-fine 6 to 12 micron filters, superheated steam, or those susceptible to water contamination.
- Suction box pumps, vacuum and white water pumps, agitators, reduction gears, and gear head motors.
- Pulp grinders and pulp refiner oil circulation systems.
- Gear drive units and pumps in industrial applications.
- Plain and antifriction bearings at elevated temperatures.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

ISO Grade	150	220	320
Product Number	*253035*	*253036*	*253037*
SDS Number	*13560*	*13560*	*13560*
API Gravity	29.5	28.4	27.3
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 143 13.7	 209 17.7	 304 22.7
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 753 75	 1107 91	 1621 113
Viscosity Index	91	92	92
Flash Point, °C(°F)	246(475)	249(480)	248(473)
Pour Point, °C(°F)	-15(+5)	-15(+5)	-12(+10)
Rust Prevention, ASTM D665B	Pass	Pass	Pass
Oxidation Stability Minutes to 25 psi pressure drop, ASTM D2272	 150	 150	 150

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON RED CHAIN BAR OIL
68, 100, 150, 220

PRODUCT DESCRIPTION

Chevron Red Chain Bar Oils are designed for use in chain saws.

CUSTOMER BENEFITS

Chevron Red Chain Bar Oils deliver value through:

- **Minimal wear** — Helps minimize wear for the chain, bar, and sprocket.
- **Tackiness** — The level of tackiness helps keep the oil on the chain and helps prevent sling-off when the chain is traveling at high speeds resulting in minimal waste and consumption.
- **Field experience** — Used extensively in the field with proven experience.

FEATURES

Chevron Red Chain Bar Oils are very tacky lubricants made from special high viscosity base oils having the desired flow and pumpability properties to help assure adequate lubrication over a wide range of ambient temperatures.

Chevron Red Chain Bar Oils are manufactured to meet the needs of the forest products industry under adverse operating conditions.

To a logger, chainsaw lubrication is one of the most demanding requirements for efficient chainsaw performance and operation. Chevron Red Chain Bar Oils were designed to meet this demand with economy in mind.

There are four grades of Chevron Red Chain Bar Oils to meet any ambient temperature requirements.

ISO 68 is recommended for winter conditions when temperatures are consistently below 0°C (32°F).

ISO 100 is the ideal grade for cool weather conditions of 0-15°C (32-60°F) to help assure a proper flow from either hand operated or automatic chain oilers.

ISO 150 is a good choice for all-season use in mild climates and provides excellent wear protection under hot weather operating conditions. It may also be used, where OEM recommended, for chain drives, on lumber carriers, lawnmowers, and farm equipment.

ISO 220 is often preferred by forest industry professionals during the summer season due to its outstanding lubricating and film retention properties. The higher viscosity of the ISO 220 grade, in combination with wear protection additives, helps provide the extra level of protection needed in high performance professional saws.

APPLICATIONS

Chevron Red Chain Bar Oils are recommended for use in chain saws using either hand-operated or automatic chain oilers to lubricate the chain, bar, and sprocket.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

ISO Grade	68	100	150	220
Product Number	*225156*	*225108*	*225109*	*225157*
SDS Number	*6804*	*6804*	*6804*	*6804*
API Gravity	27.7	27.9	25.5	24.9
Viscosity, Kinematic cSt at 40°C	65	95	143	209
Viscosity, Saybolt SUS at 100°F	335	495	750	1105
Flash Point, °C(°F)	200(392)	218(424)	218(424)	218(424)
Pour Point, °C(°F)	-30(-22)	-27(-17)	-24(-11)	-21(-6)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

METALWORKING FLUIDS

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BRIGHT-CUT® METALWORKING FLUID

NHG, NM, AM, AH

PRODUCT DESCRIPTION

Bright-Cut® Metalworking Fluids are chlorine-free cutting oils for use in machining operations.

CUSTOMER BENEFITS

Bright-Cut Metalworking Fluids deliver value through:

- **Excellent antiweld performance, optimal tool life and exceptional surface finish** without chlorine and with minimal amounts of sulfur and fat.
- **Clear, light color** allows operator to see the machined part during the cutting operation.
- **Minimal odor** — Does not have the strong sulfur smell characteristic of conventional cutting oils, resulting in a more pleasant work environment.
- **Chlorine-free** — Minimizes the cost of disposal at the end of the fluid life.
- **Outstanding thermal and oxidation stability** — For maximum fluid life, due to Group II base stocks found in NM, AM and AH grades.
- **Minimal misting and smoking promoting a safe work environment** — The thermal stability and low volatility of the Group II base stock and the use of an effective mist suppressant minimizes worker exposure to cutting oil mist and vapor.
- **Multipurpose performance** — The nonstaining cutting oils are formulated to serve as the cutting oil, hydraulic fluid and machine lubricant to help eliminate the problem of machine lubricants contaminating the cutting oil.

FEATURES

The unique synthetic antiweld components of Bright-Cut replace the chlorine and minimize the amount of sulfur and fat typically needed for difficult cutting operations. They are light in color, for maximum visibility during machining, and minimal in odor.

Bright-Cut Metalworking Fluids formulated with Group II base stocks provide maximum oil life and promote a safe work environment by increasing the fluid's flash point, and minimizing exposure to aromatics and product vapor, smoking, and misting.

Bright-Cut Metalworking Fluids:

- provide excellent cooling and lubrication in a wide range of machining operations
- help prevent welding of chip and tool
- flush chips away from the work area
- protect the finished work surfaces, tools and machines against rusting and staining
- minimizes oil mist in high speed machine tools

The nonstaining oil, Bright-Cut NM Metalworking Fluid, can be used as a dual or tri-purpose oil in associated splash, hydraulic or spindle lubrication systems of metalworking machines.

Bright-Cut AM and AH Metalworking Fluids contain active sulfur and will stain copper and brass.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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APPLICATIONS

Do not use Bright-Cut® Metalworking Fluids in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

The **severity** of the machining operation and the **machinability** of the metal are the criteria for selecting the proper cutting oil.

Bright-Cut NHG Metalworking Fluid

- Service Classification: Honing/Grinding, Nonstaining
- A low viscosity cutting oil that is designed for use in light duty machining or honing and grinding operations on ferrous and nonferrous metals, particularly aluminum, magnesium and their alloys. It can also be mixed with other Bright-Cut Metalworking Fluids to adjust their compounding to meet the demands of a specific machining operation.
- **Not for sale or use in the South Coast Air Quality Management District or the Ventura County Air Pollution Control District of California**

Bright-Cut NM Metalworking Fluid

- Service Classification: Medium Duty, Nonstaining
- The workhorse tri-purpose cutting oil, suitable for automatic screw machine operations on free-machining to intermediate steels, and intermediate to difficult nonferrous metals.

Bright-Cut AM Metalworking Fluid

- Service Classification: Medium Duty, Active
- A versatile, general purpose cutting oil for use with carbon steels and alloy steels. It provides the cooling needed for light-to-moderately severe machining operations and gives excellent tool life and finishes in operations such as tapping, threading, drilling, gear shaving and turning.

Bright-Cut AH Metalworking Fluid

- Service Classification: Heavy Duty, Active
- Provides excellent performance for a wide range of applications. It is suitable for machining tough alloy steels and stainless steels. It is well adapted for broaching, threading, tapping and other difficult operations requiring a heavy duty oil for tool life and finish. This oil may be blended with Bright-Cut NHG Metalworking Fluid for less severe applications.

TYPICAL TEST DATA

	NHG	NM	AM	AH
Product Number	*233935*	*233945*	*233944*	*233946*
SDS Number	*7720*	*7721*	*7721*	*7721*
API Gravity	39.4	31.0	31.5	30.5
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 4.68 —	 38.9 6.5	 37.1 6.36	 41.0 6.7
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 41 —	 200 48	 190 48	 210 49
Flash Point, °C(°F)	129(264)	210(410)	218(424)	194(381)
Pour Point, °C(°F)	-6(+21)	-12(+10)	-4(+25)	0(+32)
Color	L 0.5	L 1.0	L 1.5	L 1.5
Total Sulfur, wt %	0.1	0.5	1.1	1.7
Active Sulfur, wt %	—	—	0.5	1.6
Phosphorus, wt %	0.027	—	—	—
Zinc, wt %	0.030	—	—	—
Chlorine, wt %	—	—	—	—
Fatty Oil, vol %	1.8	—	—	—
Synthetic EP, wt %	—	5	5	4.5
Antimist	Yes[a]	Yes	Yes	Yes
Volatile Organic Content (VOC), g/L ASTM E1868-10	 383	 < 10	 < 10	 < 10

a Antimist is less effective in low viscosity oils.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON SOLUBLE OIL B

PRODUCT DESCRIPTION

Chevron Soluble Oil B is used broadly in machine shops as a multifunctional cutting fluid. It is primarily formulated to cool and lubricate the contact point of the tool and the work piece.

CUSTOMER BENEFITS

Chevron Soluble Oil B delivers value through:

- **Minimal separation** — Excellent emulsion even with hard water
- **Good rust protection** for steel work and machined parts even when water/oil emulsion ratios are 80:1
- **Cooling** maximized by metal wetting. In addition, promotes good chip settling.
- **Minimal foaming** — Possibility of sump overflow minimized
- **Good stability in storage** — Minimal tendency to turn rancid
- **Good ability to control bacterial growth and rancid odors**

FEATURES

Chevron Soluble Oil B:

- helps prevent rusting or corrosion of the machined metals
- helps control the growth of bacteria — which is a constant problem in soluble oil circulating systems due to outside contamination
- minimizes surface foam
- speeds the release of entrained air which could cause pump cavitation

This is an extremely versatile fluid designed to meet many of the situations encountered in the metalworking industry.

Chevron Soluble Oil B is an emulsifying oil that readily mixes with water, forming a homogeneous and exceptionally stable emulsion. It is used in the machining of both ferrous and nonferrous metals, particularly when cutting with carbon or high speed steel or tungsten carbide tools. It contains an effective biocide that combats bacterial growth, rancidity, and odor in machine sumps.

APPLICATIONS

Chevron Soluble Oil B is recommended for metals (except magnesium) where maximum cooling is desired — particularly when cutting with carbon, high speed steel, or tungsten carbide tools.

Chevron Soluble Oil B is used extensively in milling, drilling, gear cutting, turning, planing, shaping, sawing, and grinding operations.

Chevron Soluble Oil B is typically diluted in water/oil ratios ranging from 10:1 to 50:1. See the Chevron Soluble Oil Mixing Recommendations chart for the proper water/oil ratio for each application.

Always add oil to water to avoid forming sticky invert emulsions that do not emulsify properly in water.

Chevron Soluble Oil B provides excellent in-process corrosion protection. Use of this product as a metal protective fluid for short-term rust protection is not recommended.

Do not recommend Chevron Soluble Oil B emulsions for operations involving magnesium. Hot magnesium is a fire hazard when it contacts water.

Emulsions of soluble metalworking fluids and water may become contaminated with harmful microorganisms such as bacteria and fungus, which can cause illness and infection. This can occur even in emulsions with fluids that initially contain some biocide because the biocide can be depleted during service. A metalworking fluid maintenance program should be followed in order to control this hazard. Such a program may require the use of biocides.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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MWF-40

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TYPICAL TEST DATA

	B
Product Number	*233703*
SDS Number	*7090*
API Gravity	21.6
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 38.0 5.2
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 198 43.7
Flash Point, °C(°F)	160(320)
Pour Point, °C(°F)	-30(-22)
Total Sulfur, wt %	0.30
Active Sulfur, wt %	None
Volatile Organic Content (VOC), g/L ASTM E-1868-10	 44

Minor variations in product typical test data are to be expected in normal manufacturing.

MIXING RECOMMENDATIONS

First figure indicates parts of water. Second figure indicates parts of Chevron Soluble Oil B.

Material	Turning, Shaping, Planing, Drilling	Milling	Pipe and Plain Threading	Automatic Screw Machines	Grinding	Thread Grinding	Deep Drilling	Gear Shaving or Cutting
Plain, medium, and high carbon steels	20:1	20:1	→	20:1	50:1	20:1	→	20:1
Alloy steels	15:1	15:1	→	15:1	50:1	15:1	→	15:1
Ingot iron, wrought iron, low carbon steels	15:1	15:1	→	15:1	50:1	15:1	→	15:1
Stainless steels, tool and die steels	10:1	10:1	→	10:1	50:1	10:1	→	10:1
Aluminum and aluminum alloys	25:1	25:1	30:1	30:1	50:1	30:1	20:1	30:1
Copper and brass	25:1	25:1	30:1	30:1	→	→	20:1	30:1
Zinc and zinc alloys	25:1	30:1	30:1	30:1	→	→	20:1	→
Bronze and high strength copper alloys	10:1	10:1	10:1	10:1	50:1	10:1	→	10:1
Magnesium and magnesium alloys	**FIRE HAZARD**							
Titanium and titanium alloys	10:1	10:1	→	→	→	→	→	→
Nickel and nickel alloys	10:1	10:1	→	10:1	50:1	10:1	→	10:1
Cast iron	Dry	Dry	Dry	→	Dry	Dry	Dry	Dry

→ Seldom used.

Emulsions of soluble metalworking fluids and water may become contaminated with harmful microorganisms such as bacteria and fungus, which can cause illness and infection. This can occur even in emulsions with fluids that initially contain some biocide because the biocide can be depleted during service. A metalworking fluid maintenance program should be followed in order to control this hazard. Such a program may require the use of biocides.

GEAR LUBRICANTS

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CLARITY® SYNTHETIC EA GEAR OIL

100, 150

PRODUCT DESCRIPTION

Clarity® Synthetic EA Gear Oils are readily biodegradable high performance gear oils that meet EPA Vessel General Permit (VGP) requirements for environmentally acceptable lubricants. They are designed to give maximum protection in industrial gear applications on vessels and in environmentally sensitive areas.

CUSTOMER BENEFITS

Clarity Synthetic EA Gear Oils deliver value through:

- **Environmentally acceptable** — Meets the requirements of the EPA Vessel General Permit (VGP) for biodegradation, low toxicity and low bioaccumulation.
- **Premium performance** — Ashless formulation provides excellent protection against wear of industrial gears, provides rust and corrosion protection, water separability, foam inhibition, EP protection and shear stability.
- **Long oil life** — Outstanding ability of the synthetic base stock to withstand oxidation at high operating temperatures results in maximum service life for the oil relative to vegetable-based readily biodegradable products.
- **Excellent low temperature pumpability** — Specifically developed with high viscosity index to ensure good fluidity for low operating temperatures.

FEATURES

These lubricants are readily biodegradable, non-bioaccumulative, and minimally toxic. In the event of a spill, the product biodegrades by more than 60% within 28 days, minimizing the impact to the environment.

Clarity Synthetic EA Gear Oils are designed to give maximum protection in industrial gear equipment used in applications requiring a high performance gear oil and have environmental concerns such as off-shore marine or Oil and Gas, construction in or near water, mining and power utility operations as well as other high-performance industrial applications.

Clarity Synthetic EA Gear Oils are formulated with synthetic base stock and an ashless, zinc-free additive system that provide exceptional oxidation stability, water separability, foam suppression, and protection against wear, rust and corrosion.

Clarity Synthetic EA Gear Oils are high VI synthetic products which allow for operation over a wide temperature range.

Clarity Synthetic EA Gear Oils are designed to the performance requirements of conventional antiwear/ extreme pressure gear oils, while providing an additional benefit in case of leaks or incidental discharge to the environment.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

21 April 2014
GL-5

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APPLICATIONS

Clarity® Synthetic EA Gear Oils[1] are designed to give maximum protection in industrial gear equipment used on vessels and in environmentally sensitive areas.

Clarity Synthetic EA Gear Oils meet the requirements of:

- **Aegir**
- **AGMA** EP 9005-E02
- **Berg**
- **Blom+Voss**
- **Chesterton**
- **Cincinnati Milacron** P-76 (ISO 100), P-77 (ISO 150)
- **David Brown** S1.53.101
- **DIN** 51517, Part 3
- **IHC Merwede**
- **James Walker**
- **Kamewa**
- **Kemel**
- **Ortlinghaus**
- **Schottel**
- **U.S. Steel** 224
- **Wärtsilä**

1 Chevron Clarity EA Gear Oils are rebrands of Terresolve Technologies, Ltd. products as follows:

Chevron	Terresolve Technologies
Clarity® Synthetic EA Gear Oil 100	ENVIROLOGIC® 210
Clarity® Synthetic EA Gear Oil 150	ENVIROLOGIC® 215

ENVIROLOGIC® is a trademark owned by Terresolve Technologies, Ltd. DBA RSC Bio Solutions and is used with permission.

Clarity Synthetic EA Gear Oils are miscible with common mineral based gear oils, however, following good practice, in-service oils should be completely drained to avoid any risk of additive incompatibility and ensure that the full performance benefits are achieved.

Do not use in high pressure systems in the vicinity of flames, sparks, and hot surfaces. Use only in well ventilated areas. Keep container closed.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	100	150
Product Number	*223061*	*223060*
SDS Number	*35642*	*35642*
API Gravity	36.8	36.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 100.0 18.0	 150.0 23.0
Viscosity Index	199	183
Flash Point, °C(°F)	185(365)	185(365)
Pour Point, °C(°F)	-39(-38)	-39(-38)
Copper Corrosion, ASTM D130, 3 hrs. at 100°C	 1b	 1b
Rust Test, ASTM D665B Synthetic Sea water	Pass	Pass
Water Separability, ASTM D1401 at 82°C	≤3 ml emulsion at 30 minutes	≤3 ml emulsion at 30 minutes
FZG, DIN 51354, Fail Load Stage	>12	>12
Timken OK Load, ASTM D2782, lb	>60	>60
Elastomer Compatibility, ASTM D471 Buna-N (100°C, 168 hrs) Viton (150°C, 168 hrs)	 Pass Pass	 Pass Pass
Biodegradability, ASTM D7373, %	>60	>60
Aquatic Toxicity Fathead minnow, OECD 203, mg/L Daphnia magna, OECD 202, mg/L Algae, OECD 201, mg/L	 >1000 >130 >120	 >1000 >130 >120
Bioaccumulation	Negative	Negative

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® GEAR ESI®

SAE 80W-90, 85W-140

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® Gear ESI® are premium grade automotive gear lubricants designed for gears operating under severe temperature and load conditions, and whose SAE 80W-90 viscosity grade offers extended-drain performance comparable to leading synthetics.

CUSTOMER BENEFITS

Delo Gear ESI deliver value through:

- **Minimal wear** — Delo Gear ESI are formulated to promote long life for gears, bearings, and seals.
- **Seal compatibility** — Seal materials are not adversely affected by Delo Gear ESI at temperatures as high as 163°C (325°F).
- **Low operating temperatures** — Unique additive chemistry minimizes friction resulting in cool operating temperatures.
- **Long lubricant life** — The outstanding thermal and oxidation stability characteristics of Delo Gear ESI allow for optimal drain intervals which may result in lubricant savings.
- **Fuel savings** — The remarkable low friction properties of this product contribute to minimal energy consumption.
- **Compatibility** — Compatible with conventional sulfur-phosphorus and synthesized hydrocarbon based lubricants.

FEATURES

Delo Gear ESI are premium grade automotive gear lubricants.

They are formulated with ISOSYN® Technology and compounded with a unique extreme pressure additive utilizing an inorganic borate compound. They also contain a patented, synergistic combination of additives that protect against wear, seizure, oxidation, corrosion, rust, and foam.

Delo Gear ESI are ideally suited for gear sets exposed to extremely high temperatures and loads.

Tests have proven that Delo Gear ESI provide a wear protection film 3 to 5 times thicker than the conventional sulfur-phosphorus antiwear film. The inorganic borate film is composed of compounds that do not react with metal. The film forms promptly to provide exceptional gear protection and maximum thermal stability. By minimizing friction, cool operating temperatures have been observed.

APPLICATIONS

These lubricants are excellent automotive gear lubricants, particularly those operating under severe temperature and load conditions. They provide excellent wear control even in the presence of small amounts of water. Their exceptional thermal and oxidation stability, and antiwear performance promote long gear life and optimal drain intervals.

Delo Gear ESI **SAE 80W-90** was field tested in more than 100 on-highway, Class 8 trucks with drain intervals of 500,000 to 750,000 miles. The product showed excellent field results in axles manufactured by **Dana**, **Meritor**, and **Mack**. It is approved for the extended drain specifications of both **Meritor** and **Mack**.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

21 February 2014
GL-11

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Delo® Gear ESI®:

- meet the performance requirements of **API Service Categories** GL-4, GL-5, and MT-1
- are qualified for **SAE J2360** (formerly known as MIL-PRF-2105E)
- are approved for **Meritor** TP-9539 up to 500,000 mile initial and service fill (refer to manufacturer's recommendations for extended drain lubricants)
- SAE 80W-90 is approved for **Mack** GO-J PLUS up to 500,000 mile initial and service fill (refer to manufacturer's recommendations for extended drain lubricants)

TYPICAL TEST DATA

SAE Grade	80W-90	85W-140
Product Number	*224503*	*224504*
SDS Number	*6698*	*6698*
Density at 15°C, kg/L	0.8882	0.9013
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 140 14.2	 341 25.0
Viscosity, Brookfield cP at -12°C cP at -26°C	 — 120,000	 80,000 —
Viscosity Index	99	95
Flash Point, °C(°F)	210(410)	210(410)
Pour Point, °C(°F)	-33(-27)	-15(+5)
Timken OK Load, lb	75	75

Minor variations in product typical test data are to be expected in normal manufacturing.

DELO® SYN-GEAR HD

SAE 75W-90

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® Syn-Gear HD gear lubricant is a heavy duty, extreme pressure, multigrade automotive gear lubricant.

CUSTOMER BENEFITS

Delo Syn-Gear HD delivers value through:

- **Extended drain capabilities** — Field proven in fleet testing for 500,000-mile drain intervals.
- **Excellent thermal and oxidation stability** — The synthetic hydrocarbon base oil used in this product provides outstanding stability.
- **High viscosity index and low pour point** — The synthetic hydrocarbon base stock provides extremely broad operating temperature ranges when compared with conventional mineral oil based gear lubricants.
- **Excellent seal compatibility** — This product is compatible with widely used seal elastomers.
- **Refill and top off compatibility** — Delo Syn-Gear HD is compatible with conventional mineral oil based and other synthetic automotive gear lubricants.

FEATURES

Delo Syn-Gear HD is a heavy duty, extreme pressure, multigrade automotive gear lubricant.

ISOSYN TECHNOLOGY®

It is manufactured from synthesized hydrocarbon base fluids which have excellent thermal and oxidation stability, a high viscosity index, and a low pour point.

The low pour point of Delo Syn-Gear HD imparts maximum lubrication during startup at subzero temperatures, while its improved viscosity-temperature characteristics provide dependable lubrication at high temperatures. Low frictional losses in the lubricant film and minimal churning losses due to lower bulk oil viscosity lead to reduced operating temperatures when compared to conventional gear lubricants.

APPLICATIONS

Delo Syn-Gear HD is recommended as a rear axle and differential lubricant in over-the-road and off-road vehicles when operating under severe conditions and in extremely cold or hot environments.

Delo Syn-Gear HD meets or exceeds the requirements of **API Service Categories** GL-4, GL-5 and MT-1. This product passed the field and bench requirements for the original version of Dana's SHAES 256 extended drain axle lubricant specification (Revision A, now obsolete).

Delo Syn-Gear HD is approved for:

- **Meritor** O-76 Extended Drain
- **SAE J2360** (formerly MIL-PRF-2105E)
- **Volvo 97312**

Delo Syn-Gear HD meets the requirements of:

- **Mack** GO-J
- **MAN Nutzfahrzeuge** 342 Type M2

This product has been successfully field tested for long drain intervals in class 8 on-highway trucks using axles made by the following OEMs: **Meritor, DAF, Daimler, Dana, MAN** and **Scania**.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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GL-17

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TYPICAL TEST DATA

SAE Grade	75W-90
Product Number	*223034*
SDS Number	*35588*
Density at 60°F, lb/gal	7.22
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 108 15.1
Viscosity, Brookfield mPa.s at -40°C	 137,500
Viscosity Index	146
Flash Point, °C(°F)	192(378)
Pour Point, °C(°F)	-45(-49)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® SYN-GEAR HD ISOCLEAN® CERTIFIED LUBRICANT

SAE 75W-90

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® Syn-Gear HD ISOCLEAN® Certified Lubricant is a heavy duty, extreme pressure, multigrade automotive gear lubricant. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo Syn-Gear HD ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Extended drain capabilities** — Field proven in fleet testing for 500,000-mile drain intervals.
- **Excellent thermal and oxidation stability** — The synthetic hydrocarbon base oil used in this product provides outstanding stability.
- **High viscosity index and low pour point** — The synthetic hydrocarbon base stock provides extremely broad operating temperature ranges when compared with conventional mineral oil based gear lubricants.
- **Excellent seal compatibility** — This product is compatible with widely used seal elastomers.
- **Refill and top off compatibility** — Delo Syn-Gear HD is compatible with conventional mineral oil based and other synthetic automotive gear lubricants.

FEATURES

Delo Syn-Gear HD ISOCLEAN Certified Lubricant is a heavy duty, extreme pressure, multigrade automotive gear lubricant. It is manufactured from synthesized hydrocarbon base fluids which have excellent thermal and oxidation stability, a high viscosity index, and a low pour point.

The low pour point of Delo Syn-Gear HD ISOCLEAN Certified Lubricant imparts maximum lubrication during startup at subzero temperatures, while its improved viscosity-temperature characteristics provide dependable lubrication at high temperatures. Low frictional losses in the lubricant film and minimal churning losses due to lower bulk oil viscosity lead to reduced operating temperatures when compared to conventional gear lubricants.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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GL-17 ISOCLEAN

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APPLICATIONS

Delo® Syn-Gear HD ISOCLEAN® Certified Lubricant is recommended as a rear axle and differential lubricant in over-the-road and off-road vehicles when operating under severe conditions and in extremely cold or hot environments.

Delo Syn-Gear HD ISOCLEAN Certified Lubricant meets or exceeds the requirements of **API Service Categories** GL-4, GL-5 and MT-1. This product passed the field and bench requirements for the original version of Dana's SHAES 256 extended drain axle lubricant specification (Revision A, now obsolete).

Delo Syn-Gear HD ISOCLEAN Certified Lubricant is approved for:

- **Meritor** O-76 Extended Drain
- **SAE J2360** (formerly MIL-PRF-2105E)
- **Volvo 97312**

Delo Syn-Gear HD ISOCLEAN Certified Lubricant meets the requirements of:

- **Mack** GO-J
- **MAN Nutzfahrzeuge** 342 Type M2

This product has been successfully field tested for long drain intervals in class 8 on-highway trucks using axles made by the following OEMs: **Meritor, DAF, Daimler, Dana, MAN** and **Scania**.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

SAE Grade	**75W-90**
Product Number	*223027*
SDS Number *U.S.* *Canada* *Mexico*	 *35588* *37170* *37171*
Density at 60°F, lb/gal	7.22
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 108 15.1
Viscosity, Brookfield mPa.s at -40°C	 137,500
Viscosity Index	146
Flash Point, °C(°F)	192(378)
Pour Point, °C(°F)	-45(-49)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® SYN-GEAR XDM

SAE 75W-90, 80W-140

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® Syn-Gear XDM are premium heavy duty, extreme pressure, multigrade automotive gear lubricants.

CUSTOMER BENEFITS

Delo Syn-Gear XDM deliver exceptional value through:

- **Extended drain capabilities** — Meet the requirements of major axle manufacturers for extended drains.
- **Excellent thermal and oxidation stability** — Synthetic hydrocarbon base oils provide outstanding stability.
- **High viscosity index and low pour point** — Synthetic hydrocarbon base stocks provide extremely broad operating temperature ranges when compared with conventional mineral oil based lubricants.
- **Excellent seal compatibility** — Compatible with many widely used seal elastomers.
- **Refill and top off compatibility** — Delo Syn-Gear XDM are compatible with conventional mineral oil based and other synthetic automotive gear lubricants.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drivetrain that covers lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Maximizes the bottom line business results of trucking industry professionals.

FEATURES

Delo Syn-Gear XDM are premium heavy duty, extreme pressure, multigrade automotive gear lubricants. Manufactured from synthesized hydrocarbon base fluids which have excellent thermal and oxidation stability, a high viscosity index, and a low pour point.

The low pour points of Delo Syn-Gear XDM impart excellent lubrication during startup at subzero temperatures, while the outstanding viscosity temperature characteristics provide excellent lubrication at high temperatures.

APPLICATIONS

Delo Syn-Gear XDM lubricants are recommended as rear axle and differential lubricants in over-the-road and off-road vehicles when operating under severe conditions and in extremely cold or hot environments. Delo Syn-Gear XDM lubricants meet and exceed the requirements of API Service Categories GHL-4, GL-5 and MT-1. In addition, they are approved for:

- **Dana** SHAES 256 REV C (SAE 75W-90 only)
- **Meritor** O-76 Extended Drain
- **SAE** J2360 (formerly MIL-PRF-2105E)
- **STEMCO** PPS+ and PPS wheel end systems (SAE 75W-90 only)

Delo Syn-Gear XDM approvals apply to both viscosity grades unless indicated otherwise. In addition, Delo Syn-Gear XDM SAE 80W-140 meets the requirements of Dana SHAES 256 REV A. Delo Syn-Gear XDM SAE 75W-90 is recommended for **Dana** and **Meritor** axles with 500,000-mile aservice intervals and supports Dana's 750,000 mile axle warranty coverage for line haul service.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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GL-19

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TYPICAL TEST DATA

SAE Grade	75W-90	80W-140
Product Number	*223030*	*223031*
SDS Number	*35582*	*35586*
Density at 60°F, lb/gal	7.21	7.31
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 108 15.1	 245 26.5
Viscosity, Brookfield cP at -26°C cP at -40°C	 — 106,000	 50,000 —
Viscosity Index	146	140
Flash Point, PM, °C(°F)	140(284)	136(277)
Pour Point, °C(°F)	-48(-54)	-42(-44)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® SYN-GEAR XDM ISOCLEAN® CERTIFIED LUBRICANT

SAE 75W-90, 80W-140

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® Syn-Gear XDM ISOCLEAN® Certified Lubricants are premium heavy duty, extreme pressure, multigrade automotive gear lubricants. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo Syn-Gear XDM ISOCLEAN Certified Lubricants deliver exceptional value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Extended drain capabilities** — Meet the requirements of major axle manufacturers for extended drains.
- **Excellent thermal and oxidation stability** — Synthetic hydrocarbon base oils provide outstanding stability.
- **High viscosity index and low pour point** — Synthetic hydrocarbon base stocks provide extremely broad operating temperature ranges when compared with conventional mineral oil based lubricants.
- **Excellent seal compatibility** — Compatible with many widely used seal elastomers.
- **Refill and top off compatibility** — Delo Syn-Gear XDM ISOCLEAN Certified Lubricants are compatible with conventional mineral oil based and other synthetic automotive gear lubricants.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drivetrain that covers lubricant-related damage to your equipment, including parts and labor.[1] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Maximizes the bottom line business results of trucking industry professionals.

FEATURES

Delo Syn-Gear XDM ISOCLEAN Certified Lubricants are premium heavy duty, extreme pressure, multigrade automotive gear lubricants. Manufactured from synthesized hydrocarbon base fluids which have excellent thermal and oxidation stability, a high viscosity index, and a low pour point.

The low pour points of Delo Syn-Gear XDM ISOCLEAN Certified Lubricants impart excellent lubrication during startup at subzero temperatures, while the outstanding viscosity temperature characteristics provide excellent lubrication at high temperatures.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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GL-19 ISOCLEAN

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APPLICATIONS

Delo® Syn-Gear XDM ISOCLEAN® Certified Lubricants are recommended as rear axle and differential lubricants in over-the-road and off-road vehicles when operating under severe conditions and in extremely cold or hot environments. Delo Syn-Gear XDM ISOCLEAN Certified Lubricants meet and exceed the requirements of API Service Categories GHL-4, GL-5 and MT-1. In addition, they are approved for:

- **Dana** SHAES 256 REV C (SAE 75W-90 only)
- **Meritor** O-76 Extended Drain
- **SAE** J2360 (formerly MIL-PRF-2105E)
- **STEMCO** PPS+ and PPS wheel end systems (SAE 75W-90 only)

Delo Syn-Gear XDM ISOCLEAN Certified Lubricant approvals apply to both viscosity grades unless indicated otherwise. In addition, Delo Syn-Gear XDM SAE 80W-140 ISOCLEAN Certified Lubricant meets the requirements of Dana SHAES 256 REV A. Delo Syn-Gear XDM SAE 75W-90 ISOCLEAN Certified Lubricant is recommended for **Dana** and **Meritor** axles with 500,000-mile aservice intervals and supports Dana's 750,000 mile axle warranty coverage for line haul service.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

SAE Grade	75W-90	80W-140
Product Number	*223029*	*223028*
SDS Number *U.S.* *Canada* *Mexico*	 *35582* *36013* *36014*	 *35586* *37043* *35586*
Density at 60°F, lb/gal	7.21	7.31
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 108 15.1	 245 26.5
Viscosity, Brookfield cP at -26°C cP at -40°C	 — 106,000	 50,000 —
Viscosity Index	146	140
Flash Point, PM, °C(°F)	140(284)	136(277)
Pour Point, °C(°F)	-48(-54)	-42(-44)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® SYN-GEAR XDA

SAE 75W-85

PRODUCT DESCRIPTION

"Delo. Let's go further.®"

Delo® Syn-Gear XDA is a premium heavy duty, extreme pressure, multigrade automotive gear lubricant formulated for new generation Daimler axles found on newer model Freightliner and Western Star Trucks.

CUSTOMER BENEFITS

Delo Syn-Gear XDA delivers exceptional value through:

- **Extended drain capabilities** — Provides extended life service up to 300,000 miles (500,000 km) for Daimler axles that require Daimler MB235.31 and Detroit DFS 93K219.03.[1]
- **Excellent thermal and oxidation stability** — Synthetic hydrocarbon base oils provide outstanding stability.
- **High viscosity index and low pour point** — Synthetic hydrocarbon base stocks provide extremely broad operating temperature ranges when compared with conventional mineral oil based lubricants.
- **Excellent seal compatibility** — Compatible with many widely used seal elastomers.
- **Refill and top off compatibility** — Delo Syn-Gear XDA is compatible with conventional mineral oil based and other synthetic automotive gear lubricants.
- **Warranty Plus Protection** — Bumper-to-bumper warranty protection from the engine to the drivetrain that covers lubricant-related damage to your equipment, including parts and labor.[2] Problem resolution and technical advice from Chevron's lubrication experts.
- **Access to Chevron's lubrication and industry knowledge** — Maximizes the bottom line business results of trucking industry professionals.

1 Results will vary based on operating conditions and engine types. Always follow OEM recommendations and utilize used oil analysis testing when extending oil drain intervals.

2 See Warranty Plus for details and restrictions.

FEATURES

Delo Syn-Gear XDA is a premium heavy duty, extreme pressure, multigrade automotive gear lubricant. It is manufactured from synthesized hydrocarbon base fluids which have excellent thermal and oxidation stability, a high viscosity index, and a low pour point.

The low pour point of Delo Syn-Gear XDA imparts excellent lubrication during startup at subzero temperatures, while the outstanding viscosity temperature characteristics provide excellent lubrication at high temperatures.

APPLICATIONS

Delo Syn-Gear XDA is recommended as rear axle and differential lubricant in over-the-road applications when operating under severe conditions and in extremely cold or hot environments. Delo Syn-Gear XDA meets and exceeds the requirements of API Service Category GL-5. It is approved for **Detroit DFS** 93K219.03.

In addition, it meets the performance requirements for:

- **SAE** J2360 (formerly MIL-PRF-2105E)
- **Daimler MB** 235.31

Delo Syn-Gear XDA SAE 75W-85 is recommended for **Daimler** and **Detroit** drive axles in line haul on-highway service. For Freightliner and Western Star trucks that have Daimler axles installed.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

10 May 2018
GL-20

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TYPICAL TEST DATA

SAE Grade	75W-85
Product Number	*223090*
SDS Number	*43600*
Density at 60°F, lb/gal	7.23
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 69.0 11.9
Viscosity, Brookfield cP at -26°C cP at -40°C	 7,200 65,000
Viscosity Index (min/max)	160/167
Flash Point, COC, °C(°F)	195
Pour Point, °C(°F)	-48

Minor variations in product typical test data are to be expected in normal manufacturing.

DELO® TORQFORCE® FD
SAE 60

PRODUCT DESCRIPTION

Delo® TorqForce® FD SAE 60 is a premium heavy-duty gear lubricant specifically designed for use in final drives and axles of modern Caterpillar off-road equipment operating in severe service, where fluids meeting the Cat FD-1 specification are recommended.

CUSTOMER BENEFITS

Delo TorqForce FD SAE 60 delivers value through:

- **Maximizes equipment life in severe service** — Advanced additive system minimizes wear in heavily loaded gears and bearings by forming a strong protective layer on metal surfaces under extreme service conditions.
- **Prolongs oil life** — Extremely high thermal and oxidation stability protects against viscosity increase and deposit formation. Drain interval of 6,000 hours is recommended (compare to typical 2,000 hour drain interval for Cat TO-4 fluids).
- **Minimizes unscheduled maintenance** — Effective rust and corrosion inhibitors protect final drive components. Good viscosity characteristics at low temperatures ensure rapid oil circulation on start-up, preventing premature component wear.
- **Excellent foam protection** — Works to avoid fluid loss due to foaming.
- **Long equipment life** — Fluid film with special additives helps protect metal surfaces against pitting, scuffing and wear, even under severe operating conditions of high temperature and high load.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1]
- **Access to Chevron's lubrication and industry knowledge** — Maximizes the bottom line business results of trucking industry professionals.

FEATURES

Delo TorqForce FD SAE 60 is designed *specifically* for heavy-duty final drives and axles in severe service. It exhibits significantly improved performance versus TO-4 fluids in the area of gear protection, resistance to macropitting, improved corrosion protection and foam stability.

For customers who have final drive applications where the fluid also lubricates oil-immersed brakes or clutches from a common sump system, please use Delo TorqForce SAE 50 (Caterpillar TO-4). Additionally, Chevron's Delo TorqForce FD SAE 60 should not be used in powershift transmissions since it doesn't contain key friction modifiers required for high friction materials found in these systems.

APPLICATIONS

- Final drives, axles, differentials and front wheels of Caterpillar equipment where Cat FD-1 performance fluid is specified. It is not suitable where a common sump is used for lubricating final drive gears, and immersed brakes or clutches.
- Caterpillar Mining and Aggregate Haul Trucks
- Caterpillar Wheel and Track Mining Loaders & Dozers
- Caterpillar Wheel Scrapers
- Caterpillar Wheel and Track Fellers
- Caterpillar Wheel and Track Skidders
- Caterpillar Knuckleboom Loaders

Delo TorqForce FD SAE 60 meets or exceeds the **Caterpillar** FD-1 specification.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

1 July 2016
GL-22

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TYPICAL TEST DATA

SAE Grade	60
Product Number	*293111*
SDS Number	*41030*
Density at 15 °C, kg/L	.90
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 335 25
Viscosity Index	97
Flash Point, °C(°F)	288(550)
Pour Point, °C(°F)	-25(-13)
Phosphorus, mass %	0.031
Calcium, mass %	0.028

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® TORQFORCE® FD ISOCLEAN® CERTIFIED LUBRICANT

SAE 60

PRODUCT DESCRIPTION

Delo® TorqForce® FD SAE 60 ISOCLEAN® Certified Lubricant is a premium heavy-duty gear lubricant specifically designed for use in final drives and axles of modern Caterpillar off-road equipment operating in severe service, where fluids meeting the Cat FD-1 specification are recommended. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Delo TorqForce FD SAE 60 ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Maximizes equipment life in severe service** — Advanced additive system minimizes wear in heavily loaded gears and bearings by forming a strong protective layer on metal surfaces under extreme service conditions.
- **Prolongs oil life** — Extremely high thermal and oxidation stability protects against viscosity increase and deposit formation. Drain interval of 6,000 hours is recommended (compare to typical 2,000 hour drain interval for Cat TO-4 fluids).
- **Minimizes unscheduled maintenance** — Effective rust and corrosion inhibitors protect final drive components. Good viscosity characteristics at low temperatures ensure rapid oil circulation on start-up, preventing premature component wear.
- **Excellent foam protection** — Works to avoid fluid loss due to foaming.
- **Long equipment life** — Fluid film with special additives helps protect metal surfaces against pitting, scuffing and wear, even under severe operating conditions of high temperature and high load.
- **Warranty Plus protection** — Bumper-to-bumper warranty protection from the engine to the drive train. Payment for Chevron lubricant-related damage to your equipment, including parts and labor.[1]
- **Access to Chevron's lubrication and industry knowledge** — Maximizes the bottom line business results of trucking industry professionals.

1 See Warranty Plus for details and restrictions.

Product(s) manufactured in the USA.
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A **Chevron** company product

1 July 2016
GL-22 ISOCLEAN

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FEATURES

Delo® TorqForce® FD SAE 60 ISOCLEAN® Certified Lubricant is designed *specifically* for heavy-duty final drives and axles in severe service. It exhibits significantly improved performance versus TO-4 fluids in the area of gear protection, resistance to macropitting, improved corrosion protection and foam stability.

For customers who have final drive applications where the fluid also lubricates oil-immersed brakes or clutches from a common sump system, please use Delo TorqForce SAE 50 (Caterpillar TO-4). Additionally, Chevron's Delo TorqForce FD SAE 60 ISOCLEAN Certified Lubricant should not be used in powershift transmissions since it doesn't contain key friction modifiers required for high friction materials found in these systems.

APPLICATIONS

- Final drives, axles, differentials and front wheels of Caterpillar equipment where Cat FD-1 performance fluid is specified. It is not suitable where a common sump is used for lubricating final drive gears, and immersed brakes or clutches.
- Caterpillar Mining and Aggregate Haul Trucks
- Caterpillar Wheel and Track Mining Loaders & Dozers
- Caterpillar Wheel Scrapers
- Caterpillar Wheel and Track Fellers
- Caterpillar Wheel and Track Skidders
- Caterpillar Knuckleboom Loaders

Delo TorqForce FD SAE 60 meets or exceeds the specification:

- **CATERPILLAR** FD-1

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

SAE Grade	**60**
Product Number	*293112*
SDS Number	*41030*
Density at 15 °C, kg/L	.90
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 335 25
Viscosity Index	97
Flash Point, °C(°F)	288(550)
Pour Point, °C(°F)	-25(-13)
Phosphorus, mass %	0.031
Calcium, mass %	0.028

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON GEAR OIL GL-1

SAE 90, 140

PRODUCT DESCRIPTION

Chevron Gear Oils GL-1 are rust and oxidation inhibited gear oils that are recommended for many automotive and industrial equipment where the equipment suppliers recommend the use of a straight mineral oil in SAE viscosity grades 90 (ISO 220) or 140 (ISO 460).

CUSTOMER BENEFITS

Chevron Gear Oils GL-1 deliver value through:

- **Good lubricant film** — Provided through use of select high viscosity index base stocks.
- **Excellent rust protection** — Offers long equipment life by protecting gears from rust.
- **Good antifoam protection** — Provides maximum gear and bearing life by maintaining full lubricant film with minimal entrained air or surface foam.
- **High viscosity index** — Avoids thinning out excessively at high temperatures.
- **Good oxidation stability** — Provide long service life even in the presence of copper or bronze.

FEATURES

Chevron Gear Oils GL-1 are rust and oxidation inhibited gear oils.

They are manufactured from high viscosity index paraffinic base stocks. They contain a metal deactivator to help stop such metals as copper from acting as catalysts to promote oil oxidation. They also contain rust, corrosion, and foam inhibitors, plus a pour point depressant to offer fluidity at low temperatures.

Chevron Gear Oils GL-1 help provide long life for gears and bearings in gear cases where the OEM recommends the use of a straight mineral oil.

High viscosity indexes and low pour points help deliver good film strength and gear wear protection at both high and low temperatures.

APPLICATIONS

Chevron Gear Oils GL-1 are recommended for many types of automotive and industrial equipment where the equipment suppliers recommend the use of a straight mineral oil in SAE viscosity grades 90 (ISO 220) or 140 (ISO 460).

Chevron Gear Oils GL-1 are also suitable for lubrication of many types of equipment where copper or bronze is present and susceptible to attack by oils containing sulfur-phosphorus compounds.

Chevron Gear Oils GL-1 meet the requirements of **API Service Category** GL-1.

TYPICAL TEST DATA

SAE Grade	90	140
Product Number	*223036*	*223037*
SDS Number	*35585*	*35585*
Density at 15°C, kg/L	0.8968	0.8956
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 204 18.0	 404 28.0
Viscosity Index	96	95
Flash Point, °C(°F)	294(561)	310(590)
Pour Point, °C(°F)	-12(+10)	-12(+10)

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

7 May 2015
GL-25

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HAVOLINE® GEAR OIL
SAE 80W-90, 85W-140

PRODUCT DESCRIPTION

Havoline® Gear Oils are high performance oils recommended for use in most spiral bevel and hypoid differentials, power dividers, and oil-lubricated steering axle wheel bearings.

CUSTOMER BENEFITS

Havoline Gear Oils deliver value through:

- **Long gear life** — Extreme pressure properties protect hypoid and other types of gears from scuffing and wear.
- **Wide range of weather protection** — Multiple viscosity capability offers proper gear lubrication at both low and high operating temperatures.
- **Rust and corrosion protection** — Effective inhibitor package protects against rusting or corrosion of gear and bearing surfaces.
- **Low foam** — Excessive foaming minimized by use of foam inhibitor.
- **Long lubricant life** — Outstanding thermal and oxidation stability allow high temperature operation with long lubricant life.
- **Seal Protection** — Formulated to protect against oil seal deterioration.

FEATURES

Havoline Gear Oils are made from paraffinic base stocks and contain a carefully balanced additive package to help provide maximum gear protection and long lubricant life.

The sulfur-phosphorus extreme pressure additives used in Havoline Gear Oils provide outstanding thermal and oxidation stability.

In addition, these lubricants are fortified with rust and corrosion inhibitors, a foam inhibitor, and a pour point depressant.

The sulfur-phosphorus extreme pressure additives in Havoline Gear Oils minimize the spalling and wear of gears by creating a microthin sacrificial film on the surface of the gear teeth which is actually softer than the gears themselves. Frictional heat and pressures between tooth surfaces cause the sulfur-phosphorus to react with the surface of the gear teeth at the point of contact, thus creating the sacrificial film.

The highly refined base stocks and various inhibitors in the additive package help assure a well-balanced lubricant and long gear and bearing life.

APPLICATIONS

Havoline Gear Oils are recommended for use in many spiral bevel and hypoid differentials, power dividers, and oil-lubricated steering axle wheel bearings.

Their multiviscosity characteristics allow their use in equipment operating over a broad ambient temperature range. This means good cold flow properties and gear protection.

Havoline Gear Oils are approved for:

- **Mack** GO-J

Havoline Gear Oils meet the requirements of:

- **API Service Categories** MT-1, GL-4, and GL-5
- **SAE J 2360** (formerly known as MIL-PRF-2105E)

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

11 February 2013
GL-33

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TYPICAL TEST DATA

SAE Grade	80W-90	85W-140
Product Number	*222271*	*222272*
SDS Number	*8600*	*8600*
Density at 15.6°C(60°F), kg/L(lb/gal)	0.896(7.46)	0.908(7.56)
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 145 14.2	 341 25.0
Viscosity, Brookfield cP at -12°C cP at -26°C	 — 81,000	 123,000 —
Viscosity Index	95	95
Flash Point, °C(°F)	218(421)	226(439)
Pour Point, °C(°F)	-33(-27)	-15(+5)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® LS GEAR LUBRICANT
SAE 80W-90

PRODUCT DESCRIPTION

Havoline® LS Gear Lubricant is a high quality gear lubricant designed to provide protection in extreme operating conditions for applications requiring API GL-5 or MT-1 performance levels.

CUSTOMER BENEFITS

Havoline LS Gear Lubricant delivers value through:

- **Controlled inventory costs** — One gear lubricant for both conventional and limited slip differentials. Simplified inventory can help save money, space, and handling time.
- **Optimal gear life** — Extreme pressure properties protect hypoid and other types of gears from scuffing and wear.
- **Long lubricant life** — Outstanding thermal and oxidation stability allow high temperature operation with long lubricant life.

FEATURES

Havoline LS Gear Lubricant is a high quality gear lubricant.

It is formulated with a thermally stable friction modifier and can be used for complete replacement or top-off in limited slip differentials.

Havoline LS Gear Lubricant contains a high performance sulfur-phosphorous extreme pressure additive, thermally stable base stocks, and friction modifiers for limited slip performance. In addition, this lubricant is fortified with rust and corrosion inhibitors, a foam inhibitor, and a pour point depressant.

The extreme pressure additives in Havoline LS Gear Lubricant minimize the spalling and wear of gears by creating a micro-thin sacrificial film on the surface of the gear teeth which is actually softer than the gears themselves. Frictional heat and pressures between tooth surfaces cause the sulfur-phosphorous to react with the surface of the gear teeth at the point of contact, thus creating the sacrificial film.

The limited slip additive was carefully selected to provide the desired frictional properties in limited slip differentials with no degradation of performance in conventional applications.

Havoline LS Gear Lubricant has outstanding thermal and oxidative stability. It minimizes oxidative sludge and varnish formation for maximum gear, bearing and seal life. In particular, the high thermal stability of the friction modifier results in stable friction levels and longer life for anti-stick-slip performance.

APPLICATIONS

Havoline LS Gear Lubricant is recommended for service fill and top-off of all limited slip differentials. It is recommended for differentials where manufacturers' specify API GL-5 gear lubricants plus supplemental limited slip additive.

Havoline LS Gear Lubricant provides excellent performance in conventional automotive gear oil applications requiring API GL-5 or MT-1 performance levels, including:

- Differentials calling for this viscosity grade
- Axles in buses and heavy duty trucks where gear lubricants are recommended
- Four-wheel drive transfer cases
- Applications where a "multipurpose" gear lubricant or an API Service Classification GL-5 is required

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

8 June 2015
GL-34

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Havoline® LS Gear Lubricant can also be used in off-highway wheel loader axles equipped with wet brakes. It is recommended for small and medium size loaders made by **Hitachi** and **Kawasaki**. This fluid can be a good choice for applications requiring friction modification (anti-chatter) with a level of gear protection much higher than that provided by typical API GL-4 tractor fluids.

Havoline LS Gear Lubricant meets or exceeds the performance requirements of **API Service Categories** MT-1 and GL-5.

Note: Havoline LS Gear Lubricant is designed for full refill of all limited slip differentials. However, there may be instances when axle chatter occurs. If so, it is acceptable to add at least 3% by volume of aftermarket limited slip top treat additive (4 ounces of top treat per gallon of lubricant).

TYPICAL TEST DATA

SAE Grade	**80W-90**
Product Number	*250513*
SDS Number	*34405*
Density at 15°C, kg/L	0.889
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 135 14.3
Viscosity, Brookfield mPa.s at -26°C	 70,300
Viscosity Index	104
Flash Point, °C(°F)	221(430)
Pour Point, °C(°F)	-34(-29)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® POWER STEERING FLUID

PRODUCT DESCRIPTION

Fluid for automotive power steering systems in automobiles and light trucks.

CUSTOMER BENEFITS

Havoline® Power Steering Fluid delivers value through:

- **Protection against pump wear**
- **Protection against deterioration of seals and hoses**
- **Protection against corrosion, rust, and oxidation**

FEATURES

Havoline Power Steering Fluid is a general purpose power steering fluid.

Havoline Power Steering Fluid is blended with high quality base stocks and a balanced additive system containing friction modifiers, anti-wear agents, and inhibitors against oxidation, foam, and rust.

APPLICATIONS

Havoline Power Steering Fluid is recommended for automotive power steering systems in automobiles and light trucks.

It is designed for use in applications which call for the following OEM specifications:

- **FCA US LLC** (formerly known as Chrysler Group LLC) MS-5931
- **Ford** ESW-M2C128-C
- **GM** 9985010
- **Volkswagen** TL-VW-570-26

Havoline Power Steering Fluid is also suitable for Subaru, Mercedes-Benz, Mazda, and Volvo systems. It is not recommended for use in Honda vehicles. It can be used in power steering applications where DEXRON®, DEXRON®-II, DEXRON®-II D, DEXRON®-III or MERCON® is required.[1] Check owner's manual for correct fluid type recommended.

TYPICAL TEST DATA

Product Number	*221806*
SDS Number	*10825*
API Gravity	31.2
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 41.0 7.7
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 191 52.0
Viscosity, Brookfield cP at -40°C	 31,450
Viscosity Index	155
Flash Point, °C(°F)	210(410)
Pour Point, °C(°F)	-48(-54)
Color	Red

Minor variations in product typical test data are to be expected in normal manufacturing.

1 DEXRON is a registered trademark of General Motors Corporation.
MERCON is a registered trademark of Ford Motor Company.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

25 February 2015
GL-35

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MEROPA®

68, 100, 150, 220, 320, 460, 680, 1000, 1500

PRODUCT DESCRIPTION

Meropa® gear lubricants are premium quality extreme pressure gear oils with excellent load carrying capacity, water demulsibility, oxidation stability, and corrosion protection.

CUSTOMER BENEFITS

Meropa gear lubricants deliver value through:

- **Gear set efficiencies** — High thermal stability EP system helps maintain clean gear and bearing surfaces, minimizing deposits which interfere with effective lubrication. High oxidation stability limits in-service viscosity increases, which can lead to energy losses.
- **Long equipment life** — Effective EP system forms a protective film in areas of metal-to-metal contact, minimizing wear rates and maintaining efficient transfer of power. Good water separation and effective rust inhibitors protect surfaces against rust and corrosion. High thermal stability additive system minimizes the formation of high temperature compounds which can be corrosive to bearing materials. The effective corrosion inhibitor provides additional protection for metal components.
- **Long oil life** — Effective oxidation inhibitors and copper passivator minimize oil oxidation, limiting viscosity increase and promoting long drain intervals.

FEATURES

Meropa gear lubricants are high performance, multipurpose gear lubricants designed for many types of industrial gear lubrication services where loads and shock loadings are high.

APPLICATIONS

Meropa gear lubricants are recommended for:

- industrial enclosed gearing where an AGMA extreme pressure lubricant is specified
- bath, splash, circulating, or spray mist lubrication as applicable to the proper viscosity grade
- general industrial plant lubrication where the performance properties of an AGMA extreme pressure lubricant is required

Meropa gear lubricants meet the requirements of:

- **AGMA** EP 9005-E02 (ISO 68, 100, 150, 220, 320, 460, 680, 1000, 1500)
- **DIN** 51517-3 (CLP)
- **MAG Cincinnati, Cincinnati Machine** P-63 (ISO 68), P-76 (ISO 100), P-77 (ISO 150), P-74 (ISO 220), P-59 (ISO 320), P-35 (ISO 460), P-78 (ISO 1000)
- **U.S. Steel** 224 Specification (ISO 220, 320, 460, 680)

Meropa gear lubricants (ISO 68, 100, 150, 220, 320, 460) are suitable for use in **Bijur** oil application equipment.

Meropa gear lubricants have a typical sulfur-phosphorus odor characteristic of industrial gear oils. A ventilated environment is recommended during use.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

1 July 2016
GL-37

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TYPICAL TEST DATA

ISO Grade	68	100	150	220	320	460	680
Product Number	*277209*	*277219*	*277210*	*277211*	*277212*	*277213*	*277214*
SDS Number	*23551*	*23551*	*23551*	*23551*	*23551*	*23551*	*23551*
AGMA Grade	2 EP	3 EP	4 EP	5 EP	6 EP	7 EP	8 EP
API Gravity	31.0	30.6	29.7	28.4	27.3	26.3	26.0
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 64.6 8.6	 95.0 11.0	 142 14.4	 209 18.8	 304 23.2	 437 29.4	 646 39.8
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 334 55	 495 64	 744 77	 1102 96	 1618 116	 2341 144	 3467 194
Viscosity Index	104	100	100	100	95	95	100
Flash Point, °C(°F)	225(437)	225(437)	240(464)	245(473)	245(473)	245(473)	260(500)
Pour Point, °C(°F)	-33(-27)	-30(-22)	-30(-22)	-21(-5)	-18(0)	-15(+5)	-12(+10)
Timken OK Load, lb	65	65	65	65	65	65	65
FZG Pass Stage, ASTM D5182	12	12	12	12	12	12	>12

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	1000	1500
Product Number	*277215*	*277216*
SDS Number	*23551*	*23551*
AGMA Grade	8A EP	9 EP
API Gravity	25.9	25.7
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 950 53.9	 1425 74.0
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 5115 262	 7699 359
Viscosity Index	107	114
Flash Point, °C(°F)	260(500)	260(500)
Pour Point, °C(°F)	-12(+10)	-12(+10)
Timken OK Load, lb	65	65
FZG Pass Stage, ASTM D5182	>12	>12

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

MEROPA®
ISOCLEAN® CERTIFIED LUBRICANT
68, 100, 150, 220, 320, 460, 680

PRODUCT DESCRIPTION

Meropa® ISOCLEAN® Certified Lubricants are premium quality extreme pressure gear oils with excellent load carrying capacity, water demulsibility, oxidation stability, and corrosion protection. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Meropa ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Gear set efficiencies** — High thermal stability EP system helps maintain clean gear and bearing surfaces, minimizing deposits which interfere with effective lubrication. High oxidation stability limits in-service viscosity increases, which can lead to energy losses.
- **Long equipment life** — Effective EP system forms a protective film in areas of metal-to-metal contact, minimizing wear rates and maintaining efficient transfer of power. Good water separation and effective rust inhibitors protect surfaces against rust and corrosion. High thermal stability additive system minimizes the formation of high temperature compounds which can be corrosive to bearing materials. The effective corrosion inhibitor provides additional protection for metal components.
- **Long oil life** — Effective oxidation inhibitors and copper passivator minimize oil oxidation, limiting viscosity increase and promoting long drain intervals.

FEATURES

Meropa ISOCLEAN Certified Lubricants are high performance, multipurpose gear lubricants designed for many types of industrial gear lubrication services where loads and shock loadings are high.

APPLICATIONS

Meropa ISOCLEAN Certified Lubricants are recommended for:

- industrial enclosed gearing where an AGMA extreme pressure lubricant is specified
- bath, splash, circulating, or spray mist lubrication as applicable to the proper viscosity grade
- general industrial plant lubrication where the performance properties of an AGMA extreme pressure lubricant is required

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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1 July 2016
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Meropa® ISOCLEAN® Certified Lubricants meet the requirements of:

- **AGMA** EP 9005-E02 (ISO 68, 100, 150, 220, 320, 460, 680)
- **DIN** 51517-3 (CLP)
- **MAG Cincinnati, Cincinnati Machine** P-63 (ISO 68), P-76 (ISO 100), P-77 (ISO 150), P-74 (ISO 220), P-59 (ISO 320), P-35 (ISO 460)
- **U.S. Steel** 224 Specification (ISO 220, 320, 460, 680)

Meropa gear lubricants (ISO 68, 100, 150, 220, 320, 460) are suitable for use in **Bijur** oil application equipment.

Meropa ISOCLEAN Certified Lubricants have a typical sulfur-phosphorus odor characteristic of industrial gear oils. A ventilated environment is recommended during use.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

ISO Grade	68	100	150	220	320	460	680
Product Number	*278039*	*278047*	*278040*	*278041*	*278042*	*278043*	*278044*
SDS Number	*23551*	*23551*	*23551*	*23551*	*23551*	*23551*	*23551*
AGMA Grade	2 EP	3 EP	4 EP	5 EP	6 EP	7 EP	8 EP
API Gravity	31.0	30.6	29.7	28.4	27.3	26.3	26.0
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 64.6 8.6	 95.0 11.0	 142 14.4	 209 18.8	 304 23.2	 437 29.4	 646 39.8
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 334 55	 495 64	 744 77	 1102 96	 1618 116	 2341 144	 3467 194
Viscosity Index	104	100	100	100	95	95	100
Flash Point, °C(°F)	225(437)	225(437)	240(464)	245(473)	245(473)	245(473)	260(500)
Pour Point, °C(°F)	-33(-27)	-30(-22)	-30(-22)	-21(-5)	-18(0)	-15(+5)	-12(+10)
Timken OK Load, lb	65	65	65	65	65	65	65
FZG Pass Stage, ASTM D5182	12	12	12	12	12	12	>12

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

MEROPA® AQUAGEAR® EP
220, 320, 460

PRODUCT DESCRIPTION

Meropa® Aquagear® EP oils are gear oils designed to emulsify water. They are designed to meet the Joy Mining Machinery requirements for industrial EP gear oils that are used in enclosed gear sets in longwall mining equipment, and can be used in many gearboxes of other mining equipment and construction equipment operating in contaminated, wet environments.

CUSTOMER BENEFITS

Meropa Aquagear EP oils deliver value through:

- **Long equipment life** — Effective sulfur-phosphorus extreme-pressure additives help provide high film thickness that protects gear teeth from wear and premature failure.
- **Long oil life** — Special additives and base oil formulations help prevent product degradation when operating in severe conditions that lead to rapid oxidation and thermal stress - promoting long service life of the oil.
- **Flexibility to use in wet conditions** — Quickly forms stable emulsions with water to help prevent separated water from corroding equipment, and minimizes water corrosion on either steel (rust) or nonferrous metals (including copper and its alloys) in gear sets.
- **Cold weather reliability** — Pour point is depressed to provide good cold flow performance at low temperature conditions. These gear oils will flow at approximately 5 - 10°C above their pour point temperatures.

FEATURES

Meropa Aquagear EP oils are multipurpose gear lubricants.

They are formulated with highly refined, high viscosity index paraffinic base oils and a sulfur-phosphorus additive system. Meropa Aquagear EP oils contain extreme pressure, antiwear and emulsibility additives; oxidation, rust, corrosion and foam inhibitors; a pour point depressant; and a metal deactivator to protect copper or copper alloys from corrosion.

They are designed to meet or exceed the performance requirements of Joy Mining Machinery specifications for enclosed gear sets used in longwall mining equipment.

Meropa Aquagear EP oils have high film strength and load-carrying capacity. Gear teeth are protected from wear, surface distress, and premature failure.

They provide maximum thermal and oxidation stability to help prevent degradation under severe operating conditions and promote long lubricant life.

They are designed to form a stable emulsion with contaminating water.

APPLICATIONS

Chevron recommends Meropa Aquagear EP oils for use in Joy Mining Machinery calling for industrial EP gear oils as used in enclosed gear sets in longwall mining equipment. In addition, they can be used in gearboxes of other mining equipment and construction equipment operating in contaminated, wet environments.

Meropa Aquagear EP oils meet the specifications of:

- **Joy** TO-MEP (ISO 220), TO-HEP (ISO 320) and TO-HD (ISO 460).

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

ISO Grade	220	320	460
Product Number	*278013*	*278014*	*278015*
SDS Number	*23514*	*23514*	*23514*
API Gravity	28.1	26.0	26.0
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 220 19.9	 320 27.2	 454 34.0
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 1158 101	 1689 134	 2409 166
Viscosity Index	104	113	111
Flash Point, °C(°F)	248(478)	244(471)	242(468)
Pour Point, °C(°F)	-24(-11)	-18(0)	-18(0)
Falex EP, ASTM D3233, lb	3750+	3750+	3750+
FZG Pass Stage, DIN 51364	12	12	12
Oxidation, ASTM D2893, % Viscosity Increase	3.2	3.6	5.1
Emulsibility, ASTM D1401, mL H_2O at 48 h	0	0	0
Foaming, ASTM D892 Tendency, mL Stability, mL	 0 0	 0 0	 0 0
Corrosion, Copper Strip, 3 h at 100°C	1B	1B	1B
Rust Prevention, ASTM D665	Pass	Pass	Pass

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

MEROPA® SYNTHETIC EP
150, 220, 320, 460, 680

PRODUCT DESCRIPTION

Meropa® Synthetic EP are high quality industrial EP gear lubricants.

CUSTOMER BENEFITS

Meropa Synthetic EP lubricants deliver value through:

- **Excellent thermal and oxidation stability** — The synthetic hydrocarbon base oils used in these products provide outstanding stability promoting long lubricant and equipment life.
- **High viscosity index and low pour point** — These result in very broad operating temperature ranges -46°C to 149°C (-50°F to 300°F) when compared with conventional mineral oil based lubricants.
- **Energy savings** — The synthetic base oil will typically increase gear efficiency, resulting in less power consumption.
- **Extended drain intervals** — Long lubricant life, low maintenance costs and reduced used oil disposal when compared to mineral oil products.
- **Compatibility** — Meropa Synthetic EP lubricants are compatible with most mineral oil based industrial EP/R&O gear lubricants, as well as with most PAO based synthetic industrial EP and R&O gear lubricants.

FEATURES

Meropa Synthetic EP lubricants are high quality industrial EP gear lubricants.

Meropa Synthetic EP lubricants are developed from an advanced formulation that provides exceptional load carrying and antiwear properties; protection against rust, corrosion, foaming, and oxidation; and excellent demulsibility. This formulation provides outstanding performance in most types of industrial gearboxes, exemplified by the FZG pass stage results of >12.

These products possess very high shear stability even under heavily loaded, high speed conditions in industrial gears.

The low pour point and very good low temperature fluidity of Meropa Synthetic EP lubricants provide excellent lubrication during startup at sub-zero temperatures, while their exceptional viscosity-temperature characteristics provide dependable lubrication at high temperatures.

A unique property of the synthetic base oil is a low traction coefficient, resulting in improved gear efficiency, energy savings, less friction, less wear, and lower operating temperatures compared to conventional mineral oil products.

Due to the very high viscosity index, these products provide a higher oil viscosity at operating temperature than a mineral oil product of the same ISO grade. This results in increased oil film thickness and better antiwear protection for both bearings and gears.

Drain intervals can be extended longer than conventional mineral oil products. That means fewer oil changes, reduced maintenance costs, and less used oil disposal.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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APPLICATIONS

Meropa® Synthetic EP lubricants are recommended for many types of enclosed industrial gearboxes, especially those running continuously at temperatures up to 107°C (225°F) or exposed to very cold temperatures as low as -46°C (-50°F), or under severe service conditions, such as heavy loads or low speeds. These products also provide excellent protection for bearings operating under similar conditions.

They can promote long service life for applications where mineral oil products deteriorate too rapidly or lead to premature failures.

Meropa Synthetic EP lubricants meet the requirements of:

- **AGMA** 9005 and qualify as AGMA EP gear lubricants
- **DIN** 51517-3 (CLP)
- **Joy** TO-SMEP (ISO 220) and TO-SHEP (ISO 320)
- **U.S. Steel 224**

Meropa Synthetic EP lubricants meet the requirements of **MAG Cincinnati, Cincinnati Machine** P-35 (ISO 460), P-59 (ISO 320), P-74 (ISO 220), P-77 (ISO 150).

TYPICAL TEST DATA

ISO Grade	150	220	320	460	680
Product Number	*278090*	*278094*	*278091*	*278093*	*278092*
SDS Number	*37071*	*37071*	*37071*	*37071*	*37071*
AGMA Grade	4 EP	5 EP	6 EP	7 EP	8 EP
API Gravity	34.4	33.8	33.2	32.7	32.1
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 142 19.9	 209 26.9	 304 35.8	 437 47.0	 646 63.0
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 728 100	 1075 132	 1570 174	 2267 227	 3366 304
Viscosity Index	162	164	165	166	168
Flash Point, °C(°F)	242(468)	240(464)	240(464)	240(464)	242(468)
Pour Point, °C(°F)	-51(-60)	-51(-60)	-39(-38)	-36(-33)	-30(-22)
Rust Test, ASTM D665A and B	Pass	Pass	Pass	Pass	Pass
Four-Ball EP Weld, ASTM D2783, kg	 250	 250	 250	 250	 250
Timken OK Load, lb	95	95	95	95	95
FZG, Fail Load Stage	>12	>12	>12	>12	>12

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

MEROPA® SYNTHETIC EP ISOCLEAN® CERTIFIED LUBRICANT

150, 220, 320, 460, 680

PRODUCT DESCRIPTION

Meropa® Synthetic EP ISOCLEAN® Certified Lubricants are high quality industrial EP gear lubricants. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Meropa Synthetic EP ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Excellent thermal and oxidation stability** — The synthetic hydrocarbon base oils used in these products provide outstanding stability promoting long lubricant and equipment life.
- **High viscosity index and low pour point** — These result in very broad operating temperature ranges -46°C to 149°C (-50°F to 300°F) when compared with conventional mineral oil based lubricants.
- **Energy savings** — The synthetic base oil will typically increase gear efficiency, resulting in less power consumption.
- **Extended drain intervals** — Long lubricant life, low maintenance costs and reduced used oil disposal when compared to mineral oil products.
- **Compatibility** — Meropa Synthetic EP lubricants are compatible with most mineral oil based industrial EP/R&O gear lubricants, as well as with most PAO based synthetic industrial EP and R&O gear lubricants.

FEATURES

Meropa Synthetic EP ISOCLEAN Certified Lubricants are high quality industrial EP gear lubricants.

Meropa Synthetic EP ISOCLEAN Certified Lubricants are developed from an advanced formulation that provides exceptional load carrying and antiwear properties; protection against rust, corrosion, foaming, and oxidation; and excellent demulsibility. This formulation provides outstanding performance in most types of industrial gearboxes, exemplified by the FZG pass stage results of >12.

These products possess very high shear stability even under heavily loaded, high speed conditions in industrial gears.

The low pour point and very good low temperature fluidity of Meropa Synthetic EP ISOCLEAN Certified Lubricants provide excellent lubrication during startup at sub-zero temperatures, while their exceptional viscosity-temperature characteristics provide dependable lubrication at high temperatures.

A unique property of the synthetic base oil is a low traction coefficient, resulting in improved gear

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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efficiency, energy savings, less friction, less wear, and lower operating temperatures compared to conventional mineral oil products.

Due to the very high viscosity index, these products provide a higher oil viscosity at operating temperature than a mineral oil product of the same ISO grade. This results in increased oil film thickness and better antiwear protection for both bearings and gears.

Drain intervals can be extended longer than conventional mineral oil products. That means fewer oil changes, reduced maintenance costs, and less used oil disposal.

APPLICATIONS

Meropa® Synthetic EP ISOCLEAN® Certified Lubricants are recommended for many types of enclosed industrial gearboxes, especially those running continuously at temperatures up to 107°C (225°F) or exposed to very cold temperatures as low as -46°C (-50°F), or under severe service conditions, such as heavy loads or low speeds. These products also provide excellent protection for bearings operating under similar conditions.

They can promote long service life for applications where mineral oil products deteriorate too rapidly or lead to premature failures.

Meropa Synthetic EP ISOCLEAN Certified Lubricants meet the requirements of:

- **AGMA** 9005 and qualify as AGMA EP gear lubricants
- **DIN** 51517-3 (CLP)
- **Joy** TO-SMEP (ISO 220) and TO-SHEP (ISO 320)
- **U.S. Steel 224**

Meropa Synthetic EP lubricants meet the requirements of **MAG Cincinnati, Cincinnati Machine** P-35 (ISO 460), P-59 (ISO 320), P-74 (ISO 220), P-77 (ISO 150).

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

ISO Grade	150	220	320	460	680
Product Number	*278078*	*278079*	*278080*	*278081*	*278082*
SDS Number	*37071*	*37071*	*37071*	*37071*	*37071*
AGMA Grade	4 EP	5 EP	6 EP	7 EP	8 EP
API Gravity	34.4	33.8	33.2	32.7	32.1
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 142 19.9	 209 26.9	 304 35.8	 437 47.0	 646 63.0
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 728 100	 1075 132	 1570 174	 2267 227	 3366 304
Viscosity Index	162	164	165	166	168
Flash Point, °C(°F)	242(468)	240(464)	240(464)	240(464)	242(468)
Pour Point, °C(°F)	-51(-60)	-51(-60)	-39(-38)	-36(-33)	-30(-22)
Rust Test, ASTM D665A and B	Pass	Pass	Pass	Pass	Pass
Four-Ball EP Weld, ASTM D2783, kg	 250	 250	 250	 250	 250
Timken OK Load, lb	95	95	95	95	95
FZG, Fail Load Stage	>12	>12	>12	>12	>12

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

MEROPA® SYNTHETIC WM 320

PRODUCT DESCRIPTION

Meropa® Synthetic WM 320 is a gear lubricant formulated for lubrication of heavily loaded enclosed gear drives in industrial applications and in wind turbines.

CUSTOMER BENEFITS

Meropa Synthetic WM gear lubricant delivers value through:

- **Excellent protection** to wind turbine gear boxes, and mobile and general industrial enclosed gear and drive systems operating in a wide variety of severe applications — These advanced lubricants help deliver complete protection under demanding conditions where water contamination and elevated temperatures will cause lubrication failure in conventional oils.
- **High viscosity index** — Helps provide excellent equipment performance and protection, offering exceptionally low viscosity performance in very low temperature start-ups. This low viscosity continues to offer excellent low drag coefficients as the equipment reaches normal operating temperature, maximizing energy efficiency.
- **Stable chemistry** — Helps provide outstanding thermal stability at elevated temperatures. Meropa Synthetic WM is highly resistant to oxidation and deposit formation, helping to maximize lubrication performance, system cleanliness and service life. Meropa Synthetic WM offers excellent foam suppression and is highly resistant to water contamination, demulsifying water and rapidly separating it, ready for removal from the system.
- **Rust and corrosion protection** — Meropa Synthetic WM is non-corrosive to steel, copper, bronze, babbitt and nickel cadmium, and offers excellent high level rust and corrosion protection over very long service periods.

FEATURES

Meropa Synthetic WM's polyalphaolefin (PAO) base oil technology, combined with its advanced sulphur-phosphorus additive systems, delivers powerful extreme pressure protection. This maximizes wear resistance, including micropitting, in heavily-loaded, high shock load situations, promoting optimal equipment performance and service life.

APPLICATIONS

Recommended for the lubrication of heavily loaded enclosed gear drives and speed reducers driven by wind turbines, fractional horsepower motors and large high horsepower units in heavy duty industrial applications.

Meropa Synthetic WM 320 is successfully used for wind turbine applications and suitable for use in Flender gear units.

Also recommended for a variety of gears including:

- spur, bevel, helical, worm and industrial hypoid gear cases on mobile contractor type equipment
- open pit and underground mining equipment
- cement mills, ball mills
- rolling mills
- crushers
- shakers
- hoists
- conveyors
- kilns
- winches
- machine tools
- skip lines and marine equipment

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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Meropa® Synthetic WM 320 is approved by **Moventas** for use in wind turbine gearboxes.

Meropa Synthetic WM 320 meets the requirements of:

- **ANSI/AGMA** 9005-E02 EP
- **David Brown** Textron Power Transmission
- **DIN** 51517-3 CLP
- **US Steel** 224

TYPICAL TEST DATA

ISO Grade	Test Method	320
Product Number		*278095*
SDS Number		*23564*
Density at 15°C, kg/L	ASTM D1298	0.856
Viscosity, Kinematic cSt at 40°C cSt at 100°C	ASTM D445	 318.6 35.43
Viscosity Index	ASTM D2270	156
Flash Point, °C(°F)	ASTM D92	240(464)
Pour Point, °C(°F)	ASTM D97	-45(-49)
TAN, mg KOH/g	ASTM D664	0.7
Cu Corrosion, 3h 100°C	ASTM D0130	1A
FZG Damaged Load, A/8.3/90	DIN 51354	>12

Minor variations in product typical test data are to be expected in normal manufacturing.

MEROPA® ULTRA GEAR LUBRICANT
68, 150, 220, 320, 460, 680

PRODUCT DESCRIPTION

Meropa® Ultra Gear Lubricants are premium industrial gear lubricants designed for many types of industrial bearings and gears where loads and shock loadings are high.

CUSTOMER BENEFITS

Meropa Ultra Gear Lubricants deliver value through:

- **Minimum wear** — Excellent antiwear properties help assure long life for gears, bearings, and seals.
- **Long lubricant life** — The outstanding thermal and oxidation stability characteristics of Meropa Ultra Gear Lubricants promote long drain intervals which can result in significant lubricant savings.

FEATURES

Meropa Ultra Gear Lubricants are premium grade, industrial gear lubricants.

Meropa Ultra Gear Lubricants are formulated with a unique extreme pressure additive using an inorganic borate compound and help provide outstanding protection against oxidation, corrosion, and rust protection.

These products are ideally suited for gear sets exposed to very high loads.

The inorganic borate film is composed of compounds that do not adversely react with metal. The film forms promptly to help provide exceptional gear protection and optimal thermal stability. By minimizing friction, cooler operating temperatures have been observed. This helps extend the life of the gears as well as the life of the lubricant.

APPLICATIONS

Meropa Ultra Gear Lubricants are designed for many types of industrial bearings and gears where loads and shock loadings are high.

They provide excellent wear control even in the presence of small amounts of water.

Meropa Ultra Gear Lubricants meet the requirements of:

- **ANSI/AGMA** 9005-E02 EP
- **US Steel** 224 (ISO 68 - ISO 460)

Meropa Ultra Gear Lubricants are registered by **NSF** and are acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

ISO Grade	68	150	220	320	460	680
Product Number	*278011*	*278006*	*278008*	*278009*	*278007*	*278010*
SDS Number	*6692*	*6692*	*6692*	*6692*	*6692*	*6692*
AGMA Grade	2 EP	4 EP	5 EP	6 EP	7 EP	8 EP
API Gravity	30.2	28.6	27.5	26.5	25.8	25.6
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 68 8.7	 150 14.9	 220 19.0	 320 24.0	 460 30.3	 680 40.7
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 352 56	 786 78	 1162 97	 1702 119	 2463 149	 3656 198
Viscosity Index	99	99	97	95	95	99
Flash Point, °C(°F)	230(446)	270(518)	280(536)	280(536)	290(554)	270(518)
Pour Point, °C(°F)	-30(-22)	-30(-22)	-18(0)	-12(+10)	-12(+10)	-12(+10)
Load Weld, ASTM D2783 Index, kg Point, kg	 47 250	 55 250	 56 250	 56 250	 56 250	 61 315
FZG Pass stage	 >12	 >12	 >12	 >12	 >12	 >12

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

MEROPA® XL

68, 150, 220, 320, 460, 680

PRODUCT DESCRIPTION

Meropa® XL gear oils are premium high-performance gear oils, offering long lubricant life, corrosion protection, excellent wear protection with high load carrying capacity and robust micropitting wear protection. They are designed for use in industrial and marine gear systems, where extreme load and shock load protection is required.

CUSTOMER BENEFITS

Meropa XL gear oils deliver value through:

- **Provides thermal and oxidative stability** — The thermal and oxidative stability of Meropa XL minimizes deposit formation and can extend bearing and gear life. Excellent resistance to oil degradation at high temperatures, resulting in extended oil life and long drain intervals.
- **Rust and corrosion protection** — Meropa XL offers rust and corrosion protection over long service periods.
- **Extended gear and bearing life** — Particularly effective in enclosed gear drives operating under extreme load, speed, and temperature conditions.
- **Less wear** — Ensures optimum wear protection with reduced maintenance and increased system uptime.
- **Provides micropitting resistance** — Delivers excellent micropitting and wear protection with reduced maintenance and increased system uptime. Approved by Siemens AG, Flender Gear Units, Rev. 15 for helical, bevel and planetary gear units. Micropitting performance is a key component in the Siemens AG Flender approval.
- **Keeps components clean** — Advanced additive technology helps prevent varnish and sludge and keeps components clean. Clean components can contribute to long lubricant and equipment life.
- **Water separation** — Excellent demulsibility and corrosion protection for trouble-free operation in applications where water contamination is unavoidable.

FEATURES

Meropa XL gear oils are designed to help ensure optimal performance in today's smaller, lighter and more energy efficient industrial gear systems. The advanced formulation is balanced to provide extreme pressure protection, while providing protection against yellow metal corrosion. The robust chemistry is compatible with multiple types of sealant and paint coatings, and helps to minimize the possibility of leaking seals and paint blistering on the inside of the gearbox. Competitive products with over-aggressive chemistries will attack the paint coatings and cause filter plugging.

APPLICATIONS

Meropa XL gear oils are recommended for:

- industrial enclosed gearing where an AGMA EP lubricant is specified
- industrial enclosed gearing where DIN 51517 (CLP) lubricant is specified
- bath, splash, circulating, or spray mist lubrication as applicable to the proper viscosity grade
- marine gearboxes requiring an extreme pressure lubricant

Also recommended for a variety of gears, including:

- Spur, bevel, helical, worm and industrial hypoid gear cases on mobile contractor type equipment
- Underground mining equipment
- Cement mills, ball mills
- Rolling mills

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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- Crushers
- Shakers
- Hoists
- Conveyors
- Machine tools
- Marine equipment

Meropa XL gear oils are approved for:

- **Siemens** AG, Flender Gear Units, Rev. 15 (ISO 150-680)
- **Fives Cincinnati** (ISO 150-680)
- **AGMA** EP 9005-E02
- **DIN** 51517-3 (CLP)
- **US Steel** 224

TYPICAL TEST DATA

ISO Grade	68	150	220	320
Product Number	*277414*	*277410*	*277411*	*277412*
SDS Number	*37390*	*37390*	*37390*	*37390*
AGMA Grade	2 EP	4 EP	5 EP	6 EP
API Gravity	31.7	33.6	31.6	29.5
Density at 15°C, kg/L	0.87	0.87	0.87	0.88
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 68 9.1	 150 16.3	 220 21.9	 320 29.1
Viscosity Index	110	115	120	124
Flash Point, °C(°F)	224(435)	250(482)	248(478)	248(478)
Pour Point, °C(°F)	-26(15)	-36(-33)	-30(-22)	-30(-22)
Foam Properties Sequence I-III, D892 Tendency, mL Stability, mL	 0 0	 0 0	 0 0	 0 0
Copper Corrosion, D130 3 hr at 100ºC	 1B	 1B	 1B	 1B
Rust Test, D665B	Pass	Pass	Pass	Pass
Steel Pin Corrosion (24 hrs 60ºC), ISO 7120B Synthetic Sea Water	 Pass	 Pass	 Pass	 Pass
FAG FE-8 (D7.5-80/80-80), DIN 51819-3 Roller Weight Loss, (mg)	 3	 1.0	 1.0	 1.0
FZG Pass Stage, ASTM D5182	—	> 12	> 12	> 12
FZG Micropitting, FVA 54, failure load stage	—	10/High	10/High	10/High

Minor variations in product typical test data are to be expected in normal manufacturing.

Meropa XL gear oils have the typical sulfur-phosphorus odor characteristic of industrial gear oils. A ventilated environment is recommended during use.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	460	680
Product Number	*277413*	*277416*
SDS Number	*37390*	*37390*
AGMA Grade	7 EP	8 EP
API Gravity	29.3	28.9
Density at 15°C, kg/L	0.88	0.88
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 460 38.2	 680 50.0
Viscosity Index	127	127
Flash Point, °C(°F)	247(477)	238(460)
Pour Point, °C(°F)	-27(-17)	-33(-27)
Foam Properties Sequence I-III, ASTM D892 Tendency, mL Stability, mL	 0 0	 0 0
Corrosion, Copper Strip, 3 hr at 100°C, ASTM D130	1B	1B
Rust Test, ASTM D665B	Pass	Pass
Steel Pin Corrosion (24 hours 60°C) Synthetic Sea Water ISO 7120B	Pass	Pass
FAG FE-8 Roller Bearing Test, DIN 51819-3 Roller Weight Loss (mg)	 1.0	 1.0
FZG Pass Stage, ASTM D5182	> 12	> 12
FZG Micropitting, Failure Stage, FVA 54	10/High	10/High

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® GEAR EP-5

SAE 80W-90, 85W-140

PRODUCT DESCRIPTION

Delo® Gear EP-5 gear lubricants are recommended for use in spiral bevel and hypoid differentials, power dividers, and oil-lubricated steering axle wheel bearings.

CUSTOMER BENEFITS

Delo Gear EP-5 delivers value through:

- **Long gear life** — Extreme pressure properties protect hypoid and other types of gears from scuffing and wear.
- **Rust and corrosion protection** — Effective inhibitor package protects against rusting or corrosion of gear and bearing surfaces.
- **Excellent foam inhibition** — Foaming minimized by use of foam inhibitor.
- **Long lubricant life** — Outstanding thermal and oxidation stability allow high temperature operation with long lubricant life.
- **Seal Protection** — Formulated to protect against oil seal deterioration.

FEATURES

Delo Gear EP-5 are multipurpose lubricants.

They are made from paraffinic base stocks and contain a carefully balanced additive package to provide gear protection and long lubricant life.

The sulfur-phosphorus extreme pressure additive technology used in Delo Gear EP-5 provides exceptional thermal and oxidation stability. In addition, this lubricant is fortified with rust and corrosion inhibitors, a foam inhibitor, and a pour point depressant.

The sulfur-phosphorus extreme pressure additives in Delo Gear EP-5 minimize the spalling and wear of gears by creating a microthin sacrificial film on the surface of the gear teeth which is actually softer than the gears themselves. Frictional heat and pressures between gear teeth cause the sulfur-phosphorus to react with the surfaces of the gear teeth at the point of contact, thus creating the sacrificial film.

The highly refined base stocks and various inhibitors in the additive package help assure a well-balanced lubricant and long gear and bearing life.

APPLICATIONS

Delo Gear EP-5 lubricants are recommended for use in spiral bevel and hypoid differentials, power dividers, and oil-lubricated steering axle wheel bearings.

Their multiviscosity characteristics allow their use in equipment operating over a broad ambient temperature range. This means good cold flow properties and gear protection.

Delo Gear EP-5 lubricants are approved for **SAE J2360** (formerly known as MIL-PRF-2105E) and meet the requirements of:

- **API Service Categories** MT-1, GL-4 and GL-5
- **Mack** GO-J

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

18 April 2017
GL-46

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TYPICAL TEST DATA

SAE Grade	80W-90	85W-140
Product Number	*223022*	*223021*
SDS Number *U.S.* *Canada* *Mexico*	 *44036* *44042* *44043*	 *44036* *44042* *44043*
Density at 15.6°C(60°F), kg/L(lb/gal)	0.8856(7.39)	0.8991(7.50)
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 145 14.2	 341 25.0
Viscosity, Brookfield cP at -12°C cP at -26°C	 — 73,000	 80,000 —
Viscosity Index	95	95
Flash Point, °C(°F)	218(421)	226(439)
Pour Point, °C(°F)	-33(-27)	-15(+5)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® GEAR EXTREME EP-5

SAE 75W-90

PRODUCT DESCRIPTION

Delo® Gear Extreme EP-5 gear lubricant is a heavy duty automotive gear lubricant designed to meet the severe demands of cold weather operations.

CUSTOMER BENEFITS

Delo Gear Extreme EP-5 delivers value through:

- **Maximizing fuel economy** by minimizing friction and lubricant drag.
- **Minimizing wear** through use of high performance antiwear additives.
- **Maximizing lubrication** in cold operating conditions due to good flow properties.
- **Gear and bearing protection** due to effective rust and foam inhibitors.

FEATURES

Delo Gear Extreme EP-5 is a heavy duty automotive gear lubricant designed to meet the severe demands of cold weather operations.

It is formulated with highly refined base stocks and compounded with extreme pressure, antiwear, corrosion inhibition, rust preventive, and foam suppressant additives, as well as a shear stable viscosity index improver. This additive package is a modern sulfur-phosphorus system with maximum thermal stability, gear spalling protection, and antiwear performance.

Delo Gear Extreme EP-5 is designed to provide excellent wear protection for automotive gear sets operating in extremely cold conditions, where fluidity of the lubricant is critical to protect gears and bearings. Low viscosity hastens the release of entrained air in the lubricant at low temperatures, and can help promote better oil film on moving parts.

APPLICATIONS

Delo Gear Extreme EP-5 is recommended for automotive rear axle and manual transmission gears operating in severe arctic climates, or where the manufacturer recommends a viscosity range lighter than conventional SAE 80W-90 or SAE 85W-140 gear lubricants.

Delo Gear Extreme EP-5 is engineered to meet the requirements of **API Service Categories** GL-4, GL-5 and MT-1.

It is engineered to pass the performance requirements of **SAE J2360** (formerly known as MIL PRF-2105E).

TYPICAL TEST DATA

SAE Grade	75W-90
Product Number	*250601, 223035*[a]
SDS/MSDS Number *U.S.* *Canada* *Mexico*	 *46997* *46998* *46996*
Density at 15°C, kg/L	0.885
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 94 16.8
Viscosity, Brookfield cP at -40°C	 120,000
Viscosity Index	195
Channel Point, °C(°F)	-50(-58)
Pour Point, °C(°F)	-45(-49)

a Product code for Multigear Extreme EP-5

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

1 April 2018
GL-50

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DELO® GEAR LS
SAE 80W-90

PRODUCT DESCRIPTION

Delo® Gear LS gear lubricant is a high quality gear lubricant designed to provide protection in extreme operating conditions for applications requiring API GL-5 or MT-1 performance levels.

CUSTOMER BENEFITS

Delo Gear LS gear lubricant delivers value through:

- **Controlled inventory costs** — One gear lubricant for both conventional and limited slip differentials. Simplified inventory can help save money, space, and handling time.
- **Optimal gear life** — Extreme pressure properties protect hypoid and other types of gears from scuffing and wear.
- **Long lubricant life** — Outstanding thermal and oxidation stability allow high temperature operation with long lubricant life.

FEATURES

Delo Gear LS gear lubricant is a high quality gear lubricant.

It is formulated with a thermally stable friction modifier and can be used for complete replacement or top-off in limited slip differentials.

Delo Gear LS gear lubricant contains a high performance sulfur-phosphorous extreme pressure additive, thermally stable base stocks, and friction modifiers for limited slip performance. In addition, this lubricant is fortified with rust and corrosion inhibitors, a foam inhibitor, and a pour point depressant.

The extreme pressure additives in Delo Gear LS gear lubricant minimize the spalling and wear of gears by creating a micro-thin sacrificial film on the surface of the gear teeth which is actually softer than the gears themselves. Frictional heat and pressures between tooth surfaces cause the sulfur-phosphorous to react with the surface of the gear teeth at the point of contact, thus creating the sacrificial film.

The limited slip additive was carefully selected to provide the desired frictional properties in limited slip differentials with no degradation of performance in conventional applications.

Delo Gear LS gear lubricant has outstanding thermal and oxidative stability. It minimizes oxidative sludge and varnish formation for maximum gear, bearing and seal life. In particular, the high thermal stability of the friction modifier results in stable friction levels and longer life for anti-stick-slip performance.

APPLICATIONS

Delo Gear LS gear lubricant is recommended for service fill and top-off of all limited slip differentials. It is recommended for differentials where manufacturers' specify API GL-5 gear lubricants plus supplemental limited slip additive.

Delo Gear LS gear lubricant provides excellent performance in conventional automotive gear oil applications requiring API GL-5 or MT-1 performance levels, including:

- Differentials calling for this viscosity grade
- Axles in buses and heavy duty trucks where gear lubricants are recommended
- Four-wheel drive transfer cases
- Applications where a "multipurpose" gear lubricant or an API Service Classification GL-5 is required

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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GL-52

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Delo® Gear LS gear lubricant can also be used in off-highway wheel loader axles equipped with wet brakes. It is recommended for small and medium size loaders made by **Hitachi** and **Kawasaki**. This fluid can be a good choice for applications requiring friction modification (anti-chatter) with a level of gear protection much higher than that provided by typical API GL-4 tractor fluids.

Delo Gear LS gear lubricant meets or exceeds the performance requirements of **API Service Categories** MT-1 and GL-5.

Note: Delo Gear LS gear lubricant is designed for full refill of all limited slip differentials. However, there may be instances when axle chatter occurs. If so, it is acceptable to add at least 3% by volume of aftermarket limited slip top treat additive (4 ounces of top treat per gallon of lubricant).

TYPICAL TEST DATA

SAE Grade	**80W-90**
Product Number	*250602, 250600*[a]
SDS/MSDS Number *U.S.* *Canada* *Mexico* *Colombia* *El Salvador*	 *46958* *46959* *46960* *46961* *46962*
Density at 15°C, kg/L	0.889
Viscosity, Kinematic mm^2/s at 40°C mm^2/s at 100°C	 135 14.3
Viscosity, Brookfield mPa.s at -26°C	 70,300
Viscosity Index	104
Flash Point, °C(°F)	221(430)
Pour Point, °C(°F)	-34(-29)

a. Product code for Multigear LS SAE 80W-90

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON OPEN GEAR GREASE

PRODUCT DESCRIPTION

Chevron Open Gear Grease is an open gear grease formulated with high viscosity mineral oils in a nonsoap-based thickener typically used in chain and open gear lubricant applications.

CUSTOMER BENEFITS

Chevron Open Gear Grease delivers value through:

- **Low environmental impact** — Does not contain a diluent.
- **Long equipment life** — High film strength provides excellent antiwear protection to gear teeth under high, shock load conditions.
- **Minimizes operating cost** — Long lasting lubrication film minimizes frequency of repeated application and, therefore, overall volume of lubricant used.
- **Reliability** — The high dropping point, the molybdenum disulfide/graphite fillers, and the tackiness additive offer excellent protection against gear failure at elevated temperatures during severe operation.
- **Flexibility to use in wet conditions** — Resists rust, supporting long gear life, and assures good film strength even in a wet environment.

FEATURES

Chevron Open Gear Grease is formulated with high viscosity mineral oils in a nonsoap-based thickener. This grease appears brownish-black and is extremely tacky.

Chevron Open Gear Grease contains special functional fillers (molybdenum disulfide and graphite), which impart a long-lasting film on working surfaces.

It also contains tackiness additives, wetting agents and rust inhibitors to protect metal surfaces.

APPLICATIONS

Chevron Open Gear Grease is recommended:

- for many open gears in industrial, mining, construction, and marine equipment
- for chain and sprocket lubrication
- as a tenacious fifth wheel lubricant

Chevron Open Gear Grease can be applied in a variety of methods, including:

- from a cartridge in a caulking gun
- through a mechanical lubricator over a wide range of operating temperatures

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

10 February 2018
GL-55

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TYPICAL TEST DATA

Product Number	*230002*
SDS Number	*6809*
Contains Diluent	No
Penetration, at 25°C(77°F) Unworked	 360
Four-Ball EP Weld, ASTM D2596, kg Wear, ASTM D2266, mm	 315 0.60
Rust Test, ASTM D1743, rating	Pass
Timken OK Load, lb	40
Thickener Type	Inorganic Clay
Base Oil Viscosity, Kinematic (without thickener or filler) cSt at 40°C cSt at 100°C	 6532 152
Flash Point, °C(°F)	>204(400)
Resultant Film	Tacky
Texture	Smooth
Color	Brown-Black

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON OPEN GEAR LUBRICANT
100 NC, 250 NC, 800 NC

PRODUCT DESCRIPTION

Chevron Open Gear Lubricants are formulated to minimize wear and provide shock load protection during typical operations.

CUSTOMER BENEFITS

Chevron Open Gear Lubricants deliver value through:

- **Low environmental impact** — The carrier solvent contained in Chevron Open Gear Lubricant is a non-ozone depleting diluent. Chevron Open Gear Lubricants also pass the EPA's Toxicity Characteristic Leaching Procedure (TCLP) test.
- **Long equipment life** — High film strength provides excellent anti-wear protection to gear teeth under high, shock load conditions.
- **Ease of application** — Easily applied with brushes, swabs or through automatic lubrication systems.

FEATURES

Chevron Open Gear Lubricants are black, viscous lubricants formulated with an asphaltic base and diluted with a non-chlorinated solvent for easy application by hand or through automatic lubrication systems.

They provide a high film strength coating on gear teeth to minimize wear.

Chevron Open Gear Lubricants are designed to provide tacky, tenacious lubricant films on open gears operating under severe shock load conditions.

Chevron Open Gear Lubricants contain a non-chlorinated diluent that eases the application of these lubricants onto the gears. The diluent then evaporates, leaving a tacky lubricant film on the gear teeth.

They can also be used to lubricate chains, sprockets, wire rope, and cables. When used as a cable coating, the diluent allows the lubricant to penetrate into the core, thus carrying the lubricant into the individual strands and minimizes wear as the cable is run through sheaves or onto a winch drum.

APPLICATIONS

Chevron Open Gear Lubricants are recommended for many types of open gears, wire ropes, and cables.

They can be applied by brush, by swab or by automatic lubrication systems.

All grades provide lubrication for mining equipment including:

- girth and pinion gears on rod and ball mills;
- rack and pinion gears on shovel dipsticks;
- swing and pinion gears on top of the lower frame of shovels and draglines, which are sometimes served with an automatic lubrication system.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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GL-65

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TYPICAL TEST DATA

	100 NC	250 NC	800 NC
Product Number	*255140*	*255141*	*255142*
SDS Number	*7088*	*7088*	*7088*
Contains Diluent[a]	Yes	Yes	Yes
Thickener Type	Asphaltic	Asphaltic	Asphaltic
Timken OK Load, ASTM D2782, lb	40	40	40
Four-Ball Weld Point, ASTM D2783, kg Wear Scar Diameter, ASTM D2266, mm	 315 0.60	 315 0.60	 315 0.57
Rust Test, ASTM D665, 24 h, Distilled Water	Pass	Pass	Pass
Viscosity, Kinematic cSt at 40°C (with diluent) cSt at 100°C (without diluent)	 445 180	 4125 800	 8375 1569
Viscosity, Saybolt SUS at 100°F (with diluent) SUS at 210°F (without diluent)	 2060 840	 19,110 3730	 38,800 7320
Low Temperature Pumpability Lincoln Ventmeter at 400 psi, °C(°F)	 -25(13)	 0(32)	 25(77)
Flash Point, °C(°F)	79(175)	83(181)	88(190)
Pour Point, °C(°F)	-23(-10)	4(40)	10(50)
Resultant Film[b]	Tacky	Tacky	Tacky
Texture	Smooth	Smooth	Smooth
Color	Black	Black	Black

a Diluent is nonchlorinated and combustible. It is also volatile, therefore it is important to keep containers tightly sealed to avoid loss.

b At normal ambient temperature 21°C to 38°C (70°F to 100°F).

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

GREASES

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GREASE GUIDELINES

OPERATING TEMPERATURE RANGES

	Operating Temperature, °C(°F)	
	Minimum[a]	**Maximum[b]**
Black Pearl® Grease EP		
NLGI 0	-40(-40)	127(260)
NLGI 1, 2	-40(-40)	177(350)
Chevron Coupling Grease	-29(-20)	162(325)
Chevron Curve Grease	-23(-10)	71(160)
Delo® Grease EP		
0, 00	-40(-40)	132(270)
1, 2	-40(-40)	177(350)
Delo® Grease ESI®	-18(0)	177(350)
Delo® Heavy Duty EP 1, 2	-26(-15)	177(350)
Delo® Heavy Duty Moly 3% EP 1, 2	-26(-15)	177(350)
Delo® Heavy Duty Moly 5% EP 1, 2	-40(-40)	232(450)
Delo® Heavy Duty Synthetic Moly 5% EP 1	-40(-40)	232(450)
Delo® Synthetic Grease SF	-45(50)	190(375)
Chevron Moly Grease EP		
1	-20(-4)	125(257)
2	-15(+5)	127(260)
Multifak® EP		
000	-35(-31)	70(158)
00	-35(-31)	77(170)
0	-30(-22)	99(210)
1	-20(-4)	125(257)
2	-15(5)	127(260)
RPM® Arctic Grease NLGI 1	-50(-58)	150(302)
Rykotac® Grease EP	-34(-30)	177(350)
Sil-X® Grease NLGI 1	-9(+15)	204(400)
Chevron SRI Grease 2	-30(-22)	177(350)
Starplex® EP 1, 2	-40(-40)	177(350)
Starplex® Premium 1	-18(0)	163(325)
Texclad® 2	-18(0)	79(175)
Ulti-Plex® Grease EP NLGI 1, 2	-26(-15)	177(350)
Ulti-Plex® HV Synthetic Grease EP	-40(-40)	232(450)
Ulti-Plex® Synthetic Grease EP	-51(-60)	232(450)

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Chevron Ultra-Duty Grease EP		
NLGI 0	-26(-15)	132(270)
NLGI 1	-26(-15)	138(280)
NLGI 2	-26(-15)	143(290)
Chevron Ultra-Duty HD 00	-29(-20)	121(250)

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

Always refer to the OEM's equipment guidelines for determining the best relubrication intervals.

THICKENER TYPE

	Aluminum complex	Calcium	Lithium	Lithium complex	Polyurea	Silica	GC-LB	LB
Black Pearl® Grease EP					♦		♦	
Chevron Coupling Grease			♦					
Chevron Curve Grease		♦						
Delo® Grease EP				♦			♦	
Delo® Grease ESI®				♦				
Delo® Heavy Duty EP				♦				
Delo® Heavy Duty Moly 3%/5% EP				♦				
Delo® Heavy Duty Synthetic Moly 5% EP				♦				
Delo® Synthetic Grease SF					♦			
Chevron Moly Grease EP			♦					
Multifak® EP			♦					♦
RPM® Arctic Grease					♦		♦	
Rykotac® Grease EP					♦			
Sil-X® Grease						♦		
Chevron SRI Grease					♦			
Starplex® EP				♦			♦	
Starplex® Premium				♦				
Texclad®		♦						
Ulti-Plex® Grease EP				♦				
Ulti-Plex® HV Synthetic Grease EP				♦				
Ulti-Plex® Synthetic Grease EP				♦				♦
Chevron Ultra-Duty Grease EP			♦					
Chevron Ultra-Duty HD			♦					

COMPATIBILITY

The statement that two greases are compatible means only that mixtures of the two do not soften excessively or lose heat resistance to an unacceptable degree.

The statement that two greases are compatible does not imply equivalence of the two greases in overall lubrication performance.

Therefore, the statement that two greases are compatible offers no information about the performance of mixtures with regard to load carrying ability, rust prevention, wear prevention or any other measurable aspect of grease performance.

Reported test results are not based on ASTM D6185 but are instead based on a Chevron proprietary test method. Compatibility testing done on fresh products does not necessarily predict compatibility results for combinations of fresh and used products.

When changing lubricants, it is essential that all equipment manufacturer procedures be followed, including drain and flush requirements.

For further information, contact LUBE TEK at 1-800-LUBE-TEK (1-800-582-3835) or lubetek@chevron.com.

RESOURCES

Chevron Lubricants Technical Bulletin LTB_42_02_12 "Grease Compatibility and Grease Lubrication Practices"

BLACK PEARL® GREASE EP

NLGI 1, 2

PRODUCT DESCRIPTION

Black Pearl® Greases EP are multipurpose, polyurea, extreme pressure, water-resistant greases.

CUSTOMER BENEFITS

Black Pearl Greases EP deliver value through:

- **Excellent pumpability** — Easy pumping in typical centralized lubrication systems and at low temperatures.
- **High load capacity** — High film strength provide good overall EP performance, shock load protection and low wear protection.
- **Corrosion protection** — Pass the modified ASTM D1743 Bearing Rust Test.
- **Water resistance** — Product provides exceptional water wash out results.
- **Excellent adhesion** — These greases stay in place and continue lubricating under most operating conditions.
- **Long lubricant life** in storage and in use.

FEATURES

Black Pearl Greases EP are multipurpose, polyurea, extreme pressure, water-resistant greases.

Black Pearl Greases EP are formulated with highly refined base stock, a polyurea thickener, and rust and oxidation inhibitors. They are black in color and smooth and buttery in texture.

FUNCTIONS

Black Pearl Greases EP provide outstanding film strength and adhesive properties. As a result, these products are particularly effective in providing excellent wear protection in heavily loaded and shock load conditions.

Black Pearl Greases EP are formulated to stay in place, stick to bearing surfaces and, thus, provide excellent lubrication under a wide range of operating conditions. They perform particularly well in roller bearings. These products provide exceptional water wash out results. The rust inhibitors effectively protect bearing surfaces against corrosion. Pumpability is excellent over a wide range of temperatures as indicated by the Lincoln ventmeter test and the relatively low pressure drop in piping. Oxidation inhibitors promote long life in storage and in use. In addition, Black Pearl Greases EP also perform well at high temperatures.

APPLICATIONS

Black Pearl Greases EP are recommended for general lubrication service in many types of automotive and industrial applications.

Typical industrial applications are:

- Presses
- Antifriction bearings
- Low and high speed journal bearings
- Roller and needle bearings
- Shaker or classifier screen bearings
- Conveyors and run out rolls
- Electric motor bearings (especially cylindrical roller bearings)
- Exhaust fan bearings
- Crusher bearings
- Pump bearings

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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30 November 2016
GR-10

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Typical automotive applications are:

- — Chassis points including ball joints and universal joints
- — Wheel bearings
- — Water pumps
- — Fifth wheels
- — Steering system bearings
- — King pins

Black Pearl Greases® EP NLGI 1 and 2 are approved for the NLGI Certification Mark GC-LB for use as automotive chassis and wheel bearing greases based on ASTM D4950. They work well in both plain and antifriction-type bearings, particularly those subjected to shock loading.

Black Pearl Greases EP are registered by **NSF** and are acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

NLGI Grade	1	2
Product Number	*254592*	*254591*
SDS Number	*7237*	*7237*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -40(-40) 177(350)	 -40(-40) 177(350)
Penetration, at 25°C(77°F) Unworked Worked (60 strokes) Worked (100,000 strokes)	 320 325 360	 255 280 335
Dropping Point, °C(°F)	270(518)	270(518)
Timken OK Load, lb	70	70
Four-Ball Weld Point, kg Wear Scar Diameter, mm	 500 0.42	 500 0.42
Lincoln Ventmeter, psig at 30 s at 75°F 30°F 0°F -22°F	 215 235 280 625	 300 350 800 †
Copper Corrosion	1a	1a
Bearing Rust	Pass	Pass
Water Washout, 79°C, %	<1	<1
Thickener, %	11.5	13.5
Type	Polyurea	Polyurea
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 145 14.4	 145 14.4
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 761 77	 761 77
Viscosity Index	97	97
Flash Point, °C(°F)*	260(500)	260(500)
Pour Point, °C(°F)*	-9(+16)	-9(+16)
Texture	Smooth, Buttery	Smooth, Buttery
Color	Black	Black

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

† Too stiff at this temperature to pump through device.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Chevron Coupling Grease

Product Description

Chevron Coupling Grease is specifically designed for the lubrication of high-speed grease lubricated flexible couplings where high centrifugal forces are present.

Customer Benefits

Chevron Coupling Grease delivers value through:

- **Exceptional film strength** — Formulated with a high viscosity base oil and polymer for exceptional film strength
- **Minimal oil separation** in high-speed couplings under high centrifugal forces
- **Excellent adhesion** — Stringy and tacky
- **Minimal leakage** because of a tackiness polymer additive
- **Extreme pressure, rust, and oxidation protection**
- **Long relubrication intervals** — Helps avoid costly maintenance and downtime
- **Excellent low temperature pumpability** down to 0°C (32°F)

Features

Chevron Coupling Grease is a brown, stringy and tacky grease manufactured using a high viscosity base oil, a lithium soap thickener, rust and oxidation inhibitors, and extreme pressure and polymer tackiness additives.

It is designed for high-speed grease lubricated flexible couplings and is specially formulated to provide specific resistance to centrifugal separation in high-speed gear or grid couplings.

Chevron Coupling Grease has high load-carrying capacity and therefore provides good protection of lubricated parts against wear.

Applications

Chevron Coupling Grease is specifically designed for the lubrication of high-speed grease lubricated flexible couplings where high centrifugal forces are present.

It is recommended for use in high- speed grid, gear, or chain couplings in a variety of industrial applications.

Chevron Coupling Grease meets the coupling requirements of AGMA CG-1, CG-2 and CG-3 type couplings.

Chevron Coupling Grease exhibits little to no oil separation in the ASTM D4425 high-speed centrifuge test.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

NLGI Grade	0/1
Product Number	*230003*
SDS Number	*6819*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -29(-20) 162(325)
Penetration, at 25°C(77°F) Unworked Worked	 252 330
Dropping Point, °C(°F)	190(374)
Timken OK Load, lb	40
Thickener, % Type	5 Lithium Polymer
Four Ball Weld, kg	 315
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 885 41
Texture	Smooth, Tacky
Color	Dark Brown
Centrifugal Oil Separation, 24 h, vol %	 <3

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON CURVE GREASE

PRODUCT DESCRIPTON

Chevron Curve Grease was specifically designed for the lubrication of contact areas between wheel flanges of locomotive and railroad cars and curved railroad tracks. It is well suited for use in automatic rail curve lubricators.

CUSTOMER BENEFITS

Chevron Curve Grease delivers value through:

- **Outstanding lubrication** enhanced by the high graphite content.
- **Resists water washout** and lubricates in wet conditions.
- **Wide operating temperature range** — Provides lubrication in a wide range of climatic conditions.
- **Excellent pumpability** — Pumps and spreads properly in a wide temperature range.
- **Stable in storage and use** — Resists softening and oil separation, even at high temperatures.
- **Good adherence** — Calcium soap enables this grease to adhere to lubricated surfaces and provide even distribution.

FEATURES

Chevron Curve Grease is a smooth textured calcium soap grease containing 12% finely powdered graphite. It was specially formulated for the lubrication of contact areas between wheel flanges of locomotives and railroad cars and curved railroad tracks. It is black in color.

FUNCTIONS

Chevron Curve Grease provides excellent lubrication over a wide operating temperature range. It will pump and spread properly at temperatures from -23°C (-10°F) to 71°C (160°F). It resists water washout and will lubricate in wet conditions.

Chevron Curve Grease adheres to wheel flanges and, thus, provides even distribution to rail surfaces. The graphite continues to furnish outstanding lubrication even at temperatures which rise beyond the melting point of petroleum grease.

It is stable in storage and in use and does not soften or separate at temperatures well above 71°C (160°F).

APPLICATIONS

Chevron Curve Grease was specifically designed for the lubrication of contact areas between wheel flanges of locomotive and railroad cars and curved railroad tracks. It is well suited for use in automatic rail curve lubricators.

Chevron Curve Grease is also an excellent lubricant for slides, guides, ways, chains, screws, cams, and rack and pinion sets in industrial applications. It is widely used in sawmills, plywood presses, and chain tracks.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

NLGI Grade	Between 0 and 1
Product Number	*253469*
SDS Number	4576
Penetration, at 25°C(77°F) Unworked Worked	 328 337
Dropping Point, °C(°F)	102(216)
Thickener, % Type	12.0 Calcium
Viscosity, Kinematic[a] cSt at 40°C cSt at 100°C	 31.5 4.9
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 164 43
Viscosity Index	63
Flash Point, °C(°F)*	155(311)
Pour Point, °C(°F)*	-18(0)
Texture	Smooth
Color	Black

a Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

DELO® GREASE EP

00, 0, 1, 2

PRODUCT DESCRIPTION

Delo® Greases EP are technically advanced, extreme pressure greases for a wide variety of on-road applications.

CUSTOMER BENEFITS

Delo Greases EP deliver value through:

- **Extreme pressure high load carrying capacity**
- **Excellent corrosion and wear protection**
- **Excellent water resistance**
- **Excellent high temperature stability**
- **Outstanding low temperature pumpability**

FEATURES

Delo Greases EP are technically advanced, extreme pressure greases for a wide variety of on-highway and light duty off-road applications.

They are formulated with highly refined base stocks, a lithium complex thickener, rust and oxidation inhibitors, and extreme pressure and tackiness additives. They are blue in color with a tacky texture.

They are engineered to minimize friction and wear with a thick, velvety coating for excellent load carrying protection.

Delo Greases EP are specially formulated for extreme pressure wheel bearing and chassis applications including the steering drag links, king pins, transmission cross shaft spring pins, shackle pins, brake cam shafts, and fifth wheel faceplates and pivots operating under high and low temperature conditions.

The high viscosity index base oil makes these products perfect for the centralized lubrication systems found on today's mobile equipment.

These products are formulated to perform in unusually demanding conditions of high and low temperatures. The lithium complex thickener in Delo Greases EP elevates the dropping point to approximately 266°C (510°F). This high dropping point equates to excellent high temperature stability up to 177°C (350°F).

Delo Greases EP have the proper base oil viscosity to meet NLGI GC-LB requirements for low temperature operation. **NLGI 1** and **2** are recommended for applications operating in the temperature range of -18°C to 177°C (0°F to 350°F). **NLGI 00** and **0** can be used at temperatures as low as -34°C (-30°F).

Delo Greases EP exceed the requirements of NLGI GC-LB for EP protection and rust protection, making them well suited for the most severe applications.

APPLICATIONS

Delo Greases EP are designed for extreme duty in a wide variety of on-highway and light duty off-road vehicle and equipment applications.

On-highway heavy duty trucks — These lubricants are perfect for a wide variety of Class 8 trucks in most chassis and wheel bearing applications ranging from automatic centralized greasing systems to wheel bearings operating near the high temperatures of disc brakes. This product is for most applications, from owner/operators to fleets (especially those considering extended service intervals).

Light Duty Off-Road vehicles — Whether the application is in logging, agriculture or utilities, these greases will perform. Use them in tractors, cherry pickers or any of a number of light duty off-road vehicles. For heavy-duty construction and mining applications, please refer to the Chevron Delo HD Grease product data sheet.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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Medium- and light-duty trucks and buses — As with their heavy duty counterparts, the Class 7 and Class 6 vehicles and buses require an extreme duty grease. Delo® Greases EP will provide that performance.

Automobiles — Delo Greases EP are exceptional lubricants for high temperature wheel bearings and other high performance automotive applications.

NLGI 1 and **2** are approved for the NLGI Certification Mark GC-LB.

Delo Greases EP 2 meets the requirements of the Mack MG-C grease specification.

TYPICAL TEST DATA

NLGI Grade	00	0	1	2
Product Number	*235212*	*235211*	*235209*	*235208*
SDS/MSDS Number *USA* *Canada* *Mexico* *Colombia*	 *6818* *6818CAN* *6818MEX*	 *6818* *6818CAN* *6818MEX*	 *6818* *6818CAN* *6818MEX*	 *6818* *6818CAN* *6818MEX* *33733*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -40(-40) 132(270)	 -40(-40) 132(270)	 -40(-40) 177(350)	 -40(-40) 177(350)
Penetration, at 25°C(77°F) Worked (60 Strokes)	 415	 370	 325	 280
Dropping Point, °C(°F)	n/a	235(455)	245(471)	255(491)
Four Ball Weld Point, kg	315	315	315	315
Four Ball Wear Scar, mm	0.45	0.45	0.45	0.45
Timken OK Load, lb	50	50	50	50
Water Washout, wt %	n/a	15	10	5
Water Spray-off, wt %	n/a	n/a	30	20
Lincoln Ventmeter, psig at 30 s, at 75°F 30°F 0°F -22°F	 — 50 50 100	 — 100 150 450	 — 200 450 1250	 — 250 700 1400
Copper Corrosion	1b	1b	1b	1b
Bearing Rust, 5% Synthetic Sea Water	 Pass	 Pass	 Pass	 Pass
Thickener, % Type	4.0 Lithium Complex	5.8 Lithium Complex	8.0 Lithium Complex	11.0 Lithium Complex
ISO Viscosity Grade Base Oil Equivalent	 220	 220	 220	 220
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 226 20.7	 226 20.7	 226 20.7	 226 20.7
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 1188 104.2	 1188 104.2	 1188 104.2	 1188 104.2
Viscosity Index	107	107	107	107
Flash Point, °C(°F)*	274(525)	274(525)	274(525)	274(525)
Oil Separation, wt %	n/a	5	5	5
Texture	Tacky	Tacky	Tacky	Tacky
Color	Blue	Blue	Blue	Blue

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® GREASE ESI® EP 2

PRODUCT DESCRIPTION

Delo® Grease ESI® EP is a technically advanced, extended service interval wheel bearing, chassis and kingpin grease for a wide variety of on-road and off-road applications.

CUSTOMER BENEFITS

Delo Grease ESI EP delivers value through:

- **Extended Service Protection to 30,000+ miles/48,000+ km (or equivalent hours)**[1]
- **Extreme pressure high load carrying capacity**
- **Excellent corrosion and wear protection**
- **Excellent water resistance**
- **Excellent high temperature stability**
- **Superb low temperature pumpability**[2]

FEATURES

Delo Grease ESI EP is a technically advanced, extended service premium grease for a wide variety of on-highway and light duty off-road applications.

It is formulated with highly refined base stocks, a lithium complex thickener, rust and oxidation inhibitors, and extreme pressure and tackiness additives. Delo Grease ESI EP is red in color with a tacky texture, and is an NLGI 2 consistency grade.

It is engineered to minimize friction and wear with a thick, velvety coating for excellent load carrying protection.

Delo Grease ESI EP is specially formulated for extreme pressure in extended service wheel bearing and chassis applications including the steering drag links, kingpins, fifth-wheels, transmission cross shaft spring pins, shackle pins, brake cam shafts, and fifth wheel faceplates and pivots operating under high and low temperature conditions.

This product is formulated to perform in unusually demanding conditions of high and low temperatures including good pumpability in a variety of lubrication systems. Delo Grease ESI EP uses a lithium complex thickener system and has a dropping point of approximately 266°C (510°F). Delo Grease ESI EP has excellent high temperature stability up to 177°C (350°F).[3] Delo Grease ESI EP can also be recommended for applications operating down to -32°C (-25°F).[4]

1 Notes: Service intervals of 30,000+ miles/ 48,000+ km (or equivalent hours) are recommended for customers who maintain equipment in accordance with OEM requirements for their specific geographic area and specific service of the vehicle.

2 As compared to Mid-High Viscosity Base Oil Heavy Duty EP 2 Greases.

3 Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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Delo® Grease ESI® EP has the proper base oil viscosity to meet NLGI LB requirements for low temperature operation. Delo Grease ESI EP exceeds the requirements of NLGI GC for EP protection and wheel bearing life.

APPLICATIONS

Delo Grease ESI EP is designed for extreme duty in a wide variety of on-highway and light duty off-road vehicle and equipment applications.

On-highway heavy duty trucks — This lubricant is perfect for a wide variety of Class 6 - 8 trucks in most chassis and wheel bearing applications ranging from automatic centralized greasing systems (see Notes A and B) to wheel bearings operating near the high temperatures of disc brakes. This product is for most applications, from owner/operators to fleets (especially those considering extended service intervals of 30,000+ miles/48,000+ km or equivalent hours).[5]

Light Duty Off-Road vehicles — Whether the application is in logging, agriculture or utilities, this grease will perform. Use it in tractors, cherry pickers or any of a number of light duty off-road vehicles.

Automobiles — Delo Grease ESI EP is an exceptional lubricant for high temperature wheel bearings and other high performance automotive applications.

Note A: Delo Grease ESI EP is designed using high viscosity base oils. These oils offer excellent protection in severe duty, high shock load conditions where typical ambient temperatures are above -32°C (-25°F). Before using in applications involving onboard automatic grease dispensing systems in severe cold climate conditions, you should first consult with your equipment OEM specialist or Chevron Lubrication Specialist.

Note B: Not recommended for unheated shops where centralized automatic dispensing systems or long manual grease runs are the preferred method of lubrication and normal operating temperatures are consistently below -7°C (20°F).

Delo Grease ESI EP is approved for:

- **MB-Approval** 265.1

4 Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

5 Notes: Service intervals of 30,000+ miles/ 48,000+ km (or equivalent hours) are recommended for customers who maintain equipment in accordance with OEM requirements for their specific geographic area and specific service of the vehicle.

TYPICAL TEST DATA

NLGI Grade	2
Product Number	*259126*
SDS/MSDS Number *U.S.* *Colombia*	 *44800* *44810*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -32(-25) 177(350)
Penetration, at 25°C(77°F) Worked (60 strokes)	 285
Dropping Point, °C(°F)	266(511)
Four Ball Weld Point, kg Wear Scar, mm	 400 0.45
Timken OK Load, lb	80

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

NLGI Grade	**2**
Load Wear Index, kg	72
Bearing Water Washout, wt % Loss at 175°F	4
Water Spray-Off, % at 100°F	15
EMCOR Dynamic Bearing Rust, 10% Synthetic Sea Water, ASTM D6138	0
Lincoln Ventmeter, psig at 30 s, at 75°F 32°F 0°F -22°F	 325 570 1601 †
Copper Corrosion	1B
Thickener, % Type	11 Lithium Complex
ISO Viscosity Grade, Base Oil Equivalent	 220/320
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 261 21.5
Viscosity Index*	98
Flash Point, °C(°F)*	274(525)
Texture	Tacky
Color	Red

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

† Too stiff at this temperature to pump through device.

* Determined on mineral oil extracted by vacuum filtration. Minor variations in data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® SYN-GREASE™ SXD 220 MOLY 5% EP 1
DELO® GREASE ESI® HD MOLY 5% EP
DELO® GREASE ESI® HD MOLY 3% EP
DELO® GREASE ESI® HD EP
1, 2

PRODUCT DESCRIPTION

Delo® Grease ESI® HD EP is a comprehensive line of greases that are available with or without molybdenum disulfide. These greases are designed for plain and anti-friction bearing applications operating under high stress/high load conditions, coupled with high ambient temperatures typically found in heavy duty off-road applications.

CUSTOMER BENEFITS

Delo Syn-Grease SXD 220 Moly 5% EP 1, Delo Grease ESI HD Moly 5% EP, Delo Grease ESI HD Moly 3% EP and Delo Grease ESI HD EP greases deliver value for the off-road construction and mining industries by offering:

- **Corrosion and wear protection**
- **Water resistance** in both submerged and direct pressure spray situations
- **Shock load protection**
- **Performance across a wide temperature range** from extremely hot to extremely cold conditions, this unique Heavy Duty EP product line delivers when needed most

FEATURES

Delo Grease ESI HD EP greases are multipurpose, high performance products specially formulated for plain and anti-friction bearing applications operating under high stress/high load conditions, coupled with high ambient temperatures typically found in heavy duty off-road applications. Developed as a true contractors product, this line of grease was specifically designed to lubricate and protect equipment that is subjected to demanding conditions.

DELO SYN-GREASE SXD 220 MOLY 5% EP

Our product to use in the most demanding applications. This product features synthetic base oil in a lithium complex thickener system. Provides excellent corrosion protection, water resistance, and shock loading capability. This product also provides excellent performance throughout a wide temperature range. It is especially effective in very cold climates or where temperature ranges vary dramatically in a short period of time. It contains 5% moly which is desired by many OEMs for off-road applications.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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DELO® GREASE ESI® HD MOLY 5% AND 3%

This tier of products features 5% or 3% moly sought after by many OEMs in off-road applications. These products are formulated using highly refined base oils in a lithium complex thickener system. They also feature better corrosion resistance, wear control, and shock loading than our basic Delo Grease ESI HD EP product. They provide very good protection over a wide temperature range.

DELO GREASE ESI HD EP

Our basic product which works in many applications and provides good protection from wear, shock loading, and fairly effective operating temperature range. This product features high viscosity index conventional oil in a lithium complex thickener system. The product also provides excellent corrosion protection. This product does not contain moly.

Delo Grease ESI HD EP greases are manufactured using select, highly refined base oils using a lithium complex thickener system that includes excellent rust and oxidation inhibitors coupled with extreme pressure and tackiness additives. The non-moly version is red in color and stringy in texture. Additionally, this comprehensive line includes 5% and 3% moly versions to meet the demands of OEM manufacturers who require molybdenum disulfide in the grease to meet required warranty specifications. These moly-containing products are grey/black in color and stringy in texture.

The lithium complex thickener in Delo Grease ESI HD EP greases elevates the dropping point to approximately 265°C (510°F) making them excellent for use in applications where sustained high operating temperatures are common. Additionally, since they are all comprised of the same base formulation, they are compatible with one another.

APPLICATIONS

These greases are recommended for applications operating over wide temperature ranges.

Delo Grease ESI HD EP greases are not intended for use in high-speed bearing applications such as those found in electric motors due to the greases' high viscosity base stocks formulation. When in doubt, please consult your Chevron representative or OEM maintenance manual for application parameters when considering a switch to these greases.

Delo Grease ESI HD EP greases are ideal for a wide variety of Off-Road Construction applications across several industries:

- **Off-Road Construction** — These greases display outstanding water washout and spray-off resistance properties in wet, off-road environments and offer excellent shock load extreme pressure (EP) protection. Unique additive technology of these products makes them tenacious at adhering to metal surfaces found in this industry while protecting these vital components from rust and corrosion. Applications for the product include most types of heavy-duty earth moving machinery, including tractors (dozers), excavators, backhoes, shovels, high lifts, articulated loaders, haul trucks, tri-axle dumps and more. They are excellent for heavily loaded machine implement pins and bushings, and other applications operating in severe, high shock-load environments where metal to metal contact wear often occurs. Since Delo Grease ESI HD EP greases are offered in 5% and 3% moly containing versions, they are also able to meet wide off-road OEM application ranges using one common product line, thus reducing field inventory. Because they are lithium complex thickened, the non-moly version is also excellent for mixed fleet applications where disc brake lubrication is required, such as pick-up trucks.
- **Surface and Underground Mining and Quarry** — Applications appropriate for these greases include those found above plus pins and bushings on buckets, loaders, shovels and continuous miners, shaker screens, crushers, and conveyors.

- **Agriculture** — Will serve as an excellent multi-purpose heavy duty lubricant for both general and industrial farm and agricultural use, from medium to heavy duty front steer and articulated tractors and loaders to larger new rubber tracked units. These products will work well in many applications including three point hitches, high lift pins and bushings and other heavy duty farm related industrial machinery.
- **Heavy Duty On/Off Highway Road Construction and Maintenance Vehicles** — These products are well suited for greasing on/off road heavy duty tri-axle dump trucks and cement mixers that also find their way off road as much as on. Delo® Grease ESI® HD EP greases are an excellent choice for king pins, bushing and bucket pins, 5th wheels and other severe duty applications found on these types of vehicles. They are also ideally suited for on highway heavy duty applications as well as airport fixed ground operation snow and ice removal equipment, such as plows, blowers and salt spreaders when the preferred method of lubrication is by manual application. These products were formulated using a new rust inhibitor package tested with 0.5% mixtures of magnesium chloride and calcium chloride road de-icers and were proven to reduce rust and corrosion when these corrosive materials were present. In colder climates, where moly is required, the Delo Syn-Grease SXD 220 Moly 5% EP 1 grade would be the preferred product of choice.

Delo Grease ESI HD EP greases meet the requirements of the Mack MG-C grease specification. They also meet Caterpillar recommendations for greases containing 5% and 3% molybdenum disulfide.

Note 1: Delo Grease ESI HD EP greases are designed using high viscosity base oils. These oils offer excellent protection in severe duty, high shock load conditions where typical ambient temperatures are above freezing. For extreme cold weather climate conditions, Chevron recommends using Delo Syn-Grease SXD 220 Moly 5% EP 1 for equipment that requires the product to be used in centralized automatic grease dispensing systems.

Because each application varies, you should consult your equipment OEM or Chevron Lubrication Specialist before switching over to these products.

Note 2: In cases where centralized automatic dispensing systems or long manual grease runs are the preferred method of lubrication and normal operating temperatures are consistently well below 20°F, Delo Grease ESI HD EP, available in NLGI grades 2, 1, 0 and 00, would offer better pumpability. They would also be the preferred choice for onboard vehicle lubrication systems operating in severe cold weather service. Delo Syn-Grease SXD 220 Moly 5% EP and Delo Grease ESI HD EP are fully compatible. Please consult your local Chevron Lubrication Specialist for more information.

TYPICAL TEST DATA

	Delo Syn-Grease SXD 220 Moly 5% EP 1	Delo Grease ESI HD Moly 5% EP 1	Delo Grease ESI HD Moly 5% EP 2	Delo Grease ESI HD Moly 3% EP 1	Delo Grease ESI HD Moly 3% EP 2	Delo Grease ESI HD EP 1	Delo Grease ESI HD EP 2
Product Number	*259115*	*259121*	*259120*	*259123*	*259122*	*259125*	*259124*
SDS/MSDS Number							
USA	*44839*	44831	*44831*	*44825*	*44825*	*44815*	*44815*
Colombia	—	44834	*44834*	*44830*	*44830*	*44818*	*44818*
El Salvador	—	—	—	*44826*	*44826*	—	—
Molybdenum Disulfide content %	5	5	5	3	3	—	—
Operating Temperature, °C(°F)							
Minimum[a]	-40(-40)	-26(-15)	-26(-15)	-26(-15)	-26(-15)	-26(-15)	-26(-15)
Maximum[b]	235(450)	177(350)	177(350)	177(350)	177(350)	177(350)	177(350)
Penetration, at 25°C (77°F) Worked (60 strokes)	325	325	280	325	280	325	280
Dropping Point, °C(°F)	265(509)	265(509)	265(509)	265(509)	265(509)	265(509)	265(509)
Four Ball							
Weld Point, kg	800+	500	500	500	500	500	500
Wear, Scar Diameter, mm	0.48	0.43	0.43	0.43	0.43	0.43	0.43
Timken OK Load, lb	40	70	70	70	70	75	80
Load Wear Index, kg	135	75	75	75	75	75	75
Bearing Water Washout, wt % Loss at 175°F	1.5	5	4	5	4	5	4
Water Spray-off, % at 100°F	N/A	25	15	25	15	25	15
EMCOR Dynamic Bearing Rust, 10% Synthetic Sea Water, ASTM D6138	0,1	0,0	0,0	0,0	0,0	0,0	0,0
Lincoln Ventmeter, psig at 30 s, at							
75°F	260	250	450	250	510	250	625
30°F	400	600	1550	600	1700	600	1600
0°F	775	1720	1725	1720	1800	1720	1800
-22°F	1675	†	†	†	†	†	†

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

	Delo Syn-Grease SXD 220 Moly 5% EP 1	Delo Grease ESI HD Moly 5% EP 1	Delo Grease ESI HD Moly 5% EP 2	Delo Grease ESI HD Moly 3% EP 1	Delo Grease ESI HD Moly 3% EP 2	Delo Grease ESI HD EP 1	Delo Grease ESI HD EP 2
DIN 51805, psi 68ºF(20ºC) 32ºF(0ºC) -4ºF(-20ºC) -22ºF	 0.9 1.2 2.2 3.1	 0.5 2 10 38	 1 4 20 max pressure	 0.5 2 10 38	 2 4 19 max pressure	 0.5 2 10 38	 2 5 22 max pressure
Copper Corrosion	1b	2b	2b	2b	2b	1b	1b
Thickener, % Type	13.0 Lithium Complex	7.0 Lithium Complex	13.0 Lithium Complex	7.0 Lithium Complex	13.0 Lithium Complex	7.0 Lithium Complex	13.0 Lithium Complex
ISO Viscosity Grade Base Oil Equivalent	 220	 320	 320	 320	 320	 320	 320
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 200 23	 383 25	 383 25	 383 25	 383 25	 383 25	 383 25
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 1000 113	 2058 124	 2058 124	 2058 124	 2058 124	 2058 124	 2058 124
Viscosity Index	141	85	85	85	85	85	85
Oil Separation, wt %	1.6	2	2	2	2	2	2
Flash Point, °C(°F)*	232(450)	274(525)	274(525)	274(525)	274(525)	274(525)	274(525)
Texture	Stringy	Stringy	Stringy	Stringy	Stringy	Stringy	Stringy
Color	Gray/Black	Gray/Black	Gray/Black	Gray/Black	Gray/Black	Red	Red

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.
b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.
† Too stiff at this temperature to pump through device.
* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® SYN-GREASE™ SFE EP 0
(formerly Delo Synthetic Grease SF)

PRODUCT DESCRIPTION

Delo® Syn-Grease™ SFE EP is a high performance semi-fluid grease specifically engineered for trailer wheel-ends operating in a wide range of conditions.

CUSTOMER BENEFITS

Delo Syn-Grease SFE EP delivers value through:

- **High temperature stability** up to 190°C (375°F)
- **Low temperature lubrication** down to -45°C (-50°F)
- **Excellent antiwear/low friction performance**
- **Extreme pressure load carrying capacity**
- **Rust protection**
- **Extended lubrication intervals**
- **Energy efficiency improvement**

FEATURES

Delo Syn-Grease SFE EP is a high performance grease specifically engineered for trailer wheel-ends operating in a wide range of conditions.

Delo Syn-Grease SFE EP is manufactured using polyalphaolefin (PAO) synthetic base oil, a polyurea thickener, rust and oxidation inhibitors, extreme pressure additives, and a special combination of friction reducing agents. It is gold in color with a smooth, semifluid texture.

Delo Syn-Grease SFE EP is formulated to perform in demanding conditions of high and low temperatures. The polyurea thickener in Delo Synthetic Grease SFE elevates the dropping point to 230°C (446°F). This high dropping point equates to excellent high temperature stability up to 190°C (375°F). In addition, the high viscosity index (VI) of the PAO synthetic base oil allows for excellent flow properties at low temperatures - allowing Delo Syn-Grease SFE EP to operate at temperatures as low as -45°C (-50°F).

APPLICATIONS

Trailer lubrication — Delo Syn-Grease SFE EP is recommended for use in trailer axles. It flows smoothly and evenly at temperatures as low as -45°C (-50°F) and continues to lubricate efficiently at temperatures up to 190°C (375°F). It provides many advantages in trailer axle lubrication, compared to mineral oil-based grease, such as

- Excellent low temperature properties (i.e. lower starting torque).
- Oxidation resistance at high temperatures.
- Excellent antiwear/low friction performance throughout the operating temperature range.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

NLGI Grade	Method	0/00
Product Number		*259117*
SDS Number *U.S.* *Canada* *Mexico*		 *44740* *44741* *44742*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]		 -45(-50) 190(375)
Penetration, at 25°C(77°F) Unworked Worked	ASTM D217	 365 390
Dropping Point, °C(°F)	ASTM D2265	230(446)
Timken OK Load, lb	ASTM D2509	45
Thickener, % Type		9 Polyurea
Viscosity, Kinematic (Base Fluid) cSt at 40°C cSt at 100°C	ASTM D445	 130 17.6
Viscosity, Saybolt (Base Fluid) SUS at 100°F SUS at 210°F	ASTM D445	 603 88
Viscosity Index (Base Oil)	ASTM D2270	150
Bearing Rust Protection	ASTM D1743	Pass
Four-Ball Wear, 165°F, 1200 rpm, 40 kg Extreme Pressure Load Wear Index, kg Last Nonseizure Load, kg Weld Point, kg	 ASTM D2266 ASTM D2596	 0.34 50 126 200
Low Temperature Torque, -40°F, Nm Starting Running	ASTM D4693	 1.4 0.9
U.S. Steel Pumpability, -40°F, Grams per minute at 50 psi 100 psi 150 psi	U.S. Steel	 0.4 7.7 13.3
Texture		Smooth, Semifluid
Color		Gold

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Minor variations in product typical test data are to be expected in normal manufacturing.

CLARITY® SYNTHETIC EA GREASE

PRODUCT DESCRIPTION

Chevron's Clarity® Synthetic EA Grease is an anhydrous calcium-thickened lubricating grease based on biodegradable esters. The grease contains antioxidants, corrosion inhibitors, and EP/W additives. The thickener, together with the biodegradable esters, makes the product suitable for lubrication of heavily loaded applications. The lubricating grease has excellent adhesion and water resistance.

Clarity Synthetic EA Grease is readily biodegradable, has excellent water resistance, good corrosion resistance and is excellent for extreme pressure and heavy loads. It is compliant to 2013 VGP legislation and the Swedish Standard 155470. It is pumpable in most modern centralized lubrication systems.

CUSTOMER BENEFITS

Clarity Synthetic EA Grease delivers value through:

- **Environmentally acceptable** — Meets the requirements of the EPA Vessel General Permit (VGP) for biodegradation, low toxicity and low bioaccumulation.
- **Water resistance** — Provides satisfactory lubrication in the presence of water and is not washed out of bearings.
- **Corrosion protection** — Rust-inhibited to protect steel and nonferrous-bearing surfaces against corrosion.
- **Multipurpose** — Satisfies all grease requirements of the majority of marine equipment.
- **Pumpability** — Can be used over a wide temperature range in centralized lubrication systems.

APPLICATIONS

Clarity Synthetic EA Grease is suitable for on-deck applications including wire ropes, rudder posts, closed shaft with grease, valves, valve spindles, doors, various bearing applications on spindles, and lifeboat davit.

TYPICAL TEST DATA

Product Number	*238009*
SDS Number	*39898*
Viscosity, Kinematic (ASTM D445, DIN 51562-1) cSt at 40°C cSt at 100°C	 500.0 53.0
Operating Temperature Range, °C	-40 to 100
Penetration at 25°C (ASTM D217)	265-295
Dropping Point, °C (ASTM D2265, IP 396)	> 140
Four-ball Weld Load, kg (ASTM D2596, DIN 51350:4)	305
Water Resistance at 90°C (ASTM D4049, DIN 51807:1)	0
Water Washout at 38°C (ASTM D1264, ISO 11009)	<10%
Thickener Type	Anhydrous Calcium
Base Fluid	Ester
Texture	Smooth
Color	Yellow

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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CHEVRON MOLY GREASE EP 1, 2

PRODUCT DESCRIPTION

Chevron Moly Greases EP are molybdenum disulfide extreme pressure (EP) greases designed for automotive and industrial applications.

CUSTOMER BENEFITS

Chevron Moly Greases EP deliver value through:

- **Good water and heat resistance**
- **Good corrosion protection**
- **Good oxidation stability**
- **Good low temperature pumpability**
- **Good wear protection**
- **Long lasting lubrication**

FEATURES

Chevron Moly Greases EP are general purpose, extreme pressure (EP) greases.

They are manufactured using highly refined selected base oils, a lithium-12-hydroxystearate thickener, 3% molybdenum disulfide (moly), EP additive, rust and oxidation inhibitors. They are dark gray/black in color and smooth and buttery in texture.

These products satisfy the demand for high quality moly-type greases with extreme pressure capability in both automotive and industrial applications.

Chevron Moly Greases EP provide excellent performance under extreme pressure, boundary lubrication conditions because of their EP additive and moly content. With a Timken OK Load (ASTM D2509) of 50 lbs and moly to maintain a low coefficient of friction along sliding surfaces, even under loads exceeding the yield strengths of metals, Chevron Moly Greases EP provide both shock and heavy load protection. Moly provides a lubricity safety factor (staying power) in situations where the grease is depleted and only molybdenum disulfide remains to provide lubrication until more grease is applied.

Chevron Moly Greases EP provide longer-lasting lubrication than conventional greases. Hence, lubrication frequencies can be extended and down time reduced. They are ideal in situations where lubrication is infrequent. The "moly" provides a reserve protection should the lubricant be squeezed from the bearing surface. They have good storage stability, are pumpable at low temperatures, and provide water resistance and rust protection.

APPLICATIONS

Chevron Moly Greases EP are recommended for use in automotive and industrial equipment where a moly type grease is recommended.

Typical applications in automotive equipment are: chassis, bearings, universal joints, fifth wheels, and ball joints. Chevron Moly Greases EP are also recommended for use in construction equipment such as bulldozers, scrapers, loaders, shovels, etc.

Chevron Moly Greases EP are recommended for use in roller chains, trunions, gears, cables, sheaves, slides, and chassis bearings.

In industrial applications, these greases are recommended for the lubrication of conveyor bearings, sliding and rubbing surfaces, kiln car bearings, etc. They are particularly suited for heavily loaded pivot pins, splined shafts, or other surfaces subjected to sliding, vibration, or oscillation where fretting is encountered.

Chevron Moly Greases EP meet Caterpillar recommendations for greases containing 3% molybdenum disulfide.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

NLGI Grade	1	2
Product Number	*255659*	*255660*
SDS/MSDS Number *USA* *Colombia*	 *6912* —	 *6912* *33416*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -20(-4) 125(257)	 -15(5) 127(260)
Penetration, at 25°C(77°F) Unworked Worked	 325 325	 275 280
Dropping Point, °C(°F)	191(376)	191(376)
Four-Ball Weld Point, kg	 315	 315
Timken OK Load, lb	50	50
Lincoln Ventmeter, psig at 30 s, at 75°F 30°F 0°F -22°F	 250 → 475 1275	 400 → 583 1367
Thickener, % Type	5.1 Lithium	6.4 Lithium
ISO Viscosity Grade, Base Oil Equivalent	 220	 220
Viscosity, Kinematic* ASTM D445 cSt at 40°C cSt at 100°C	 191 14.8	 191 14.8
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 1019 79	 1019 79
Viscosity Index*	69	69
Flash Point, °C(°F)*	249(480)	249(480)
Pour Point, °C(°F)*	-18(0)	-18(0)
Texture	Smooth, Buttery	Smooth, Buttery
Color	Dark Gray/Black	Dark Gray/Black

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

→ Not tested at this temperature.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

MULTIFAK® EP
000, 00, 0, 1, 2

PRODUCT DESCRIPTION

Multifak® EP greases are multipurpose extreme pressure greases suitable for use in many industrial grease applications.

CUSTOMER BENEFITS

Multifak EP greases deliver value through:

- **Good water resistance** — Resistance to washout of bearings.
- **Good corrosion protection** — Inhibited to protect bearing surfaces.
- **Good oxidation stability** — Helps to support long life in storage and in use.
- **Simplified lubrication** — One grease designed to satisfy many different industrial grease requirements.
- **Low oil separation tendency** — Recommended for use in typical centralized lubrication systems.

FEATURES

Multifak EP greases are multipurpose extreme pressure greases suitable for use in many industrial grease applications.

Multifak EP greases are manufactured using selected highly refined medium viscosity index base oils, a lithium 12 hydroxystearate thickener, an extreme pressure additive, and rust and oxidation inhibitors.

NLGI grade 000 is red in color and stringy in texture. NLGI grades 00, 0, 1 and 2 are amber in color and buttery in texture.

Multifak EP greases have high load-carrying capacity and, therefore, provide good protection of lubricated parts against wear. They provide good lubrication in the presence of water, protect bearing surfaces against corrosion, and have excellent resistance to oxidation, which supports long life in storage and in use.

Multifak EP greases are work stable. They resist separation or throw out from antifriction bearings. They have low oil bleeding tendency under pressure and are pumpable at low temperatures.

APPLICATIONS

Multifak EP greases are suitable for use in typical centralized lubrication systems.

Multifak EP greases can satisfy a wide range of industrial and commercial grease applications.

Typical applications include:

- General Machinery - plain, antifriction, roller, and needle bearings
- Construction equipment
- Conveyors and run-out rolls
- Crusher, shaker, or classifier screen bearings
- Chassis lubrication
- Non-disc brake wheel bearings

Multifak EP greases are recommended for both plain and antifriction bearings and particularly for bearings subjected to shock loading. **NLGI grades 1** and **2** comply with Timken's recommendation for this service.

NLGI grade 000 is a semifluid grease formulated to meet the lubrication requirements of machinery having enclosed gear cases where housings and seals have lost their ability to retain conventional gear oils.

NLGI grades 1 and **2** are approved for the NLGI Certification Mark LB.

NLGI grades 0, 1 and **2** are registered by **NSF** and are acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which

Product(s) manufactured in the USA and Colombia.
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is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

TYPICAL TEST DATA

NLGI Grade	000	00	0	1	2
Product Number	*274508*	*274509*	*274501*	*274502*	*274503*
SDS/MSDS Number *USA* *Colombia*	 *38345* —	 *23689* —	 *23562* —	 *23562* —	 *23562* *34392*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -35(-31) 70(158)	 -35(-31) 77(170)	 -30(-22) 99(210)	 -20(-4) 125(257)	 -15(5) 127(260)
Penetration, at 25°C(77°F) Unworked Worked	 445 460	 415 415	 390 370	 305 325	 275 280
Dropping Point, °C(°F)	160(320)	160(320)	171(340)	186(367)	188(370)
Timken OK Load, lb	40	40	40	40	40
Thickener, % Type	1.6 Lithium	2.3 Lithium	5.0 Lithium	7.0 Lithium	9.0 Lithium
ISO Viscosity Grade, Base Oil Equivalent	 320	 100	 220	 220	 220
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 349 22.3	 112 9.8	 173 15.6	 173 15.6	 173 15.6
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 1880 112	 595 60	 914 82	 914 82	 914 82
Viscosity Index*	76	49	90	90	90
Flash Point, °C(°F)*	224(435)	204(400)	204(400)	249(480)	249(480)
Pour Point, °C(°F)*	-27(-17)	-24(-11)	-12(-10)	-12(-10)	-12(-10)
Texture	Stringy	Buttery	Buttery	Buttery	Buttery
Color	Red	Amber	Amber	Amber to Brown	Amber to Brown

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.
b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.
* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® EXTREME GREASE EP 1
(formerly RPM® Arctic Grease)

PRODUCT DESCRIPTION

Delo® Extreme Grease EP is recommended for use as a general purpose automotive and industrial grease where extreme low temperature performance is required.

CUSTOMER BENEFITS

Delo Extreme Grease EP delivers value through:

- **Low temperature performance** — Designed to lubricate in arctic climates.
- **Good rust protection** — Passes ASTM D1743-73 rust test.
- **Good pumpability** — Low viscosity oil component of grease enables easy application in winter climates. It has good pumpability at low temperatures, down to -30°C (-22°F).
- **Good load carrying capacity** — As indicated by the Timken OK load of 45 lb.

FEATURES

Delo Extreme Grease EP is manufactured using a polyurea thickener, special low viscosity base oil, and rust and oxidation inhibitors.

It is specially formulated for use in automotive and industrial applications where extreme low temperatures are encountered.

Delo Extreme Grease EP has outstanding low temperature lubrication qualities and provides metal parts with excellent rust and corrosion protection as well as protection from wear.

APPLICATIONS

Delo Extreme Grease EP is recommended for use as a general purpose automotive and industrial grease where extreme low temperature performance is required.

It is also recommended for use in environments with a wide ambient temperature range.

It is approved for the NLGI Certification Mark GC-LB.

NLGI
AUTOMOTIVE WHEEL BEARING & CHASIS LUBRICANT
GC-LB

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

NLGI Grade	1
Product Number	*259127*
SDS/MSDS Number *U.S.* *Canada* *Mexico*	 *44533* *44534* *44535*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -50(-58) 150(302)
Penetration, at 25°C(77°F) Unworked Worked	 310 325
Dropping Point, °C(°F)	245(473)
Timken OK Load, lb	45
Lincoln Ventmeter, psig at 30 s, at 75°F 30°F 0°F -22°F	 0 0 100 420
Thickener, % Type	16 Polyurea
ISO Viscosity Grade, Base Oil Equivalent	 22
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 22.0 4.3
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 115 40.7
Viscosity Index*	101
Flash Point, °C(°F)*	176(349)
Pour Point, °C(°F)*	-27(-17)
Texture	Smooth, Buttery
Color	Black

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

RYKOTAC® GREASE EP

PRODUCT DESCRIPTION

Rykotac® Grease EP is a highly refined grease that clings to metals, resists both water washout and spray-off, and provides cold weather and high temperature performance.

CUSTOMER BENEFITS

Rykotac Grease EP delivers value through:

- **Tenacious adherence to metal surfaces**
- **Excellent rust protection** — Contains a strong rust inhibitor package which gives rust protection even in the presence of salt and other corrosive agents. This property is shown by the ASTM D1743 Bearing Protection Test run with synthetic seawater.
- **Oxidation resistance**
- **Extreme pressure properties**
- **Water resistance** — The tacky texture of Rykotac Grease EP provides protection against water washout.
- **Uniqueness** — Balances extreme pressure, low and high temperature properties, and other critical performance areas.

FEATURES

Rykotac Grease EP is manufactured using highly refined, select high viscosity index base oils, and a polyurea thickener. It is red in color and tacky in texture.

Rykotac Grease EP contains polyurea thickener, highly refined paraffinic base oil, extreme pressure agents, and a special combination of synthetic tackiness agents. These agents allow maximum tackiness with a wide temperature range for high and low temperature performance.

APPLICATIONS

Rykotac Grease EP is an excellent choice for heavy duty construction or farming equipment operating in both low and high temperatures, chain drives, and other applications in which a grease that clings to metal and resists spin-off is needed. These properties are given by a formulation balanced to provide good cold weather and high temperature performance.

Rykotac Grease EP can be used in both plain and antifriction bearings.

Applications include:

- Cement plants
- Construction
- Conveyor systems
- Farming
- General industry
- Paper mills

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

Product Number	*231066*
SDS Number	*7813*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -34(-30) 177(350)
Penetration, at 25°C(77°F) Worked	 260
Dropping Point, °C(°F)	260+(500+)
Water Resistance, 79°C, % Loss	2
Thickener, % Type	— Polyurea
ISO Viscosity Grade, Base Oil Equivalent	 150
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 145 21
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 741 106
Viscosity Index	171
Texture	Tacky
Color	Red

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

SIL-X® GREASE
NLGI 1

PRODUCT DESCRIPTION

Sil-X® Grease is a silica-thickened grease recommended for industrial applications subjected to very high temperatures requiring a lubricant which will not melt.

CUSTOMER BENEFITS

Sil-X Grease delivers value through:

- **High temperature stability** — "No melt" silica thickener will not melt at high temperatures, but will remain in place on bearing surfaces and continue to help provide excellent lubricity.
- **Good leak prevention** — Grease makeup helps prevent leakage from bearings.
- **Good visibility** — Distinctive red color permits ready determination that the lubricant is still in place.

FEATURES

Sil-X Grease is a silica-thickened grease.

It is manufactured using high viscosity, high viscosity index base oils and contains effective rust and oxidation inhibitors.

It is transparent red in color, and has a smooth consistency with distinct stringiness.

Sil-X Grease provides excellent lubrication in industrial applications where high temperatures are encountered. The dropping point of Sil-X Grease exceeds 260°C (500°F).

Its high viscosity oil and high viscosity additive characteristics enable this lubricant to seal bearings and resist leakage and washout.

Under high temperature operating conditions, the "no-melt" silica thickener keeps the lubricant in place long after conventional multipurpose greases would have melted and run out of bearings.

Sil-X Grease is excellent in terms of pumpability.

APPLICATIONS

Sil-X Grease is recommended for industrial applications subjected to very high temperatures requiring a lubricant which will not melt.

Typical applications are plain or journal bearings, antifriction bearings, gear cases in kiln cars, conveyors in ceramic and paint baking ovens, furnace doors, shafts extending through furnaces, etc.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

NLGI Grade	1
Product Number	*255779*
SDS Number	*6704*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -9(+15) 204(400)
Penetration, at 25°C(7°F) Unworked Worked	 328 325
Dropping Point, °C(°F)	>260°C(500°F) Contains "no-melt" silica thickener
Lincoln Ventmeter, psig at 30 s, at 75°F 30°F 0°F -22°F	 175 200 † →
Thickener, % Type	6.0 Silica
ISO Viscosity Grade, Base Oil Equivalent	 460
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 467 30.5
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 2506 150
Viscosity Index*	94
Flash Point, °C(°F)*	304(580)
Pour Point, °C(°F)*	-12(+10)
Texture	Smooth
Color	Red

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

† Too stiff at this temperature to pump through device.

→ Not tested at this temperature.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON SRI GREASE 2

PRODUCT DESCRIPTION

Chevron SRI Grease 2 is a high temperature ball and roller bearing grease.

CUSTOMER BENEFITS

Chevron SRI Grease 2 delivers value through:

- **Wide application range** — Suitable for high rpm operation, operating temperatures ranging from -30°C to 177°C (-22°F to 350°F).
- **Excellent oxidation stability** — Provides exceptional bearing life at operating temperatures in the range of 93°C to 177°C (199°F to 350°F).
- **Excellent rust protection** — Provides rust protection as defined by ASTM D5969 with 10% Synthetic Sea Water.

FEATURES

Chevron SRI Grease 2 is a high temperature ball and roller bearing grease.

It is formulated with highly refined base stocks, a modern ashless, organic polyurea thickener coupled with high performance rust and oxidation inhibitors (the latter to provide outstanding rust protection in severe applications that many electric motor applications are exposed to in field operations). Its texture is smooth and buttery and its color is dark green.

As noted, Chevron SRI Grease 2 passes the Static Bearing Rust Test, ASTM D5969, with 10% synthetic sea water. These properties help to provide longer bearing life under high speed and high temperature operation. This is nearly 10 times the life possible when using conventional lithium greases. Under normal operating temperatures and conditions, Chevron SRI Grease 2 can be used as a "Life Pack" lubricant in sealed bearings.

Note that in today's more modern, high output (horsepower), high load electric motors, there are times where these units employ ball bearings and roller element bearings on the same motor. On units where horsepower and load are considered high on the roller element bearing, EP greases should be employed. In these instances, Black Pearl® Grease EP would be the grease of choice and is fully compatible to use with Chevron SRI Grease 2.

APPLICATIONS

Chevron SRI Grease 2 is recommended:

- for use in a wide range of automotive and industrial applications
- for use in antifriction bearings operating at high speeds (10,000 rpm and greater)
- where the operating temperatures are on the order of 150°C (302°F) and higher
- where there is a likelihood that water or salt water will get into the bearings

Chevron SRI Grease 2 will perform in bearings at temperatures as low as -30°C (-22°F).

Chevron SRI Grease 2 is registered by **NSF** and is acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

NLGI Grade	2
Product Number	*254521*
SDS Number	*35940*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -30(-22) 177(350)
Penetration, at 25°C(77°F) Unworked Worked	 255 280
Dropping Point, °C(°F)	243(470)
High Temperature Life, hours at 177°C(350°F), ASTM D3336	750+
Lincoln Ventmeter, psig at 30 s, at 75°F 30°F 0°F	 225 425 750
Thickener, % Type	8.0 Polyurea
ISO Viscosity Grade, Base Oil Equivalent	 100
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 116 12.3
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 606 69.0
Viscosity Index*	97
Flash Point, °C(°F)*	260(500)
Pour Point, °C(°F)*	-15(+5)
Texture	Smooth, Buttery
Color	Dark Green

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.
b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.
* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® STARPLEX® EP 1, 2 (formerly Starplex® EP)

PRODUCT DESCRIPTION

Delo® Starplex® EP greases are water resistant, extreme pressure, heavy duty chassis and wheel bearing greases.

CUSTOMER BENEFITS

Delo Starplex EP greases deliver value through:

- **Good water resistance** — Good resistance to wash out of bearings.
- **Good rust and corrosion protection**, even in wet conditions.
- **Extreme pressure protection.**
- **Protection against shock loading**, thus promoting long bearing life.
- **Outstanding film strength** and adhesive properties.
- **Good low temperature pumpability** — Easy handling in the container and grease dispensing equipment.

FEATURES

Delo Starplex EP greases are water resistant, extreme pressure, heavy duty chassis and wheel bearing greases.

Delo Starplex EP greases are manufactured using highly refined, select high viscosity index base oils, and a lithium complex soap.

Delo Starplex EP greases are available in two grades:

- **NLGI grade 1** for easy pumpability at low ambient temperatures
- **NLGI grade 2** for use in normal ambient temperatures

FUNCTIONS

Delo Starplex EP greases are formulated to:

- Protect bearings and other metal surfaces from corrosion when exposed to wet conditions.
- Resist water. These greases strongly resist being washed out of bearings.
- Retain their consistency under a wide range of service conditions.
- Provide outstanding film strength and adhesive properties. As a result, Starplex EP greases are particularly effective in providing low wear in shock load service.
- Operate effectively over a wide temperature range.

APPLICATIONS

Delo Starplex EP greases are recommended for:

- use in the lubrication of trucks, tractors, and passenger cars. This includes ball joints, universal joints, chassis points, wheel bearings, water pumps, and fifth wheels.
- boat trailer wheel bearings
- high temperature disc brake bearing applications

Delo Starplex EP greases are approved for the NLGI Certification Mark GC-LB.

NLGI AUTOMOTIVE WHEEL BEARING & CHASIS LUBRICANT GC-LB

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

NLGI Grade	1	2
Product Number	*259119*	*259118*
SDS/MSDS Number		
USA	*44614*	*44614*
Canada	*44615*	*44615*
Mexico	*44616*	*44616*
Colombia		*33449*
Operating Temperature, °C(°F)		
Minimum[a]	-40(-40)	-40(-40)
Maximum[b]	177(350)	177(350)
Penetration, at 25°C(77°F)		
Unworked	310	267
Worked	325	280
Dropping Point, °C(°F)	245(471)	255(491)
Four-Ball		
Weld Point, kg	315	315
Wear Scar Diameter, mm	0.45	0.45
Timken OK Load, lb	50	50
Thickener, %	9	12
Type	Lithium Complex	Lithium Complex
Viscosity, Kinematic*		
cSt at 40°C	226	226
cSt at 100°C	20.7	20.7
Viscosity, Saybolt*		
SUS at 100°F	1188	1188
SUS at 210°F	104.2	104.2
Viscosity Index*	107	107
Flash Point, °C(°F)*	274(525)	274(525)
Pour Point, °C(°F)*	-12(+10)	-12(+10)
Texture	Tacky	Tacky
Color	Red	Red

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

STARPLEX® PREMIUM 1

PRODUCT DESCRIPTION

Starplex® Premium 1 is a lithium complex grease, formulated with a high viscosity base oil and special selected additives, including polymers, to impart extreme pressure characteristics as well as corrosion, wear oxidation and water wash out protection.

CUSTOMER BENEFITS

Starplex Premium 1 delivers value through:

- **High temperature stability** up to 325°F.
- **Excellent corrosion and wear protection.**
- **Excellent water resistance.**
- **Optimal lubrication intervals**

FEATURES

Starplex Premium 1 is a lithium complex grease, formulated with a high viscosity base oil and special additives, including polymers to impart extreme pressure characteristics as well as corrosion, wear oxidation and water wash out protection.

Starplex Premium 1 provides an alternative for high temperature applications. The high viscosity base oils contained in this product serve to minimize friction between moving parts and maintain lubrication performance over a wide temperature range.

APPLICATIONS

Starplex Premium 1 is recommended for use in applications with temperatures up to 325°F (163°C). It is ideally suited for lubrication where water washout is an issue.

Starplex Premium 1 is ideal for a wide variety of applications across several industries, including:

- **Paper and Forest Products** — This lubricant is recommended for applications such as: sludge press bearings, lime kilns, pumps, woodyard heavy equipment, doctor oscillator bearings, felt roll bearings, pulp refiner bearings, rope sheaves, and exhaust fan bearings.
- **General Manufacturing and light duty Off-Road**
  - — General Machinery - plain, anti friction, roller, and needle bearings
  - — Conveyors and run-out rolls
  - — Chassis lubrication

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

NLGI Grade	1
Product Number	*277113*
SDS Number	*23640*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -18(0) 163(325)
Penetration, at 25°C(77°F) Worked	 325
Dropping Point, °C(°F)	232(450)
Timken OK Load, lb	50
Thickener, % Type	10 Lithium Complex
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 475 30
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 2537 147
Viscosity Index*	90
Flash Point, °C(°F)*	300(572)
Texture	Tacky
Color	Dark Brown

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TEXCLAD® 2

PRODUCT DESCRIPTION

Texclad® 2 is a calcium-based grease that resists washout and provides good film strength and load carrying capabilities.

CUSTOMER BENEFITS

Texclad 2 delivers value through:

- **Water tolerance** — Resists washout, even when subject to gross water contamination.
- **Excellent adhesiveness** — Provides good film strength in both wet and dry environments.

FEATURES

Texclad 2 is a calcium-based grease, which contains special friction modifiers such as molybdenum disulfide and graphite. These modifiers help create a long-lasting film on working surfaces. Texclad 2 has good load carrying capability and is very resistant to water washout.

APPLICATIONS

Texclad 2 is recommended:

- for ball mill gears, traveling water screens, and fork lifts.
- for chain and sprocket lubrication and as a tenacious fifth wheel lubricant.

TYPICAL TEST DATA

Product Number	*277116*
SDS Number	*24159*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -18(0) 79(175)
Penetration, at 25°C(77°F) Worked	 280
Dropping Point, °C(°F)	99(210)
Thickener, % Type	9.0 Calcium
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 1000 36.8
Texture	Tacky
Color	Black

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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ULTI-PLEX® GREASE EP

NLGI 1, 2

PRODUCT DESCRIPTION

Ulti-Plex® Greases EP are high performance greases specially formulated for extreme pressure bearing applications operating under high and low temperature conditions.

CUSTOMER BENEFITS

Ulti-Plex Greases EP deliver value through:

- **High temperature stability** up to 177°C (350°F).
- **Excellent corrosion and wear protection**
- **Excellent water resistance**
- **Excellent shock load protection**

FEATURES

Ulti-Plex Greases EP are high performance greases specially formulated for extreme pressure bearing applications operating under high and low temperature conditions.

Ulti-Plex Greases EP are manufactured using selected highly refined, high viscosity base oils, a lithium complex thickener, rust and oxidation inhibitors, and extreme pressure and tackiness additives. They are purple in color and stringy in texture.

The lithium complex thickener in Ulti-Plex Greases EP elevates the dropping point to approximately 255°C (491°F).

APPLICATIONS

These greases are recommended for applications operating in the temperature range of -26°C to 177°C (-15°F to 350°F).

Ulti-Plex Greases EP are ideal for a wide variety of industrial applications, including:

- **General Manufacturing** — These greases provide excellent structural integrity and protection in high temperature, extreme pressure, or wet environments such as extruder, dryer, furnace, exhaust fan, or crane bearing applications.
- **Mining** — These greases provide excellent shock load protection and water washout resistance properties found in wet, off-road environments. Applications appropriate for these greases include: pins and bushings on buckets and loaders, shaker screens, crushers, and conveyors.
- **Marine** — The excellent rust and corrosion inhibition properties make these greases ideal for deck cranes, winches, and other deck equipment found in Inland/Coastal vessels or off-shore drilling equipment.
- **Paper and Forest Products** — These lubricants are formulated for severe service applications such as: sludge press bearings, lime kilns, pumps, woodyard heavy equipment, doctor oscillator bearings, felt roll bearings, pulp refiner bearings, rope sheaves, and exhaust fan bearings.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

NLGI Grade	1	2
Product Number	*250186*	*250185*
SDS Number	*6701*	*6701*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -26(-15) 177(350)	 -26(-15) 177(350)
Penetration, at 25°C(77°F) Unworked Worked	 300 325	 240 280
Dropping Point, °C(°F)	255(491)	255(491)
Four-Ball Weld Point, kg Wear, Scar Diameter, mm	 500 0.43	 500 0.43
Timken OK Load, lb	70	75
Load Wear Index, kg	70	70
Bearing Water Washout, wt % Loss at 175°F	7	4
Water Spray-off, % at 100°F	25	15
Lincoln Ventmeter, psig at 30 s, at 75°F 30°F 0°F -22°F	 → 250 975 †	 667 975 2500 †
Copper Corrosion	1B	1B
Thickener, % Type	7.0 Lithium Complex	13.0 Lithium Complex
ISO Viscosity Grade, Base Oil Equivalent	320	320
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 383 25	 383 25
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 2058 124	 2058 124
Viscosity Index*	85	85
Flash Point, °C(°F)*	274(525)	274(525)
Texture	Stringy	Stringy
Color	Purple	Purple

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.
b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.
→ Not tested at this temperature.
† Too stiff at this temperature to pump through device.
* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

ULTI-PLEX® HV SYNTHETIC GREASE EP

PRODUCT DESCRIPTION

Ulti-Plex® HV Synthetic Grease EP is a high performance grease specially formulated for extreme pressure bearing applications operating under high and low temperature conditions and for those difficult applications requiring extended lubrication intervals.

CUSTOMER BENEFITS

Ulti-Plex HV Synthetic Grease EP delivers value through:

- **High temperature stability** up to 232°C (450°F). High temperature stability indicates the highest temperature at which the grease could be used with frequent (daily) relubrication.
- **Low temperature lubrication** down to -40°C (-40°F). Low temperature lubrication is the lowest temperature at which a grease already in place could be expected to provide lubrication but may not maintain pumpability.
- **Excellent corrosion and wear protection.**
- **Excellent water resistance.**
- **Optimal relubrication intervals.**

FEATURES

Ulti-Plex HV Synthetic Grease EP is a high performance grease specially formulated for extreme pressure bearing applications operating under high and low temperature conditions and for those difficult applications requiring extended lubrication intervals.

It is manufactured using highly refined high viscosity synthetic base oil, a lithium complex thickener, rust and oxidation inhibitors, and extreme pressure and tackiness additives. It is light tan in color and smooth and buttery in texture.

Ulti-Plex HV Synthetic Grease EP provides an alternative for high temperature applications. The uniform molecular structure of the synthetic base oil minimizes friction between moving parts and boosts lubrication performance over a wide temperature range.

The high viscosity index of the synthetic base oil allows bearings lubricated with Ulti-Plex HV Synthetic Grease EP to operate at temperatures as low as -40°C (-40°F).

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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APPLICATIONS

Ulti-Plex® HV Synthetic Grease EP is recommended for use in applications with operating temperatures up to 232°C (450°F) with a dropping point of approximately 280°C (536°F).

Ulti-Plex HV Synthetic Grease EP is ideal for a wide variety of applications across several industries, including:

- **Paper and Forest Products** — Ulti-Plex HV Synthetic Grease EP is designed for heavily loaded, low speed bearings which may be found in sludge presses and washers.
- **Mining/Mineral Processing** — Ulti-Plex HV Synthetic Grease EP is particularly recommended for:
  - — mining operations that involve extreme pressure applications requiring low temperature pumpability. Applications include: pins and bushings on buckets and loaders, shaker screens, crushers, and conveyors
  - — low temperature mining applications
  - — automatic lubricating systems in onboard shovels, trucks, and other mobile equipment
  - — kiln and cooling bed bearings
- **Off-Road Construction** — Ulti-Plex HV Synthetic Grease EP is ideally suited for lubrication systems that involve pumping grease through long supply lines at low temperatures. Ulti-Plex HV Synthetic Grease EP is formulated to minimize water washout in off-road environments.
- **Marine** — The rust and corrosion inhibition properties of Ulti-Plex HV Synthetic Grease EP make it ideal for use in marine equipment exposed to severe corrosion environments. Examples include deck equipment, offshore drilling equipment, grease lubricated shaft bearings, cranes, and windlass winches.

TYPICAL TEST DATA

NLGI Grade	**1.5**
Product Number	*250500*
SDS Number	*8268*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -40(-40) 232(450)
Penetration, at 25°C(77°F) Unworked Worked	 295 315
Dropping Point, °C(°F)	280(536)
Timken OK Load, lb	50
Four-Ball Weld Point, kg Wear, Scar Diameter, mm	 500 0.5
Load Wear Index, kg	95
Bearing Water Washout, wt % loss at 175°F	7
Lincoln Ventmeter, psig at 30 s, at 75°F 30°F 0°F	 300 550 960
Copper Corrosion	1b
Thickener, % Type	13.0 Lithium Complex
Viscosity, Kinematic (Base Fluid) cSt at 40°C cSt at 100°C	 1248 100
Viscosity, Saybolt (Base Fluid) SUS at 100°F SUS at 210°F	 5783 467
Viscosity Index (Base Fluid)	168
Flash Point, °C(°F) (Base Fluid)	302(576)
Texture	Smooth, Buttery
Color	Light Tan

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

Minor variations in product typical test data are to be expected in normal manufacturing.

ULTI-PLEX® SYNTHETIC GREASE EP

PRODUCT DESCRIPTION

Ulti-Plex® Synthetic Grease EP is a high performance grease specially formulated for extreme pressure bearing applications operating under high and low temperatures.

CUSTOMER BENEFITS

Ulti-Plex Synthetic Grease EP delivers value through:

- **High temperature stability**
- **Low temperature pumpability**
- **Low temperature lubrication**
- **Excellent corrosion protection**
- **Excellent water washout performance**
- **Long relubrication intervals**

FEATURES

Ulti-Plex Synthetic Grease EP is a high performance grease specially formulated for extreme pressure bearing applications operating under high and low temperature conditions and for those difficult applications requiring extended lubrication intervals.

It is manufactured using selected highly refined high viscosity synthetic base oils, a lithium complex thickener, rust and oxidation inhibitors, and extreme pressure and tackiness additives. It is light tan in color and smooth and buttery in texture.

Ulti-Plex Synthetic Grease EP provides an alternative for high temperature applications. The uniform molecular structure of the synthetic base oils reduces friction between moving parts and boosts lubrication performance over a wide temperature range.

The high viscosity index of the synthetic base oils allow for exceptional pumpability at subzero (-18°C/0°F) temperatures, allowing bearings lubricated with Ulti-Plex Synthetic Grease EP to operate at temperatures as low as -51°C (-60°F).

APPLICATIONS

Ulti-Plex Synthetic Grease EP is recommended for use in applications with temperatures up to 232°C (450°F), with a dropping point of approximately 280°C (536°F).

Ulti-Plex Synthetic Grease EP is ideal for a wide variety of applications across several industries, including:

- **Paper and Forest Products** — Ulti-Plex Synthetic Grease EP is recommended for applications such as: sludge press bearings, lime kilns, pumps, woodyard heavy equipment, Doctor oscillator bearings, felt roll bearings, pulp refiner bearings, rope sheaves, and exhaust fan bearings. Ulti-Plex Synthetic Grease EP is particularly well-suited for high temperature applications, such as felt roll bearings and lime kilns operating at temperatures in excess of 204°C (400°F) when combined with frequent re-lubrication.
- **Mining** — Ulti-Plex Synthetic Grease EP is recommended for
  - — mining operations that involve high pressure applications requiring low temperature pumpability. Applications include: pins and bushings on buckets and loaders, shaker screens, crushers, and conveyors
  - — low temperature mining applications
  - — automatic lubricating systems in onboard shovels, trucks, and other mobile equipment
- **Off-Road Construction** — Ulti-Plex Synthetic Grease EP is well suited for lubrication systems that involve pumping grease through long supply lines at low temperatures. It also displays exceptional water washout resistance properties in wet, off-road environments.
- **Marine** — The rust and corrosion inhibition properties of Ulti-Plex Synthetic Grease EP make it ideal for use in marine equipment exposed to corrosion environments. Examples include deck equipment, offshore drilling equipment, grease

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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lubricated shaft bearings, cranes, and windlass winches.

Ulti-Plex® Synthetic Grease EP is registered by **NSF** and is acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

TYPICAL TEST DATA

NLGI Grade	**1.5**
Product Number	*250188*
SDS Number	*5343*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -51(-60) 232(450)
Penetration, at 25°C(77°F) Unworked Worked	 295 315
Dropping Point, °C(°F)	280(536)
Timken OK Load, lb	50
Four-Ball Weld Point, kg	 500
Load Wear Index, kg	79
Bearing Water Washout, wt % loss at 175°F	5
Lincoln Ventmeter, psig at 30 s, at 75°F 30°F 0°F -22°F	 38 → 517 725
Copper Corrosion	1B
Thickener, % Type	13.0 Lithium Complex
ISO Viscosity Grade, Base Oil Equivalent	 460
Viscosity, Kinematic* (Base Fluid) cSt at 40°C cSt at 100°C	 302 32.0
Viscosity, Saybolt* (Base Fluid) SUS at 100°F SUS at 210°F	 1425 151
Viscosity Index* (Base Fluid)	145
Flash Point, °C(°F) (Base Fluid)	288(550)
Texture	Smooth, Buttery
Color	Light Tan

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

→ Not tested at this temperature.

Minor variations in product typical test data are to be expected in normal manufacturing.

*Determined on base oil extracted by vacuum filtration.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

3 September 2015
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CHEVRON ULTRA-DUTY GREASE EP
NLGI 0, 1, 2

PRODUCT DESCRIPTION

Chevron Ultra-Duty Greases EP are versatile, high pressure greases with good adhesive properties designed for a wide variety of automotive and industrial applications.

CUSTOMER BENEFITS

Chevron Ultra-Duty Greases EP deliver value through:

- **Shock load protection**
- **Load-carrying protection**
- **Corrosion and rust protection**
- **Water resistant**
- **Maximum service lubrication**

FEATURES

Chevron Ultra-Duty Greases EP are versatile, high pressure greases with good adhesive properties designed for a wide variety of automotive and industrial applications.

They are manufactured using selected highly refined, high viscosity base oils, a lithium-12 hydroxystearate thickener, rust and oxidation inhibitors, and extreme pressure and tackiness additives. They are red in color and stringy in texture.

Chevron Ultra-Duty Greases EP provide thicker shock-absorbing oil film protection and greater water resistance than conventional multipurpose greases due to their high viscosity components.

The high viscosity components and tackiness additive give Chevron Ultra-Duty Greases EP an excellent adhesive quality which provides a tenacious lubricating film in working parts. The lubricants stay in place under abrasive operating conditions to resist water washout and shock load wear.

The tackiness characteristics of Chevron Ultra-Duty Greases EP make these products somewhat harder to pump than the historical soft, buttery greases. For this reason, we recommend the use of a heavy follower plate with air-driven grease pumps.

Chevron Ultra-Duty Greases EP lubricate well at low temperatures. The ASTM D1478 low temperature torque test shows that they retain their lubricating capacity, as defined by military specification MIL-G-81322, down to about -26°C (-15°F).

APPLICATIONS

Chevron Ultra-Duty Greases EP are recommended for use in automotive and industrial equipment operating under most conditions except where very high operating temperatures are encountered. Typical applications are: mining equipment, construction equipment, material handling equipment, marine deck equipment, marine deck cranes, oil field equipment, offshore drilling equipment, paper machines, dredging equipment, logging equipment, rock quarry equipment, etc., operating in water, mud, or dusty conditions.

Chevron Ultra-Duty Greases EP will help provide the needed shock load and rust protection and, best of all, they stay put which means less frequent regreasing. They are not Chevron's primary recommendation for high temperature wheel bearings. Delo® Greases EP or Black Pearl® Greases EP are preferred for wheel bearing applications.

In industrial service, Chevron Ultra-Duty Greases EP are recommended for use in most types of plain and antifriction bearings from 1-1/2 inch OD to over 16 inch OD, operating at speeds from 50 to 3000 rpm, as well as slides, gears, ways, etc.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

3 June 2013
GR-150

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TYPICAL TEST DATA

NLGI Grade	0	1	2
Product Number	*238013*	*238012*	*238011*
SDS Number	*6790*	*6790*	*6790*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -26(-15) 132(270)	 -26(-15) 138(280)	 -26(-15) 143(290)
Penetration, at 25°C(77°F) Worked (60 Strokes)	 370	 325	 280
Dropping Point, °C(°F)	172(342)	172(342)	190(374)
Four Ball Weld Point, kg	315	315	315
Four Ball Wear Scar, mm	0.45	0.45	0.45
Timken OK Load, lb	55	70	70
Water Washout, wt %	15	10	7
Water Spray-off, wt %	n/a	40	25
Lincoln Ventmeter, psig at 30 s, at 75°F 30°F 0°F	 100 200 1700	 100 400 1750	 280 600 2500
Thickener, % Type	5.6 Lithium	7.2 Lithium	8.6 Lithium
ISO Viscosity Grade, Base Oil Equivalent	 460	 460	 460
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 400 24.3	 400 24.3	 400 24.3
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 2160 121	 2160 121	 2160 121
Viscosity Index*	76	76	76
Flash Point, °C(°F)*	274(525)	274(525)	274(525)
Oil Separation, mass %	5	4	2
Texture	Stringy	Stringy	Stringy
Color	Red	Red	Red

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON ULTRA-DUTY HD 00

PRODUCT DESCRIPTION

Chevron Ultra-Duty HD is a lithium based semi-fluid grease recommended for gear drives that specify an NLGI 00 grease.

CUSTOMER BENEFITS

Chevron Ultra-Duty HD delivers value through:

- **Semi-fluid grease properties** provide a thick film of lubricant to critical parts.
- **Low temperature lubrication**.
- **Excellent rust and corrosion protection**
- **Tacky consistency** minimizes the risk of water washout.

FEATURES

Chevron Ultra-Duty HD is a lithium based semi-fluid grease specially formulated with a high viscosity base oil, and an additive package that contains inhibitors and tackifiers.

APPLICATIONS

Chevron Ultra-Duty HD is recommended for gear drives that specify an NLGI 00, semi-fluid, grease. These include large mowing machines pulled behind tractors and gearboxes in large mixers.

Chevron Ultra-Duty HD is unsuitable for applications requiring an extreme pressure grease.

TYPICAL TEST DATA

NLGI Grade	00
Product Number	*277118*
SDS Number	*23693*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -29(-20) 121(250)
Penetration, at 25°C(77°F) Worked (60 Strokes)	 415
Dropping Point, °C(°F)	166(331)
Rust Protection	Pass
Thickener, % Type	1.9 Lithium
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 680 34.0
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 3709 167
Viscosity Index*	78
Texture	Tacky
Color	Brown

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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INDUSTRIAL OILS

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ARIES®

32, 46, 100, 150, 220, 320

PRODUCT DESCRIPTION

Aries® lubricants are designed for use in percussion air tools.

CUSTOMER BENEFITS

Aries lubricants deliver value through:

- **Long equipment life** — Extreme pressure performance withstands heavy shock loads typical of rock drill service, protecting the equipment against rapid wear.
- **Reliability in wet conditions** — Provides a tenacious film that clings to lubricated parts. Resists being washed away by trace water in the compressed air.
- **Protection in wet environments** — Antirust performance protects critical parts from the corrosive action of wet environments.
- **Low inventory cost** — A multipurpose lubricant that can be used for general purpose lubrication of gears, air tools, in hand oiling and for chain drives — minimizing the number of lubricants in inventory.

FEATURES

Aries lubricants are designed to give maximum protection to percussion rock drills.

They are formulated from highly refined, high viscosity index, paraffinic base stocks and additives, which provide performance characteristics expected of an exceptional rock drill oil.

Aries lubricants are formulated to meet the critical lubrication demands of percussion rock drills. Their exceptional extreme pressure performance provides protection for the rock drill piston, rifle bar and nut against the heavy shock loads typical of rock drill service. The adhesiveness and emulsification tendency of these oils provide a tenacious lubricant film on the rock drill's moving parts which will not be washed off by incidental water that is common in the compressed air which drives the piston in this application.

These oils also provide excellent rust and corrosion protection, which is important in light of the corrosive environments in which many rock drills are used.

Aries lubricants contain no chlorinated additives and are completely ashless, minimizing environmental and disposal considerations.

Additionally, since rock drills are frequently used in mining environments where ventilation is limited, the low odor and toxicity of these lubricants are added benefits.

APPLICATIONS

Aries lubricants have proven excellent in many air-operated tools, such as jackhammers, drifters, etc.

The additive package provides many performance characteristics, which lend themselves well to the lubrication of enclosed gears, and all types of industrial plain and anti-friction bearings as applicable to the proper viscosity grade.

Their tacky quality makes them suitable for once-through applications; e.g. lubrication of chain drives.

Aries 46, 100, 150, 220 and 320 meet the specifications of **Ingersoll-Rand** Rock Drill Oil Specification for light, medium and heavy rock drill oils.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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IO-10

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TYPICAL TEST DATA

	32	46	100	150	220	320
Product Number	*273254*	*273265*	*273266*	*273272*	*273268*	*273267*
SDS/MSDS Number *USA* *Colombia*	 *26143* —	 *23516* —	 *23516* *33458*	 *23516* —	 *23516* —	 *23516* —
API Gravity	25.2	32.2	31.5	29.8	28.8	26.7
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 30.4 5.1	 43.7 6.5	 95 10.9	 143 14.4	 209 18.5	 304 23.5
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 157 43	 226 48	 495 64	 750 77	 1101 94	 1616 117
Viscosity Index	95	98	98	99	98	97
Flash Point, °C(°F)	140(284)	210(410)	230(446)	260(500)	260(500)	260(500)
Pour Point, °C(°F)	-42(-44)	-33(-27)	-30(-22)	-30(-22)	-24(-11)	-18(0)
Timken OK Load, lb	-	60	65	65	70	75
Falex EP Fail Load, lb	-	3200	3200	3200	3200	3200
Steam Emulsion Number	>1200	>1200	>1200	>1200	>1200	>1200

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CANOPUS®
13, 68

PRODUCT DESCRIPTION

Canopus® oils are designed for use as industrial circulating oils.

CUSTOMER BENEFITS

Canopus oils deliver value through:

- **High resistance to forming emulsions** due to excellent water separating characteristics.
- **Long lubricant life** provided by natural oxidation stability.
- **Good lubricant compatibility** — Compatible with other mineral-based and polyalphaolefin lubricants.

FEATURES

Canopus oils are high quality, high viscosity index, and highly refined uncompounded straight mineral oils with excellent water separating characteristics.

Canopus oils possess good natural thermal and oxidation stability. Their high viscosity index makes them suitable for use over a wide temperature range. In circulating oil systems not requiring antiwear, compressor, or lightly loaded gear cases not requiring antiwear, they will maintain a high film strength and protect metal parts. Lubricant-related deposits will be kept to a minimum due to the excellent stability of these oils. System contaminants such as dirt and moisture can be easily removed from these oils by proper filtration.

Canopus **68** is registered by **NSF** and is acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

APPLICATIONS

Canopus oils are recommended for use in many circulating oil systems where antiwear is not required, as cylinder lubricants in double-acting reciprocating compressors, and for the lubrication of both cylinders and running gears of single-acting compressors.

Because of their compatibility, Canopus oils are good for flushing lubricant systems as well.

Canopus oils can be used for hand oiling. Their high viscosity index makes them suitable for use over a wide temperature range.

Do not use Canopus in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

	13	68
Product Number	*273109*	*273112*
SDS Number	*23519*	*23522*
API Gravity	34.0	31.3
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 12.1 2.9	 64.6 8.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 70 36.1	 335 54.5
Viscosity Index	80	99
Flash Point, °C(°F)	179(354)	242(468)
Fire Point, °C(°F)	204(399)	276(529)
Pour Point, °C(°F)	-40(-40)	-15(+5)

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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CAPELLA® P 68

PRODUCT DESCRIPTION

Capella® P 68 provides effective wear protection for reciprocating, vane, and screw compressors in ammonia refrigeration systems, and systems using refrigerant R-22 and R-502.

CUSTOMER BENEFITS

Capella P 68 delivers value through:

- **Minimum oil carryover** — Low volatility and good ammonia immiscibility which helps prevent oil reaching the evaporator, promoting refrigeration efficiency and minimizing maintenance. The low pour point and high viscosity index ensures that oil which does reach the evaporator will drain more rapidly than a naphthenic oil.
- **Minimal make-up oil required** — Minimal make-up oil is required because this product resists "carry-over" to the refrigeration system's low temperature side.
- **Minimum sludging and formation of harmful deposits** in the high temperature environment of the compressor which promotes long equipment and lubricant life while minimizing maintenance.
- **Stable viscosity** — Group II base stock properties allow the oil to maintain a stable viscosity, staying in grade longer than a naphthenic refrigeration oil.
- **Effective protection for critical parts of the compressor** provided by high viscosity index, low foaming tendency, and inherent antiwear properties. The oil maximizes equipment life and life to overhaul by providing effective lubrication to all moving parts.
- **Long drain intervals** — Resistance to thermal degradation can allow customers to extend drain intervals.

FEATURES

Capella P 68, formulated with Group II - base stocks, is designed to specifically address the requirements of ammonia refrigeration systems. Capella P 68 provides advantages over naphthenic refrigeration oils in the critical performance areas of lubrication, thermal stability, and reduction of oil carryover.

APPLICATIONS

Although designed for use in ammonia refrigeration systems, Capella P 68 is also recommended for use in systems using refrigerant R-22 and R-502 - provided the evaporator temperature is above -32°C (-25°F). It is not recommended for systems using refrigerant R-12 or R-134a.

Capella P 68 is compatible with the seal elastomers commonly used in refrigeration compressors (e.g., Buna-N, chloroprene). Some Naphthenic refrigeration oils can compromise the integrity of certain seal elastomers. It is good maintenance practice to install new seal elastomers when replacing a naphthenic refrigeration oil. This is especially important when chloroprene (neoprene) seals are present.

Capella P 68 is registered by **NSF** and is acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Capella P 68 is recommended for use in **Vilter** and **Sabroe** refrigeration compressors.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

ISO Grade	68
Product Number	*273227*
SDS Number	*23525*
API Gravity	29.5
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 67.8 8.5
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 352 54
Viscosity Index	96
Flash Point, °C(°F)	230(446)
Pour Point, °C(°F)	-42(-44)
Dielectric Strength, kV	35

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CAPELLA® WF
32, 68

PRODUCT DESCRIPTION

Capella® WF oils are designed for use as refrigeration compressor oils.

CUSTOMER BENEFITS

Capella WF oils deliver value through:

- **Wax-free** — Suitable for ultra-low temperature service.
- **Water-free** — Low moisture content helps prevent icing in refrigeration expansion valves and helps prevent system corrosion.
- **Low carbon residue** — Helps minimize the tendency to form carbon deposits on the hot spots of the compressor unit.
- **Excellent compatibility in both Freon and ammonia systems** — Suitable for use in many types of refrigeration systems.
- **Premium quality** — Helps prevent lubricant-caused equipment failures.
- **Thermal stability** — For long service life.

FEATURES

Capella WF oils help provide maximum wear protection to refrigeration compressor or system in which they are used.

Capella WF oils are manufactured using specially refined naphthenic mineral oils. Carefully selected base stocks assure the exceedingly low pour points necessary for refrigeration compressor lubricants.

They are highly refined and specially treated to help resist the sludging action of refrigerants in the presence of high temperature and metal catalysts.

APPLICATIONS

Capella WF oils are suitable for use in refrigeration systems. They are particularly suitable for modern, compact, high pressure refrigeration systems using Freon. Since they are wax-free, they are suitable for use in very cold ambient temperatures as a bearing lubricant or for hand oiling.

Capella WF oils are unsuitable for refrigerant systems using HFC refrigerants, such as R-134a.

The viscosity grade for the application should be based on the equipment manufacturer's recommendation.

Capella WF oils satisfy the requirements of hermetically sealed air conditioning compressors or the many types of smaller units.

Capella WF oils are registered by **NSF** and are acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

ISO Grade	32	68
Product Number	*273273*	*273271*
SDS/MSDS Number		
USA	*23529*	*23529*
Colombia	*33461*	*33461*
API Gravity	23.9	23.0
Viscosity, Kinematic		
cSt at 40°C	29.5	64.0
cSt at 100°C	4.37	6.48
Viscosity, Saybolt		
SUS at 100°F	154	338
SUS at 210°F	41	48
Viscosity Index	7	12
Flash Point, °C(°F)	168(334)	179(354)
Pour Point, °C(°F)	-40(-40)	-38(-36)
Dielectric Strength, kV[a] (ASTM D877[b])	> 30	> 30
Sealed Tube Stability % R-22, 14 days	0.30	0.60

a Dielectric strength value applies only to "point of manufacture" of packaged products produced at a Chevron manufacturing facility. (Does not apply to bulk packaging). The oil will quickly lose its high dielectric strength value when exposed to contamination and to very small amounts of moisture and water.

b Industry standard test method for measuring kV values is not precise and test results can differ significantly.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

16 April 2015
IO-23

CETUS® DE
32, 68, 100, 150

PRODUCT DESCRIPTION

Cetus® DE oils are used for portable and stationary rotary screw, rotary vane, and reciprocating compressors.

CUSTOMER BENEFITS

Cetus DE oils deliver value through:

- **Long life** — Cetus DE oils have a low sludge-forming tendency and a high solvency for deposits that help to keep compressor parts clean. Their ability to minimize oil consumption, carry over, varnish, sludge, and deposits; as well as maximize deposit-free valve life helps minimize compressor maintenance and energy costs.
- **Ignition safety** — Cetus DE oils provide a greater margin of safety than conventional petroleum products because their flash points, fire points, and auto ignition temperatures are much higher. They are not, however, true fire resistant fluids.

FEATURES

Cetus DE oils are synthetic diester-based, oxidation resistant, compressor oils.

APPLICATIONS

Cetus DE oils are used for portable and stationary rotary screw, rotary vane, and reciprocating compressors. While specific manufacturer recommendations vary, the ISO 32 and ISO 68 grades are most commonly used for rotary compressors, while higher viscosity grades are preferred for reciprocating units.

These oils can be used in compressors with the following gases: process air, benzene, butadiene, carbon dioxide (dry), carbon monoxide, ethylene, furnace (crack) gas, helium, hydrocarbon gases, hydrogen, inert gases, methane, natural gas, nitrogen, propane, sulfur hexafluoride, and synthesis gas.

Cetus DE oils can be used in contact with the following seals, paints, and plastics:

- Viton
- High nitrile Buna N
- Teflon
- Epoxy paint
- Oil-resistant alkyd
- Nylon
- Delrin
- Celcon

These oils should not be used with:

- Neoprene
- SBR rubber
- Low nitrile Buna N
- Acrylic paint
- Lacquer
- Polystyrene
- PVC
- ABS

Cetus DE 100 is approved by:

- Matsubara Iron Works Co. Ltd, for use as a reciprocating air compressor lubricant.
- Tanabe Pneumatic Machinery Co. Ltd, for use in type H series reciprocating compressors.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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Cetus® DE oils are registered by **NSF** and are acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

TYPICAL TEST DATA

ISO Grade	32	68	100	150
Product Number	*293020*	*293021*	*293022*	*293023*
SDS Number	*27070*	*27070*	*27070*	*27070*
API Gravity	23.1	16.7	15.9	17.5
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 31.0 5.5	 67.5 7.6	 96 10.1	 152 14.1
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 148 44.7	 340 51.1	 518 61.7	 806 72.1
Viscosity Index	120	65	92	89
Flash Point, °C(°F)	266(511)	250(482)	252(486)	249(480)
Pour Point, °C(°F)	-56(-69)	-33(-27)	-39(-38)	-34(-29)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CETUS® HIPERSYN® OIL

32, 46, 68, 100, 150, 220, 320, 460

PRODUCT DESCRIPTION

Cetus® HiPerSYN® Oils are synthetic compressor oils. Cetus HiPerSYN Oils are recommended for air compressors; especially portable and stationary rotary, vane, and screw compressors.

CUSTOMER BENEFITS

Cetus HiPerSYN Oils deliver value through:

- **Long lubricant life in high temperature operations** — Outstanding thermal and oxidation stability.
- **Long machinery life and maximum compressor efficiency** — Oxidative stability and low carbon-forming tendencies minimize sludge and deposit formation.
- **Long drain intervals** — Long lubricant life means less frequent oil changes.
- **Minimal maintenance and downtime** — Trouble-free operation and extended service intervals can lead to reduced operating costs.
- **Minimum oil consumption** — Low volatility means less oil goes downstream, and less oil is needed for makeup.
- **Proven performance** in rotary screw air compressors manufactured by major OEMs including **Sullair** and **Quincy** as well as **Diamond Power** soot blowers.

FEATURES

Cetus HiPerSYN Oils are formulated with premium base oil technology and a high level of purity and refinement, and has been further enhanced by their unique additive systems that provide outstanding thermal and oxidation stability, high viscosity index, high flash point, low pour point, anti-wear protection, and excellent hydrolytic stability.

Cetus HiPerSYN Oils also protect against the formation of oxidation byproducts and acidic materials which will eventually cause deposits and varnish, rust, oxidation, and foaming.

They provide demulsibility performance and help minimize entrained air, which could otherwise result in reduced lubricant film thickness and potentially lead to pump cavitation.

Cetus HiPerSYN Oils pass the acute aquatic toxicity criteria adopted by the U.S. Environmental Protection Agency (EPA). Cetus HiPerSYN Oils are registered by **NSF** and are acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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APPLICATIONS

Cetus® HiPerSYN® Oils are formulated to provide outstanding lubricating qualities for air compressors, especially portable and stationary rotary, vane, and screw compressors.

Do not use in breathing air apparatus or medical equipment.

Cetus HiPerSYN Oils are generally designed for applications with wider operating temperature ranges as compared to non-synthetic oils. The higher viscosity grade products are especially effective in high temperature applications, such as industrial bearings and gears that require an R&O-type synthetic gear oil as well as sootblowers, where outstanding thermal and oxidative stability are required. Cetus HiPerSYN Oil ISO 320 is recommended for use in oil lubricated vibrating mechanisms in Deister vibrating machines.

Cetus HiPerSYN Oils are approved by Volvo Construction Equipment Company for use in:

- all models of Volvo Asphalt Compactors as a drum eccentric oil and carrier oil (3,000 hour extended drain interval) - Service Bulletin 160 COA 115 Version 2, dated 2017-02-16
- all models of Volvo Soil Compactors as a drum eccentric oil and carrier oil (3,000 hour extended drain interval) - Service Bulletin 160 COS 116 Version 3, dated 2017-02-16

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

ISO Grade	ASTM	32	46	68	100
Product Number		*259136*	*259137*	*259138*	*259139*
SDS Number		*8562*	*8562*	*8562*	*8563*
API Gravity	D287	36.2	35.5	35.1	34.5
Viscosity, Kinematic cSt at 40°C cSt at 100°C	D445	 30.4 5.7	 43.7 7.3	 68.6 10.4	 105 14.1
Viscosity, Saybolt SUS at 100°F SUS at 210°F	D445	 160 45.6	 225 50.6	 352 61.2	 539 75.9
Viscosity Index	D2270	130	130	136	140
Flash Point, °C(°F)	D92	230(446)	244(471)	260(500)	260(500)
Pour Point, °C(°F)	D97	-40(-40)	-36(-33)	-38(-36)	-35(-31)
Color, ASTM	D1500	L 0.5	L 0.5	L 0.5	L 0.5
Copper Corrosion 3 h at 121°C	D130	1B	1B	1B	1B
Foam Tendency/Stability, mL/mL Sequence I	D892	 10/0	 10/0	 10/0	 10/0
Oxidation Stability Hours to 2.0 mg KOH/g acid number[a] Minutes to 25 psi pressure drop	 D943 D2272	 18,000 1800	 18,000 1800	 18,000 1800	 12,000+ 2800

a Modified ASTM D943, allowed to run beyond 10,000 h.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	ASTM	150	220	320	460
Product Number		*259140*	*259141*	*259142*	*259143*
SDS Number		*8563*	*8563*	*8563*	*8563*
API Gravity	D287	33.9	34.3	32.6	32.0
Viscosity, Kinematic cSt at 40°C cSt at 100°C	D445	 158 19.5	 231 27.0	 336 33.7	 483 43.3
Viscosity, Saybolt SUS at 100°F SUS at 210°F	D445	 815 98.7	 1183 132	 1751 164	 2520 210
Viscosity Index	D2270	142	152	142	142
Flash Point, °C(°F)	D92	260(500)	260(500)	260(500)	260(500)
Pour Point, °C(°F)	D97	-35(-31)	-34(-29)	-34(-29)	-30(-22)
Color, ASTM	D1500	L 0.5	L 0.5	L 0.5	L 0.5
Copper Corrosion 3 h at 121°C	D130	1B	1B	1B	1B
Foam Tendency/Stability, mL/mL Sequence I	D892	 10/0	 10/0	 10/0	 10/0
Oxidation Stability Hours to 2.0 mg KOH/g acid number[a] Minutes to 25 psi pressure drop	 D943 D2272	 12,000+ 2800	 12,000+ 2800	 12,000+ 2800	 12,000+ 2800

a Modified ASTM D943, allowed to run beyond 10,000 h.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Cetus® HiPerSYN® Oil ISOCLEAN® Certified Lubricant

32, 46, 68

Product Description

Cetus® HiPerSYN® ISOCLEAN® Certified Lubricants are synthetic compressor oils. They are recommended for air compressors; especially portable and stationary rotary, vane, and screw compressors. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

Customer Benefits

Cetus HiPerSYN ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Long lubricant life in high temperature operations** — Outstanding thermal and oxidation stability.
- **Long machinery life and maximum compressor efficiency** — Oxidative stability and low carbon-forming tendencies minimize sludge and deposit formation.
- **Long drain intervals** — Long lubricant life means less frequent oil changes.
- **Minimal maintenance and downtime** — Trouble-free operation and extended service intervals can lead to reduced operating costs.
- **Minimum oil consumption** — Low volatility means less oil goes downstream, and less oil is needed for makeup.
- **Proven performance** in rotary screw air compressors manufactured by major OEMs including **Sullair** and **Quincy** as well as **Diamond Power** soot blowers.

Features

Cetus HiPerSYN ISOCLEAN Certified Lubricants are formulated with premium base oil technology and a high level of purity and refinement, and has been further enhanced by their unique additive systems that provide outstanding thermal and oxidation stability, high viscosity index, high flash point, low pour point, anti-wear protection, and excellent hydrolytic stability.

Cetus HiPerSYN ISOCLEAN Certified Lubricants also protect against the formation of oxidation byproducts and acidic materials which will eventually cause deposits and varnish, rust, oxidation, and foaming.

They have very good demulsibility characteristics allowing quick release of moisture and help minimize entrained air, which could otherwise result in reduced lubricant film thickness and potentially lead to pump cavitation.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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IO-105 ISOCLEAN

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Cetus® HiPerSYN® ISOCLEAN® Certified Lubricants pass the acute aquatic toxicity criteria adopted by the U.S. Environmental Protection Agency (EPA). Cetus HiPerSYN ISOCLEAN Certified Lubricants are registered by **NSF** and are acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

APPLICATIONS

Cetus HiPerSYN ISOCLEAN Certified Lubricants are formulated to provide outstanding lubricating qualities for air compressors, especially portable and stationary rotary, vane, and screw compressors.

Do not use in breathing air apparatus or medical equipment.

Cetus HiPerSYN ISOCLEAN Certified Lubricants are generally designed for applications with wider operating temperature ranges as compared to non-synthetic oils. The higher viscosity grade products are especially effective in high temperature applications, such as industrial bearings and gears that require an R&O-type synthetic gear oil as well as sootblowers, where outstanding thermal and oxidative stability are required.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

ISO Grade	ASTM	32	46	68
Product Number		*278025*	*278026*	*278027*
SDS Number		*8562*	*8562*	*8562*
API Gravity	D287	36.2	35.5	35.1
Viscosity, Kinematic cSt at 40°C cSt at 100°C	D445	 30.4 5.7	 43.7 7.3	 68.6 10.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	D445	 160 45.6	 225 50.6	 352 61.2
Viscosity Index	D2270	130	130	136
Flash Point, °C(°F)	D92	230(446)	244(471)	260(500)
Pour Point, °C(°F)	D97	-40(-40)	-36(-33)	-38(-36)
Color, ASTM	D1500	L 0.5	L 0.5	L 0.5
Copper Corrosion 3 h at 121°C	D130	1B	1B	1B
Water Separability, Minutes to 0 mL emulsion	D1401	 15	 15	 15
Foam Tendency/Stability, mL/mL Sequence I	D892	 10/0	 10/0	 10/0
Oxidation Stability Hours to 2.0 mg KOH/g acid number[a] Minutes to 25 psi pressure drop	 D943 D2272	 18,000 1800	 18,000 1800	 18,000 1800

a Modified ASTM D943, allowed to run beyond 10,000 h.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CETUS® PAO

32, 46, 68, 100, 150

PRODUCT DESCRIPTION

Cetus® PAO oils are synthetic air compressor lubricants formulated with high quality PAO base fluids and a high performance additive package.

CUSTOMER BENEFITS

Cetus PAO oils deliver value through:

- **Exceptional thermal and oxidation stability** — Long lubricant life in high temperature operations.
- **Long machinery life and maximum compressor efficiency** — Low carbon-forming tendency minimizes deposits.
- **Long drain intervals** — Long lubricant life means less frequent oil changes.
- **Minimal maintenance and downtime** — Helps promote long service intervals which can minimize operating costs.
- **Low volatility and excellent air release tendency** — Helps to reduce oil carryover downstream and less makeup oil is needed.

FEATURES

Cetus PAO oils are synthetic air compressor lubricants formulated with the highest quality polyalphaolefin (PAO) base fluids.

They provide excellent thermal and oxidation stability, high viscosity index, high flash point, low pour point, and excellent hydrolytic stability.

Cetus PAO oils protect against rust, oxidation, and foaming, and have ashless antiwear properties.

Cetus PAO oils are designed to meet the requirements of modern higher output, more efficient air compressors. These units are more compact and operate at higher speeds than older compressors, resulting in higher temperatures. As temperatures increase, deposit formation on valves and air separators can also increase.

The high thermal and oxidation stability extends crankcase drain intervals compared with those obtained with mineral oils. Compressor operators can realize minimal equipment downtime and used oil disposal costs.

Valve cleanliness is maintained by the excellent thermal and oxidation stability and low carbon-forming tendencies of this product. Clean valves help minimize recompression, maximize compressor efficiencies and minimize maintenance shutdown costs.

Compressor users can realize savings in maintenance and lubrication costs through longer drain intervals offered by Cetus PAO compared to mineral oil based products.

In addition, they will find compatibility with most elastomeric seal materials that are used with mineral oil-based compressor lubricants.

APPLICATIONS

Cetus PAO oils are formulated to provide excellent lubricating qualities for many air compressors, especially portable and stationary rotary and screw compressors as well as single-stage, two-stage, and multistage reciprocating compressors.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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While specific manufacturer recommendations vary, the **ISO 32, 46** and **68** grades are most commonly used for rotary air compressors, while higher viscosity grades are preferred for reciprocating air compressors.

Since reciprocating compressors require both a crankcase lubricant and a cylinder lubricant, Cetus® PAO oils are formulated to meet this dual requirement.

Cetus PAO 68 has especially been developed for the lubrication of turbochargers in marine diesel engines, where two separate lubricating oil systems are in place.

Cetus PAO meet the requirements of:

- **DIN** 51506 VDL standard

Cetus PAO 68 is approved for:

- ABB VTR.4 turbochargers. Fulfills the requirements as low friction lubricant for a 5000 hour drain interval.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

TYPICAL TEST DATA

ISO Grade	32	46	68	100	150
Product Number	*293024*	*293025*	*293026*	*293027*	*293028*
SDS Number	*28999*	*28999*	*29718*	*29718*	*29751*
API Gravity	30.6	36.6	36.0	35.4	34.6
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 32.0 6.1	 46.0 8.1	 68.0 10.4	 100 14.0	 150 19.0
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 150 45.6	 214 51.4	 316 60.6	 464 74.0	 695 93.8
Viscosity Index	134	136	141	142	145
Flash Point, °C(°F)	250(482)	250(482)	240(464)	260(500)	266(510)
Pour Point, °C(°F)	-45(-49)	-46(-51)	-47(-53)	-48(-54)	-49(-56)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CETUS® PAO HC

PRODUCT DESCRIPTION

Cetus® PAO HC is a synthetic compressor lubricant formulated with high quality PAO base fluids.

CUSTOMER BENEFITS

Cetus PAO HC delivers value through:

- **Exceptional thermal stability** — The polyalphaolefin base fluid helps assure long lubricant life in high temperature operations.
- **High Purity** — Cetus PAO HC has a low carbon forming tendency and contains no polymer additives that result in the formation of deposits and sticky residues on discharge valves, piping and aftercooler tubing.
- **Low coefficient of friction** — Compared to conventional compressor lubricants, Cetus PAO HC provides better lubrication of moving parts with reduction of operating temperatures.
- **Formulation for inert y hydrocarbon gas compression** — Cetus PAO HC does not contain the additives used for air compression, which can lead to catalyst poisoning.

FEATURES

Cetus PAO HC is a synthetic compressor lubricant. It is formulated to meet the demands of reciprocating compressors for gases other than air.

It is formulated with the highest quality polyalphaolefin (PAO) base fluids. PAO has inherent properties, such as excellent thermal and oxidative stability, high viscosity index, high flash and fire points, natural friction reducing ability, and excellent low temperature fluidity, which make Cetus PAO HC especially well suited for the lubrication of compressor cylinders.

The ashless nature of Cetus PAO HC makes it nonpoisonous to catalysts.

The purity and thermal stability of this lubricant will substantially minimize the formation of sludge, deposits and sticky residues on compressor discharge valves, piping and aftercooler tubing.

APPLICATIONS

Cetus PAO HC is designed to meet the needs of cylinder lubrication in reciprocating compressors for inert gases (e.g. nitrogen, hydrogen, carbon dioxide, etc.) or for hydrocarbon gases (e.g. ethylene, propylene, propane, butane, etc).

The synthetic properties of Cetus PAO HC minimize the problems associated with dilution by liquid hydrocarbons and by gas absorption at high pressures.

Cetus PAO HC meets **U.S. Food and Drug Administration (FDA)** requirements, 21 CFR 178.3570, and is suitable for lubrication of ethylene and propylene compressors involved in the manufacture of polymeric food packaging.

Cetus PAO HC is registered by **NSF** and is acceptable as a lubricant where incidental food contact may occur (H1) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

ISO Grade	220
Product Number	*293029*
SDS Number	*31296*
AGMA Grade	5
API Gravity	36.7
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 230 28.3
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 1066 134.8
Viscosity Index	160
Flash Point, °C(°F)	232(450)
PAO 6 HVI/mPAO 150 Pour Point, °C(°F) (measured)	-49(-56)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CLARITY® HYDRAULIC OIL AW

32, 46, 68, 100

PRODUCT DESCRIPTION

Clarity® Hydraulic Oils AW are designed to give excellent protection in mobile and stationary hydraulic vane-, piston-, and gear-type pumps and in high-performance industrial applications as well as in environmentally sensitive areas.

CUSTOMER BENEFITS

Clarity Hydraulic Oils AW deliver value through:

- **Premium performance** — Ashless formulation meets or exceeds major vane, piston and gear pump manufacturer's requirements for viscosity, rust and corrosion protection, hydrolytic stability, water separability, foam inhibition, and filterability.
- **Exceptional oxidation stability** — Longer service life than conventional zinc-based antiwear hydraulic oils or vegetable hydraulic oils.
- **Excellent antiwear properties** — Provides excellent wear protection.
- **Low toxicity** — Inherently biodegradable[1] and has very low acute aquatic toxicity to both fish and invertebrates based on tests of water accommodated fractions. Ashless formulation facilitates conventional recycling programs.
- **Zinc-free/Ashless** — Suited for applications involving yellow metals found in piston pumps.

FEATURES

Clarity Hydraulic Oils AW are formulated with premium base oil technology and an ashless ("zinc-free") additive system that provides exceptional oxidation stability, water separability, foam suppression, and protection against wear, rust and corrosion. They are designed to meet or exceed the performance requirements of conventional antiwear hydraulic oils, especially in severe, high-output applications such as axial piston pumps. The antiwear performance of these oils makes them especially suited for high performance industrial applications utilizing axial piston pumps where pressures may exceed 5000 psi.

The zinc-free formula makes it well suited for applications involving yellow metals found in hydraulic systems.

Clarity® Hydraulic Oils AW are long-life lubricants (are not vegetable oil based), with dramatically longer TOST (ASTM D943 oxidation stability test) lives than conventional zinc-based hydraulic fluids. A longer TOST life equates to longer service life, which can improve the customer's bottom line. This level of oxidation stability is especially applicable in high efficiency (high speed, high temperature, high output) applications where severe stress is placed on the hydraulic fluid.

Clarity Hydraulic Oil AW 100 is a shear-stable high VI hydraulic oil designed to improve equipment efficiency and increase operating temperature range of this grade.

Many hydraulic systems are required to operate in environmentally sensitive areas where leaks or spills of hydraulic fluid may result in contamination of the soil or nearby waterways. Conventional antiwear hydraulic oils are formulated with metal-containing performance additives which can persist in the environment in the event of leaks. Vegetable-based hydraulic oils generally

1. As determined by OECD 301D (Closed Bottle Biodegradability Test), Chevron Clarity Hydraulic Oil AW was shown to be inherently biodegradable. This test is normally run for 28 days. After completing this test period, Chevron Clarity Hydraulic Oil AW was 38% degraded. Degradation of 20-59% after 28 days in OECD 301D is evidence that a product is inherently biodegradable. Chevron Clarity Hydraulic Oil AW did not meet the criteria for readily biodegradable, which is degradation of $\geq$ 60% after 28 days in OECD 301D.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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meet the environmental requirements, but can fall short of the performance requirements.

APPLICATIONS

Clarity Hydraulic Oils AW are designed for use in mobile and stationary hydraulic vane-, piston-, and gear-type pumps.

Clarity Hydraulic Oils AW have shown excellent performance in applications involving servo-valves using multimetal components.

Clarity Hydraulic Oils AW meet the requirements of:

- **ASTM D6158 HM** (ISO 32, 46, 68), **HV** (ISO 100)
- **Denison** HF-0, HF-2 testing requirements of T5D (ISO 32, 46, 68)
- **DIN** 51524-2 (ISO 32, 46, 68)
- **DIN** 51524-3 (ISO 100)
- **Eaton-Vickers** for use in M-2950-S (mobile) and I-286-S (stationary) hydraulic systems. Passes Eaton-Vickers 35VQ25 pump test. (ISO 32, 46, 68)
- **ISO 11158 L-HV** (ISO 100)
- **Fives Cincinnati** (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-68 (ISO 32), P-70 (ISO 46), P-69 (ISO 68)

Clarity Hydraulic Oil AW 100 is approved for Stern tube applications by:

- **Blohm+Voss**
- **Wärtsilä-Japan**

Clarity Hydraulic Oils AW (ISO 32, 46, 68) are registered by **NSF** and are acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Clarity Hydraulic Oils AW are not compatible with zinc/ calcium containing fluids, and OEM recommended lubricant change-out procedures including drain and flush requirements need to be adhered to.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

ISO Grade	32	46	68	100
Product Number	*230342*	*230341*	*230340*	*255702*
SDS Number	*6691*	*6691*	*6691*	*6691*
API Gravity	32.8	31.9	31.8	31.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 33.6 5.6	 46.0 6.8	 64.6 8.5	 95.0 13.8
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 173 45.0	 237 49.0	 334 54.8	 486 74.6
Viscosity Index	104	101	102	145
Flash Point, °C(°F)	222(432)	224(435)	224(435)	266(511)
Pour Point, °C(°F)	-33(-27)	-30(-22)	-30(-22)	-40(-40)
Brookfield Viscosity, ASTM D2983, cP at -20°C	—	—	—	—
Brookfield Viscosity, ASTM D2983, cP at -30°C	—	—	—	—
Brookfield Viscosity, ASTM D2983, cP at -40°C	—	—	—	—
Oxidation Stability Hours to 2.0 mg KOH/g acid number, ASTM D943	 > 18,000[a]	 > 18,000[a]	 > 18,000[a]	 > 5,000
FZG Gear Test, DIN 51354, Fail Stage	12	$\geq$12	$\geq$12	—
Acute Aquatic Toxicity (LC-50, OECD 203)	Pass	Pass	Pass	Pass

a Modified ASTM D943, allowed to run beyond 10,000 h.

The test results expressed above were obtained during the development of the product line and are considered representative of any/all commercial samples.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CLARITY® HYDRAULIC OIL AW ISOCLEAN® CERTIFIED LUBRICANT 32, 46, 68

PRODUCT DESCRIPTION

Clarity® Hydraulic Oils AW ISOCLEAN® Certified Lubricants are designed to give excellent protection in mobile and stationary hydraulic vane-, piston-, and gear-type pumps and in high-performance industrial applications as well as in environmentally sensitive areas. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Clarity Hydraulic Oil AW ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Premium performance** — Ashless formulation meets or exceeds major vane, piston and gear pump manufacturer's requirements for viscosity, rust and corrosion protection, hydrolytic stability, water separability, foam inhibition, and filterability.
- **Exceptional oxidation stability** — Longer service life than conventional zinc-based antiwear hydraulic oils or vegetable hydraulic oils.
- **Excellent antiwear properties** — Provides excellent wear protection.
- **Low toxicity** — Inherently biodegradable[1] and has very low acute aquatic toxicity to both fish and invertebrates based on tests of water accommodated fractions. Ashless formulation facilitates conventional recycling programs.
- **Zinc-free/Ashless** — Suited for applications involving yellow metals found in piston pumps.

FEATURES

Clarity Hydraulic Oils AW ISOCLEAN Certified Lubricants are formulated with premium base oil technology and an ashless ("zinc-free") additive system that provides exceptional oxidation stability, water separability, foam suppression, and protection against wear, rust and corrosion. They are designed to meet or exceed the performance requirements of conventional antiwear hydraulic oils, especially in severe, high-output applications such as axial piston pumps. The antiwear performance of these oils makes them especially suited for high performance industrial applications utilizing axial piston pumps where pressures may exceed 5000 psi.

1. As determined by OECD 301D (Closed Bottle Biodegradability Test), Chevron Clarity Hydraulic Oil AW was shown to be inherently biodegradable. This test is normally run for 28 days. After completing this test period, Chevron Clarity Hydraulic Oil AW was 38% degraded. Degradation of 20-59% after 28 days in OECD 301D is evidence that a product is inherently biodegradable. Chevron Clarity Hydraulic Oil AW did not meet the criteria for readily biodegradable, which is degradation of ≥ 60% after 28 days in OECD 301D.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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The zinc-free formula makes it well suited for applications involving yellow metals found in hydraulic systems.

Clarity® Hydraulic Oils AW ISOCLEAN® Certified Lubricants are long-life lubricants (are not vegetable oil based), with dramatically longer TOST (ASTM D943 oxidation stability test) lives than conventional zinc-based hydraulic fluids. A longer TOST life equates to longer service life, which can improve the customer's bottom line. This level of oxidation stability is especially applicable in high efficiency (high speed, high temperature, high output) applications where severe stress is placed on the hydraulic fluid.

Many hydraulic systems are required to operate in environmentally sensitive areas where leaks or spills of hydraulic fluid may result in contamination of the soil or nearby waterways. Conventional antiwear hydraulic oils are formulated with metal-containing performance additives which can persist in the environment in the event of leaks. Vegetable-based hydraulic oils generally meet the environmental requirements, but can fall short of the performance requirements.

APPLICATIONS

Clarity Hydraulic Oils AW ISOCLEAN Certified Lubricants are designed for use in mobile and stationary hydraulic vane-, piston-, and gear-type pumps.

Clarity Hydraulic Oils AW ISOCLEAN Certified Lubricants have shown excellent performance in applications involving servo-valves using multimetal components.

Clarity Hydraulic Oils AW ISOCLEAN Certified Lubricants meet the requirements of:

- **ASTM D6158 HM** (ISO 32, 46, 68)
- **Denison** HF-0, HF-2 testing requirements of T5D (ISO 32, 46, 68)
- **DIN** 51524-2 (ISO 32, 46, 68)
- **Eaton-Vickers** for use in M-2950-S (mobile) and I-286-S (stationary) hydraulic systems. Passes Eaton-Vickers 35VQ25 pump test. (ISO 32, 46, 68)
- **Fives Cincinnati** (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-68 (ISO 32), P-70 (ISO 46), P-69 (ISO 68)

Clarity Hydraulic Oils AW ISOCLEAN Certified Lubricants are registered by **NSF** and are acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Clarity Hydraulic Oils AW ISOCLEAN Certified Lubricants are not compatible with zinc/calcium containing fluids, and OEM recommended lubricant change-out procedures including drain and flush requirements need to be adhered to.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

ISO Grade	32	46	68
Product Number	*278024*	*278023*	*278022*
SDS Number	*6691*	*6691*	*6691*
API Gravity	32.8	31.9	31.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 33.6 5.6	 46.0 6.8	 64.6 8.5
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 173 45.0	 237 49.0	 334 54.8
Viscosity Index	104	101	102
Flash Point, °C(°F)	222(432)	224(435)	224(435)
Pour Point, °C(°F)	-33(-27)	-30(-22)	-30(-22)
Oxidation Stability Hours to 2.0 mg KOH/g acid number, ASTM D943	> 18,000[a]	> 18,000[a]	> 18,000[a]
FZG Gear Test, DIN 51354, Fail Stage	12	≥12	≥12
Acute Aquatic Toxicity (LC-50, OECD 203)	Pass	Pass	Pass

a Modified ASTM D943, allowed to run beyond 10,000 h.

The test results expressed above were obtained during the development of the product line and are considered representative of any/all commercial samples.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CLARITY® MACHINE OIL
150, 220, 320, 460

PRODUCT DESCRIPTION

Clarity® Machine Oils are circulating oils for use in industrial equipment such as gear boxes, calender stack bearings and crown control rolls.

CUSTOMER BENEFITS

Clarity Machine Oils deliver value through:

- **High temperature stability** — Contains an effective oxidation inhibitor to protect the oil at elevated ambient operating temperatures.
- **Long lubricant life** — A well-balanced additive package and high quality base oils help minimize breakdown and maximize oil life. Gives excellent performance in the FAG FE-8 Bearing Test.
- **Excellent wear protection** — Helps provide high FZG, Timken, and AGMA EP performance.
- **Excellent water separability** — The lubricant separates readily from water.
- **Effective foam inhibition** — Helps minimize amount of entrained air in the oil, minimizing the possibility of pump cavitation and also helps prevent surface foam.
- **Pall wet filterability** — Clarity Machine Oil consistently provides excellent wet aged filtration with low micron filters.
- **Environmental sensitivity** — Ashless formulation facilitates reclaiming and recycling efforts. Nontoxic to aquatic species as determined by LC-50 testing.

FEATURES

Clarity Machine Oils **150**, **220**, and **320** are formulated with high quality base oils.

Their ashless extreme pressure additive packages include rust, oxidation, and foam inhibitors.

Their outstanding oxidation stability minimizes deposit formation.

They have gear oil EP characteristics to minimize wear, and yet do not contain corrosive active sulfur additives.

Their ashless formulation facilitates reclaiming and recycling of circulating oils.

They have excellent water separating ability (demulsibility), and exceptional wet filterability with fine porosity oil filters, as demonstrated by the Pall Filterability Test.

FUNCTIONS

Clarity® Machine Oils are formulated to meet the critical demands of circulating systems in industrial equipment. These systems expose the lubricant to a broad range of operating temperatures which hasten oxidation. Clarity Machine Oils have good tolerance to contamination with water, oxidation byproducts and other particles. Clarity Machine Oils are able to have a long lubricant life in spite of these contaminants and still do an outstanding job of keeping the circulating oil system clean and lubricating the many plain and anti-friction bearings associated with this complex high speed equipment.

APPLICATIONS

Clarity Machine Oils are recommended for use in circulating systems of industrial equipment as well as gear boxes, including wet-end systems, dryer bearings, and calender stacks in paper machine systems.

Clarity Machine Oils have been used successfully in the lubrication of many types of paper machine equipment including Valmet, Beloit, and Voith Sulzer paper machine equipment.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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In addition, Clarity Machine Oils provide excellent filtration performance in the Pall Filterability Test using low micron filters.

Clarity Machine Oils 150, 220, 320 and 460 may be used as AGMA EP Oils 4, 5, 6 and 7, respectively, for back-side gears and enclosed gear drives.

Clarity Machine Oils **220** and **320** may also be used in plain and anti-friction bearings.

TYPICAL TEST DATA

ISO Grade	**150**	**220**	**320**	**460**
Product Number	*294008*	*294009*	*294010*	*294011*
SDS Number	*6680*	*6680*	*6680*	*6680*
AGMA Grade	4 EP	5 EP	6 EP	7 EP
API Gravity	29.3	27.7	26.1	26.3
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 143 14.6	 209 18.4	 304 23.5	 437 29.0
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 749 78.1	 1104 94.2	 1616 117	 2343 143
Viscosity Index	101	97	98	95
Flash Point, °C(°F)	246(475)	249(480)	248(473)	278(532)
Pour Point, °C(°F)	-15(+5)	-15(+5)	-12(+10)	-18(0)
Timken OK Load, lb	60	60	60	60
FZG Failure Load Stage, DIN 51354	>12	>12	>12	>12
Oxidation Stability, Hours to 2.0 mg KOH/g acid number, ASTM D943 Minutes to 25 psi pressure drop, ASTM D2272	 4500 367	 4000 375	 3000 345	 1835 345
Pall Filterability Wet Aged, mL to 25 psi	 >17,000	 >17,000	 >17,000	 —

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CLARITY® MACHINE OIL ISOCLEAN® Certified Lubricant

150, 220, 320

PRODUCT DESCRIPTION

Clarity® Machine Oils ISOCLEAN® Certified Lubricants are circulating oils for use in industrial equipment such as gear boxes, calender stack bearings and crown control rolls. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Clarity Machine Oils ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **High temperature stability** — Contains an effective oxidation inhibitor to protect the oil at elevated ambient operating temperatures.
- **Long lubricant life** — A well-balanced additive package and high quality base oils help minimize breakdown and maximize oil life. Gives excellent performance in the FAG FE-8 Bearing Test.
- **Excellent wear protection** — Helps provide high FZG, Timken, and AGMA EP performance.
- **Excellent water separability** — The lubricant separates readily from water.
- **Effective foam inhibition** — Helps minimize amount of entrained air in the oil, minimizing the possibility of pump cavitation and also helps prevent surface foam.
- **Pall wet filterability** — Clarity Machine Oil consistently provides excellent wet aged filtration with low micron filters.
- **Environmental sensitivity** — Ashless formulation facilitates reclaiming and recycling efforts. Nontoxic to aquatic species as determined by LC-50 testing.

FEATURES

Clarity Machine Oils ISOCLEAN Certified Lubricants are formulated with high quality base oils.

Their ashless extreme pressure additive packages include rust, oxidation, and foam inhibitors.

Their outstanding oxidation stability minimizes deposit formation.

They have gear oil EP characteristics to minimize wear, and yet do not contain corrosive active sulfur additives.

Their ashless formulation facilitates reclaiming and recycling of circulating oils.

They have excellent water separating ability (demulsibility), and exceptional wet filterability with fine porosity oil filters, as demonstrated by the Pall Filterability Test.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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FUNCTIONS

Clarity® Machine Oils ISOCLEAN Certified Lubricants are formulated to meet the critical demands of circulating systems in industrial equipment. These systems expose the lubricant to a broad range of operating temperatures which hasten oxidation. Clarity Machine Oils ISOCLEAN Certified Lubricants have good tolerance to contamination with water, oxidation byproducts and other particles. Clarity Machine Oils ISOCLEAN Certified Lubricants are able to have a long lubricant life in spite of these contaminants and still do an outstanding job of keeping the circulating oil system clean and lubricating the many plain and anti-friction bearings associated with this complex high speed equipment.

APPLICATIONS

Clarity Machine Oils ISOCLEAN Certified Lubricants are recommended for use in circulating systems of industrial equipment as well as gear boxes, including wet-end systems, dryer bearings, and calender stacks in paper machine systems.

Clarity Machine Oils ISOCLEAN Certified Lubricants have been used successfully in the lubrication of many types of paper machine equipment including Valmet, Beloit, and Voith Sulzer paper machine equipment.

In addition, Clarity Machine Oils ISOCLEAN Certified Lubricants provide excellent filtration performance in the Pall Filterability Test using low micron filters.

Clarity Machine Oils ISOCLEAN Certified Lubricants may be used as AGMA EP Oils 4, 5, 6 and 7, respectively, for back-side gears and enclosed gear drives.

Clarity Machine Oils ISOCLEAN Certified Lubricants **220** and **320** may also be used in plain and anti-friction bearings.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubrication Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

ISO Grade	150	220	320
Product Number	*278084*	*294043*	*278083*
SDS Number	—	*6680*	—
AGMA Grade	4 EP	5 EP	6 EP
API Gravity	29.3	27.7	26.1
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 143 14.6	 209 18.4	 304 23.5
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 749 78.1	 1104 94.2	 1616 117
Viscosity Index	101	97	98
Flash Point, °C(°F)	246(475)	249(480)	248(473)
Pour Point, °C(°F)	-15(+5)	-15(+5)	-12(+10)
Timken OK Load, lb	60	60	60
FZG Failure Load Stage, DIN 51354	>12	>12	>12
Oxidation Stability, Hours to 2.0 mg KOH/g acid number, ASTM D943 Minutes to 25 psi pressure drop, ASTM D2272	 4500 367	 4000 375	 3000 345
Pall Filterability Wet Aged, mL to 25 psi	 >17,000	 >17,000	 >17,000

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CLARITY® SYNTHETIC EA HYDRAULIC OIL

46, 68, 100

PRODUCT DESCRIPTION

Clarity® Synthetic EA Hydraulic Oils are readily biodegradable high performance hydraulic oils that meet EPA Vessel General Permit (VGP) requirements for environmentally acceptable lubricants. They are designed to give maximum protection in hydraulic equipment used on vessels and in environmentally sensitive areas.

CUSTOMER BENEFITS

Clarity Synthetic EA Hydraulic Oils deliver value through:

- **Environmentally acceptable** — Meets the requirements of the EPA Vessel General Permit (VGP) for biodegradation, low toxicity and low bioaccumulation.
- **Premium performance** — Ashless formulation provides excellent protection against wear of hydraulic pumps, provides rust and corrosion protection, hydrolytic stability, water separability, foam inhibition, and filterability.
- **Long oil life** — Outstanding ability of the synthetic base stock to withstand oxidation at high operating temperatures results in maximum service life for the oil relative to vegetable-based readily biodegradable products.
- **Excellent low temperature pumpability** — Specifically developed with high viscosity index to ensure good low temperature fluidity for low temperature operations.
- **Zinc-free** — Suited for applications involving yellow metals found in axial piston pumps.

FEATURES

These lubricants are readily biodegradable, non-bioaccumulative, and minimally toxic. In the event of a spill, the product biodegrades by more than 60% within 28 days, minimizing the impact to the environment.

Clarity Synthetic EA Hydraulic Oils are designed to give maximum protection in hydraulic equipment used in vessels and in both mobile and stationary hydraulic pumps in high-performance industrial applications.

Clarity Synthetic EA Hydraulic Oils are formulated with synthetic base stock and an ashless, zinc-free additive system that provide exceptional oxidation stability, water separability, foam suppression, and protection against wear, rust and corrosion.

Clarity Synthetic EA Hydraulic Oils are high VI synthetic products which allow for operation over a wide temperature range.

Clarity Synthetic EA Hydraulic Oils are designed to the performance requirements of conventional antiwear hydraulic oils, while providing an additional benefit in case of leaks or incidental discharge to the environment.

Clarity Synthetic EA Hydraulic Oils ISO 68 and 100 are recommended for use in marine stern tube applications.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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APPLICATIONS

Clarity® Synthetic EA Hydraulic Oils[1] are designed to give maximum protection in hydraulic equipment used on vessels and in environmentally sensitive areas. They are used in hydraulic systems as recommended by ISO 15380, HEPR in mobile and stationary hydraulic vane-, piston-, and gear-type pumps.

Clarity Synthetic EA Hydraulic Oils meet the requirements of:

- **DIN** 51524-3 (ISO 46, 68)
- **ISO** 15380 HEPR
- **Parker-Denison** (ISO 46, 68)

1 Chevron Clarity EA Hydraulic Oils are rebrands of Terresolve Technologies, Ltd. products as follows:

Chevron	Terresolve Technologies
Clarity® Synthetic EA Hydraulic Oil 46	ENVIROLOGIC® 3046
Clarity® Synthetic EA Hydraulic Oil 68	ENVIROLOGIC® 3068
Clarity® Synthetic EA Hydraulic Oil 100	ENVIROLOGIC® 3100

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Clarity Synthetic EA Hydraulic Oil 68 and 100 are approved for Stern tube applications by:

- **Blohm+Voss**
- **KEMEL COMPANY**
- **Wärtsilä**

Clarity Synthetic EA Hydraulic oils are miscible with common mineral based hydraulic oils, however, following good practice, in-service oils should be completely drained to avoid any risk of additive incompatibility and ensure that the full performance benefits are achieved.

Do not use in high pressure systems in the vicinity of flames, sparks, and hot surfaces. Use only in well ventilated areas. Keep container closed.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	46	68	100
Product Number	*223063*	*223064*	*223065*
SDS Number	*35647*	*35647*	*35647*
API Gravity	34.2	33.8	33.0
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 46.0 9.0	 68.0 11.7	 100.0 18.8
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 214 55.8	 316 65.3	 504 95.3
Viscosity Index	180	170	210
Flash Point, °C(°F)	221(430)	215(419)	193(379)
Pour Point, °C(°F)	-51(-60)	-48(-54)	-48(-54)
Brookfield Viscosity, ASTM D2983, cP at -30°C	—	5100	7500
Copper Corrosion, ASTM D130	1b	1b	1b
Rust Test, ASTM D665B Synthetic Sea water	Pass	Pass	Pass
Oxidation Stability-RPVOT ASTM D2272, minutes	400-500	400-500	400-500
FZG, Fail Load Stage	12	12	12
Eaton-Vickers 35VQ25 pump, Eaton-Vickers 104C pump (250 hours)	Pass Pass	Pass Pass	Pass Pass
Seal Compatibility with Buna-N, Viton, Polyurethane	Pass	Pass	Pass
Biodegradability OECD 301B, % in 28 days	>60	>60	>60
Ecotoxicity Fathead minnow, 96 h, LC-50, OECD 203, mg/L Daphnia magna, 48 h, EC-50, OECD 202, mg/L Algae, 72 h, EC-50, OECD 201, mg/L	 >10,000 >120 >10,000	 >10,000 >120 >10,000	 >10,000 >120 >10,000
Bioaccumulation	Negative	Negative	Negative

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CLARITY® SYNTHETIC HYDRAULIC OIL AW 32, 46, 68

PRODUCT DESCRIPTION

Clarity® Synthetic Hydraulic Oils AW are designed with ashless technology to give maximum protection and improve productivity and fuel efficiency[1] in both mobile and stationary hydraulic equipment in industrial applications as well as in environmentally sensitive areas.

CUSTOMER BENEFITS

Clarity Synthetic Hydraulic Oils AW deliver value through:

- **Hydraulic system efficiency** — High performance formula improves hydraulic response time, increases operating temperature range and can improve production, as well as the potential for lowering energy cost.[1]
- **Premium performance** — Ashless formulation provides excellent wear protection, rust and corrosion protection, hydrolytic stability, water separability, foam inhibition, and filterability.
- **Long oil life** — Outstanding ability of the synthetic base stock to withstand oxidation at high operating temperatures results in maximum service life for the oil.
- **Low toxicity** — Inherently biodegradable[2] and has very low acute aquatic toxicity[2] to both fish and invertebrates based on tests of water accommodated fractions. Ashless formulation facilitates conventional recycling programs.
- **Excellent wear protection at startup** — Minimum change in viscosity over wide operating temperatures due to high viscosity index. Multiviscosity performance minimizes the need to change viscosity grades for seasonal changes.
- **Excellent low temperature pumpability** — Specifically developed to ensure good low temperature fluidity for low temperature operations as low as -40°C (-40°F) for ISO 32 grade, and -30°C (-22°F) for ISO 46 and 68 grades.
- **Zinc-free/Ashless** —Suited for applications involving yellow metals found in axial piston pumps.

FEATURES

Clarity Synthetic Hydraulic Oils AW are designed to give maximum protection to both mobile and stationary hydraulic pumps in high-performance industrial applications as well as in environmentally sensitive areas.

Clarity Synthetic Hydraulic Oils AW are formulated with synthetic base stock and an ashless, zinc-free additive system that provide exceptional oxidation stability, water separability, foam suppression, and protection against wear, rust and corrosion.

Clarity Synthetic Hydraulic Oils AW are formulated with high VI to improve hydraulic response time and increase operating temperature range.

In laboratory efficiency testing, Clarity Synthetic Hydraulic Oils AW provided up to 8% improvement in overall hydraulic pump efficiency when compared to a typical monograde hydraulic oil like Hydraulic Oil AW (a lower VI product with VI <105).

Clarity Synthetic Hydraulic Oils AW are designed to meet or exceed the performance requirements of conventional antiwear hydraulic oils, especially in severe, high-output applications such as axial piston pumps, while providing an additional level of safety in

1 Improved productivity was shown in side-by-side excavator tests of up to 6.2%. Improved fuel efficiency was shown in excavators and in plastic injection machines of up to 4.5% and 5%, respectively. Comparisons were to a typical single grade hydraulic oil.
2 Evaluations were based on data for a similar product.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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case of leaks or incidental discharge to the environment.

Clarity Synthetic Hydraulic Oils AW are long-life lubricants, with a dramatically longer oxidation stability life (ASTM D943, Turbine Oil Stability Test) than conventional hydraulic fluids. A longer oxidation stability life equates to longer service life, which can improve the customer's bottom line. This level of oxidation stability is especially applicable in high efficiency (high speed, high temperature, high output) applications where severe stress is placed on the hydraulic fluid.

Conventional antiwear hydraulic oils formulated with metal-containing performance additives may persist in the environment in the event of leaks.

Vegetable-based hydraulic oils that meet environmental requirements may fall short of performance requirements.

APPLICATIONS

Clarity Synthetic Hydraulic Oils AW are designed for use in mobile and stationary hydraulic vane-, piston-, and gear-type pumps.

The antiwear performance of Clarity Synthetic Hydraulic Oils AW make them especially suited for high performance industrial applications utilizing axial piston pumps where pressures may exceed 5000 psi.

Clarity Synthetic Hydraulic Oils AW are well suited for applications suited in environmentally-sensitive areas. They have a viscosity index much higher than typical conventional antiwear hydraulic oils, provide excellent low temperature pumpability and better wear protection at high operating temperatures (refer to Typical Test Data table).

PERFORMANCE CLAIMS

Clarity® Synthetic Hydraulic Oil AW meets or exceeds the following industry or manufacturer's requirements:	32	46	68
Arburg		X	
ASTM D6158, HV	X	X	X
Bosch-Rexroth RD/RE 90220-01	X	X	X
DIN 51524-3 (HVLP, 2006, pt. 3)	X	X	X
Eaton Vickers 35VQ25A, M-2950-S, I-286-S	X	X	X
Frank Mohn, Framo hydraulic cargo pumping		X	
Hitachi/John Deere Construction JCMAS HK[a]		X	
ISO 11158 L-HV	X	X	X
Krauss-Maffei Kunststofftechnik		X	
Fives Cincinnati (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-68	X		
Fives Cincinnati (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-69			X
Fives Cincinnati (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-70		X	

a Meets performance requirements for equipment requiring this OEM specification particularly in John Deere Construction and Hitachi excavators.

For low temperature startups, care must be taken to ensure that the hydraulic oil flows freely into the pump and no cavitation occurs. Otherwise, subjecting a pump to cavitation will cause damage to critical components. Careful attention to the oil's viscosity at low temperature is the key to ensuring adequate flow and preventing cavitation.

Please consult with the original equipment manufacturers (OEMs) of your equipment to determine the maximum viscosity allowed during startup under no load conditions.

The recommended maximum viscosity under load conditions for hydraulic oil as specified by most pump OEMs is 860 cSt. For cold starts under no-load conditions, the startup viscosity can be much higher than 860 cSt. No-load running conditions should be applied until the equipment has warmed up to the maximum startup viscosity under load as recommended by the OEM, and full load operation can then be applied when the oil viscosity falls below this recommended viscosity under load.

Refer to the service manual of the equipment to ensure that the minimum fluid viscosity requirements are met at the highest operating temperature. Please consult with your equipment manufacturer if equipment is operating outside normal operation conditions.

Clarity Synthetic Hydraulic Oils AW are not compatible with zinc/calcium containing fluids, and OEM recommended lubricant change-out procedures including drain and flush requirements need to be adhered to.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	32	46	68
Product Number	*255697*	*255698*	*255699*
SDS Number	*29100*	*29100*	*29105*
API Gravity	37.1	36	35.9
Viscosity, ASTM D445 cSt at 40°C cSt at 100°C	 32.5 7.0	 46.5 9.3	 68.0 11.4
Viscosity Index, ASTM D2270	186	186	162
Brookfield Viscosity, ASTM D2983, cP at -20°C	1040	1820	3030
Brookfield Viscosity, ASTM D2983, cP at -30°C	3060	5430	11,580
Brookfield Viscosity, ASTM D2983, cP at -40°C	11,800	45,440	65,400
Tapered Roller Bearing (CEC L-45-A-99), % Viscosity Loss	< 7%	< 10%	< 7%
Oxidation Stability-TOST ASTM D943, Hours to 2.0mg KOH/g acid number (allowed to run beyond 10,000 h)	 > 10,000	 > 10,000	 > 10,000
FZG Gear Test, DIN 51354, Fail Stage	11	$\geq$ 12	$\geq$ 12
Flash Point, °C(°F), ASTM D92	228(442)	230(446)	218(424)
Pour Point, °C(°F), ASTM D97	-48(-54)	-42(-44)	-45(-49)
Foam Sequence I, II, III ASTM D892, ml	0/0/0	0/0/0	0/0/0
Dielectric Strength, kV[a], ASTM D877[b]	35	35	35
Acute Aquatic Toxicity (LC-50, OECD 203)	Pass	Pass	Pass

a Dielectric strength value applies only to "point of manufacture" of packaged products produced at a Chevron manufacturing facility. (Does not apply to bulk packaging). The oil will quickly lose its high dielectric strength value when exposed to contamination and to very small amounts of moisture and water.

b Industry standard test method for measuring kV values is not precise and test results can differ significantly.

The results expressed above were obtained during the development of this product and are considered representative of (any/all) commercial samples.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CLARITY® SYNTHETIC HYDRAULIC OIL AW ISOCLEAN® Certified Lubricant

32, 46, 68

PRODUCT DESCRIPTION

Clarity® Synthetic Hydraulic Oils AW ISOCLEAN® Certified Lubricants are designed with ashless technology to give maximum protection and improve productivity and fuel efficiency[1] in both mobile and stationary hydraulic equipment in industrial applications as well as in environmentally sensitive areas. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Clarity Synthetic Hydraulic Oils AW ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Hydraulic system efficiency** — High performance formula improves hydraulic response time, increases operating temperature range and can improve production, as well as the potential for lowering energy cost.[1]
- **Premium performance** — Ashless formulation provides excellent wear protection, rust and corrosion protection, hydrolytic stability, water separability, foam inhibition, and filterability.
- **Long oil life** — Outstanding ability of the synthetic base stock to withstand oxidation at high operating temperatures results in maximum service life for the oil.
- **Low toxicity** — Inherently biodegradable[2] and has very low acute aquatic toxicity[2] to both fish and invertebrates based on tests of water accommodated fractions. Ashless formulation facilitates conventional recycling programs.
- **Excellent wear protection at startup** — Minimum change in viscosity over wide operating temperatures due to high viscosity index. Multiviscosity performance minimizes the need to change viscosity grades for seasonal changes.
- **Excellent low temperature pumpability** — Specifically developed to ensure good low temperature fluidity for low temperature operations as low as -40°C (-40°F) for ISO 32 grade, and -30°C (-22°F) for ISO 46 and 68 grades.
- **Zinc-free/Ashless** —Suited for applications involving yellow metals found in axial piston pumps.

1 Improved productivity was shown in side-by-side excavator tests of up to 6.2%. Improved fuel efficiency was shown in excavators and in plastic injection machines of up to 4.5% and 5%, respectively. Comparisons were to a typical single grade hydraulic oil.

2 Evaluations were based on data for a similar product.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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FEATURES

Clarity® Synthetic Hydraulic Oils AW ISOCLEAN® Certified Lubricants are designed to give maximum protection to both mobile and stationary hydraulic pumps in high-performance industrial applications as well as in environmentally sensitive areas.

Clarity Synthetic Hydraulic Oils AW ISOCLEAN Certified Lubricants are formulated with synthetic base stock and an ashless, zinc-free additive system that provide exceptional oxidation stability, water separability, foam suppression, and protection against wear, rust and corrosion.

Clarity Synthetic Hydraulic Oils AW ISOCLEAN Certified Lubricants are formulated with high VI to improve hydraulic response time and increase operating temperature range.

In laboratory efficiency testing, Clarity Synthetic Hydraulic Oils AW ISOCLEAN Certified Lubricants provided up to 8% improvement in overall hydraulic pump efficiency when compared to a typical monograde hydraulic oil like Hydraulic Oil AW (a lower VI product with VI <105).

Clarity Synthetic Hydraulic Oils AW ISOCLEAN Certified Lubricants are designed to meet or exceed the performance requirements of conventional antiwear hydraulic oils, especially in severe, high-output applications such as axial piston pumps, while providing an additional level of safety in case of leaks or incidental discharge to the environment.

Clarity Synthetic Hydraulic Oils AW ISOCLEAN Certified Lubricants are long-life lubricants, with a dramatically longer oxidation stability life (ASTM D943, Turbine Oil Stability Test) than conventional hydraulic fluids. A longer oxidation stability life equates to longer service life, which can improve the customer's bottom line. This level of oxidation stability is especially applicable in high efficiency (high speed, high temperature, high output) applications where severe stress is placed on the hydraulic fluid.

Conventional antiwear hydraulic oils formulated with metal-containing performance additives may persist in the environment in the event of leaks.

Vegetable-based hydraulic oils that meet environmental requirements may fall short of performance requirements.

APPLICATIONS

Clarity Synthetic Hydraulic Oils AW ISOCLEAN Certified Lubricants are designed for use in mobile and stationary hydraulic vane-, piston-, and gear-type pumps.

The antiwear performance of Clarity Synthetic Hydraulic Oils AW ISOCLEAN Certified Lubricants make them especially suited for high performance industrial applications utilizing axial piston pumps where pressures may exceed 5000 psi.

Clarity Synthetic Hydraulic Oils AW ISOCLEAN Certified Lubricants are well suited for applications suited in environmentally-sensitive areas. They have a viscosity index much higher than typical conventional antiwear hydraulic oils, provide excellent low temperature pumpability and better wear protection at high operating temperatures (refer to Typical Test Data table).

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

PERFORMANCE CLAIMS

Clarity® Synthetic Hydraulic Oil AW ISOCLEAN® Certified Lubricants meets or exceeds the following industry or manufacturer's requirements:	**32**	**46**	**68**
Arburg		X	
ASTM D6158, HV	X	X	X
Bosch-Rexroth RD/RE 90220-01	X	X	X
DIN 51524-3 (HVLP, 2006, pt. 3)	X	X	X
Eaton Vickers 35VQ25A, M-2950-S, I-286-S	X	X	X
Frank Mohn, Framo hydraulic cargo pumping		X	
Hitachi/John Deere Construction JCMAS HK[a]		X	
ISO 11158 L-HV	X	X	X
Krauss-Maffei Kunststofftechnik		X	
Fives Cincinnati (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-68	X		
Fives Cincinnati (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-69			X
Fives Cincinnati (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-70		X	

a Meets performance requirements for equipment requiring this OEM specification particularly in John Deere Construction and Hitachi excavators.

For low temperature startups, care must be taken to ensure that the hydraulic oil flows freely into the pump and no cavitation occurs. Otherwise, subjecting a pump to cavitation will cause damage to critical components. Careful attention to the oil's viscosity at low temperature is the key to ensuring adequate flow and preventing cavitation.

Please consult with the original equipment manufacturers (OEMs) of your equipment to determine the maximum viscosity allowed during startup under no load conditions.

The recommended maximum viscosity under load conditions for hydraulic oil as specified by most pump OEMs is 860 cSt. For cold starts under no-load conditions, the startup viscosity can be much higher than 860 cSt. No-load running conditions should be applied until the equipment has warmed up to the maximum startup viscosity under load as recommended by the OEM, and full load operation can then be applied when the oil viscosity falls below this recommended viscosity under load.

Refer to the service manual of the equipment to ensure that the minimum fluid viscosity requirements are met at the highest operating temperature. Please consult with your equipment manufacturer if equipment is operating outside normal operation conditions.

Clarity Synthetic Hydraulic Oils AW ISOCLEAN® Certified Lubricants are not compatible with zinc/ calcium containing fluids, and OEM recommended lubricant change-out procedures including drain and flush requirements need to be adhered to.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubrication Marketer to set specific ISO Cleanliness targets for your business application.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	32	46	68
Product Number	*278054*	*278055*	*278056*
SDS Number	*29100*	*29100*	*29105*
API Gravity	37.1	36	35.9
Viscosity, ASTM D445 cSt at 40°C cSt at 100°C	 32.5 7.0	 46.5 9.3	 68.0 11.4
Viscosity Index, ASTM D2270	186	186	162
Brookfield Viscosity, ASTM D2983, cP at -20°C	1040	1820	3030
Brookfield Viscosity, ASTM D2983, cP at -30°C	3060	5430	11,580
Brookfield Viscosity, ASTM D2983, cP at -40°C	11,800	45,440	65,400
Tapered Roller Bearing (CEC L-45-A-99), % Viscosity Loss	< 7%	< 10%	< 7%
Oxidation Stability-TOST ASTM D943, Hours to 2.0mg KOH/g acid number (allowed to run beyond 10,000 h)	 > 10,000	 > 10,000	 > 10,000
FZG Gear Test, DIN 51354, Fail Stage	11	$\geq$ 12	$\geq$ 12
Flash Point, °C(°F), ASTM D92	228(442)	230(446)	218(424)
Pour Point, °C(°F), ASTM D97	-48(-54)	-42(-44)	-45(-49)
Foam Sequence I, II, III ASTM D892, ml	0/0/0	0/0/0	0/0/0
Dielectric Strength, kV[a], ASTM D877[b]	35	35	35
Acute Aquatic Toxicity (LC-50, OECD 203)	Pass	Pass	Pass

a Dielectric strength value applies only to "point of manufacture" of packaged products produced at a Chevron manufacturing facility. (Does not apply to bulk packaging). The oil will quickly lose its high dielectric strength value when exposed to contamination and to very small amounts of moisture and water.

b Industry standard test method for measuring kV values is not precise and test results can differ significantly.

The results expressed above were obtained during the development of this product and are considered representative of (any/all) commercial samples.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CLARITY® SYNTHETIC MACHINE OIL
150, 220, 320, 460

PRODUCT DESCRIPTION

Clarity® Synthetic Machine Oils are designed for use as EP gear oils and as paper machine oils.

CUSTOMER BENEFITS

Clarity Synthetic Machine Oils deliver value through:

- **High temperature stability** — Exceptional performance in the ASTM D943 Turbine Oil Stability Test. The test ran for >11,000 hours (>1 year) vs. 4000 hours for the mineral oil formulas.
- **Long lubricant life** — The PAO base oils with their high viscosity index, combined with a well-balanced additive package, minimize oil breakdown and maximize oil life.
- **Excellent wear protection** — Helps provide high FZG, Timken, and AGMA EP performance.
- **Excellent water separability** — The lubricants readily separate from water.
- **Effective foam inhibition** — Helps minimize amount of entrained air in the oils, minimizing the possibility of pump cavitation and also helps prevent surface foam.
- **Pall wet filterability** — Clarity Synthetic Machine Oils provide excellent wet filtration with low porosity filters, as determined by the Pall Filterability Test.
- **Environmental sensitivity** — Ashless formulation facilitates reclaiming and recycling circulating oils.

FEATURES

Clarity Synthetic Machine Oils combine our proprietary ashless formulation with the superior performance properties of polyalphaolefin (PAO) synthetic base oils. This combination provides greatly enhanced thermal and oxidation stability.

In addition, the high viscosity index of the PAO base oils offers greater lubricant film thickness than mineral oil-based products at high operating temperatures. Clarity Synthetic Machine Oils also offer excellent EP properties, allowing them to be used as EP gear lubricants.

Clarity Synthetic Machine Oils have excellent demulsibility (water separating ability) and wet filterability, as defined by the Pall Filterability Test.

Clarity Synthetic Machine Oils can be combined with mineral oil products for recycling purposes.

They provide long lubricant life due to exceptional oxidation stability, resulting in minimal lubricant usage and disposal.

FUNCTIONS

These products are formulated to meet critical demands of industrial equipment exposed to temperatures where mineral oil-based fluids are short-lived.

The extraordinary thermal and oxidative stability of PAOs are boosted by the outstanding antioxidant package in the Clarity Synthetic Machine Oil formulas.

The oils also contain highly effective antirust and nontraditional EP additives.

Clarity Synthetic Machine Oils 150, 220, 320, and 460 may be used as AGMA 4 EP, 5 EP, 6 EP, and 7 EP oils, respectively.

Clarity Synthetic Machine Oils provide excellent filtration performance in the Pall Filterability Test using low micron filters. This test defines oils having good filterability as giving 2000 mL filtration. After >10,000 mL, Clarity Synthetic Machine Oils were still filterable.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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IO-29

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APPLICATIONS

Clarity® Synthetic Machine Oils may be used in the following applications:

- Extreme temperature bearing and circulating oil systems
- Gear boxes
- Dryer section accessories
- Moisture profiler
- Calender rolls
- Crown control rolls
- Oil heated rolls
- High temperature air compressors
- High pressure hydraulic pumps

Clarity Synthetic Machine Oils are registered by **NSF** and are acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

ISO Grade	**150**	**220**	**320**	**460**
Product Number	*266174*	*266172*	*266175*	*266183*
SDS Number	*6872*	*6872*	*6872*	*6872*
AGMA Grade	4 EP	5 EP	6 EP	7 EP
API Gravity	36.9	36.4	35.9	35.3
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 143 19.8	 209 26.3	 304 35.2	 437 46.1
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 734 100	 1077 129	 1572 170	 2270 222
Viscosity Index	159	160	162	163
Flash Point, °C(°F)	258(496)	236(457)	258(496)	270(518)
Pour Point, °C(°F)	-48(-54)	-45(-49)	-42(-44)	-36(-33)
Timken OK Load, lb	65	65	65	65
FZG Failure Load Stage, DIN 51354	>12	>12	>12	>12
Oxidation Stability Hours to 2.0 mg KOH/g acid number, ASTM D943 Minutes to 25 psi pressure drop, ASTM D2272	 >8000 375	 >10,000 375	 >10,000 375	 >10,000 375
Pall Filterability Wet Aged, mL to 25 psi	 >10,000	 >10,000	 >10,000	 >10,000

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON CYLINDER OIL W
220, 460, 680

PRODUCT DESCRIPTION

Chevron Cylinder Oils W are recommended for lubrication of compressor cylinders and sliding worm gear surfaces in worm drive gear cases.

CUSTOMER BENEFITS

Chevron Cylinder Oils W deliver value through:

- **Excellent metal wettability** and high film strength for any moisture condition.
- **Versatility** — Three viscosity grades available to cover the range of steam pressures and temperatures found in industry.
- **Minimized inventory** — Can be used as worm gear lubricants. Meets AGMA compounded lubricant specifications.

FEATURES

Chevron Cylinder Oils W are designed to meet the needs of emulsifying cylinder oils.

Chevron Cylinder Oils W help provide excellent metal wettability. The combination of oil emulsibility and metal wetting characteristics result in minimum oil consumption rates and maximum oil lubricity in the presence of wet steam or water.

The metal wetting helps ensure an effective lubricant film on the cylinder walls and pistons of steam pump, and also provides the oiliness properties which are extremely important in lubricating the sliding worm gear surfaces in worm drive gear cases.

APPLICATIONS

Compressor manufacturers often recommend cylinder oils for compressor cylinder lubrication. The oiliness of Chevron Cylinder Oils W promotes a metal wetting characteristic that resists the washing action of water and maintains a tenacious oil film on the surface of the compressor cylinder. The low viscosity of Chevron Cylinder Oil W 220 makes it suitable for this application in colder climates.

Chevron Cylinder Oil W 460 is recommended for moderate service applications where steam pressures will not exceed 150 psi and temperatures vary between 171°C to 204°C (340°F to 400°F).

Chevron Cylinder Oil W 680 is a higher viscosity lubricant recommended for steam pressures up to 300 psi and temperatures from 218°C to 302°C (425°F to 575°F).

Chevron Cylinder Oils W are ideal choices for worm gears.

Chevron Cylinder Oils W are recommended for use in underground brine pumps at geothermal power generation facilities.

Chevron Cylinder Oils W 220, 460, and 680 meet the requirements of ANSI/AGMA 9005-E02 for AGMA Lubricant Numbers 5, 7 Compounded, and 8 Compounded, respectively.

Chevron Cylinder Oils W 460 and 680 are registered by **NSF** and are acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

ISO Grade	220	460	680
Product Number	*230339*	*230330*	*230329*
SDS Number	*7673*	*7673*	*7673*
AGMA Grade	5 (Compounded)	7 Comp (Compounded)	8 Comp (Compounded)
API Gravity	26.8	26.1	24.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 209 18.5	 437 30.4	 646 39.3
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 1103 95	 2335 149	 3476 191
Viscosity Index	98	99	99
Flash Point, °C(°F)	288(550)	308(586)	316(601)
Pour Point, °C(°F)	-12(10)	-9(16)	-8(18)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON FORM OIL 22

PRODUCT DESCRIPTION

Chevron Form Oil has been designed to be used as a concrete form wetting and release oil.

CUSTOMER BENEFITS

Chevron Form Oil delivers value through:

- **Excellent low temperature performance** — Low pour point permits oil to remain fluid at subzero temperatures.
- **Ready separation** of forms from concrete.
- **Minimum leakage** — Contains an oiliness additive to help minimize leakage and maximize film strength.

FEATURES

Chevron Form Oil is a high quality, lightly compounded lubricant which will do an excellent job as a concrete form oil where customers desire a quick clean break from the forms.

Chevron Form Oil is a light colored oil manufactured using specially refined base oils. These base oils possess excellent natural low pour points, good "metal wetting" characteristics, and good natural film strength.

Chevron Form Oil contains an oiliness additive that maximizes film strength under boundary lubrication.

APPLICATIONS

Chevron Form Oil is an excellent concrete form wetting agent. It can be used on forms where a release agent is recommended. Chevron Form Oil is especially recommended for use in the manufacture of precast concrete structures, concrete pipe, and precast concrete curbs and beams.

Chevron Form Oil, with the oiliness additive, does an excellent job in aluminum polishing.

Chevron Form Oil is recommended for use as a rust preventive on sheet and plate steel, wire, and cold drawn bar stock in warehouse storage.

TYPICAL TEST DATA

ISO Grade	22
Product Number	*242011*
SDS Number	*4734*
API Gravity	26.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 23.1 4.1
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 121 40.1
Viscosity Index	56
Flash Point, °C(°F)	185(365)
Pour Point, °C(°F)	-40(-40)
Wetting Agent, %	4.5

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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CHEVRON GLASS MACHINE OIL MV

PRODUCT DESCRIPTION

Chevron Glass Machine Oil MV is a machine oil designed for use in the glass manufacturing process.

CUSTOMER BENEFITS

Chevron Glass Machine Oil MV delivers value through:

- **Ability to maintain film thickness** — High viscosity index indicates an oil that maintains film thickness at high temperatures.
- **Sludge protection** — Detergents and dispersants help minimize deposits on metal surfaces.
- **Rust protection** — Contains a rust inhibitor to help protect metal surfaces.
- **Long lubricant life** — Resists thermal oxidation and viscosity increase, helping to provide long lubricant life.
- **Foam inhibition**

FEATURES

Chevron Glass Machine Oil MV is a machine oil designed for use in the glass manufacturing process.

It is manufactured from highly refined mineral base oils and contains an additive package with antiwear, dispersant and detergent properties.

It has a high viscosity index to help ensure good film strength between metal surfaces under moderate loads and temperatures. This film strength is further enhanced by the antiwear additive protection.

The foam and aeration suppressant allows the quick release of entrained air, also maximizing film strength.

APPLICATIONS

Chevron Glass Machine Oil MV is recommended as a machine oil and constant cushion oil for I.S. glass machines. It is also designed for use in linkage and lightly loaded gearboxes, central lubrication systems, mechanical gob distributors, blowhead and funnel cams.

TYPICAL TEST DATA

Product Number	*229106*
SDS Number	*12769*
API Gravity	29.8
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 111 14.5
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 572 77.5
Viscosity Index	134
Flash Point, °C(°F)	234(453)
Pour Point, °C(°F)	-38(-36)
Foaming Tendency, Sequence II, 0 min, mL	 15

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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GST® 2300

32, 46

Product Description

GST® 2300 oils are formulated with premium base oil technology and are highly recommended for use in gas and steam turbines with and without loaded gearboxes. GST 2300 oils are designed to meet the critical lubrication demands of:

- combined cycle turbines
- large heavy duty industrial gas turbines
- gas and steam turbines

They are an excellent recommendation for many other industrial applications including air compression and where R&O type oils are recommended.

Customer Benefits

GST 2300 oils deliver value through:

- **Outstanding oxidation stability** for long service at elevated temperatures. Formulated with premium base oil technology and an ashless, zinc-free formulation.
- **Minimal sludge and varnish formation**
- **Rapid water separation** keeps water in oil to a minimum
- **Rust and corrosion protection**
- **High viscosity index** assures minimum viscosity change with temperature variations
- **Resistance to foam formation** helps prevent reservoir overflow
- **Quick air release** minimizes the possibility of pump cavitation in systems with high circulation rates and small reservoirs

Features

GST 2300 oils are formulated with premium base oil technology and an ashless, zinc-free formulation that provides exceptional oxidation stability, water separability, and protection against rust and corrosion.

Higher temperatures in advanced gas and steam turbines require a circulating system oil with exceptional high temperature **thermal stability, oxidation resistance** and low sludging potential. GST 2300 oils have **outstanding thermal and oxidation stability and excellent sludge control**.

Corrosion inhibition protects turbine shafts, gears and lubrication system parts from corrosion and rusting.

GST 2300 oils have excellent **water separability** characteristics which allow these oils to maintain a high film strength coating on critical wear points of bearings and gear reducers and to help ensure rapid removal of water contamination.

Foam inhibition helps to prevent sump overflow.

Applications

GST 2300 oils are highly recommended for use in gas and steam turbines with and without loaded gearboxes. GST 2300 oils are designed to meet the critical lubrication demands of combined cycle turbines, large heavy duty industrial gas turbines, and gas and steam turbines with loaded gears. They are an excellent recommendation for many other industrial applications including air compression where R&O type oils are recommended.

The following viscosity grades are formulated to meet the specified OEM requirements:

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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GST 2300 32

- meets and exceeds
  - — **ASTM** D4304-00, Type I and Type II (EP)
  - — **British Standard** 489:1999
  - — **DIN** 51515, L-TD and L-TG
  - — **General Electric** GEK-32568j, GEK-101941A, GEK-28143A, GEK-28143B, GEK-46506D, GEK-27070
  - — **MAG Cincinnati, Cincinnati Machine** P-38
  - — **Siemens Westinghouse** M spec 55125Z3
  - — **Solar** ES 9-224, Class II
- is approved by **Alstom** against HTGD 90117 for non-geared and geared gas and steam turbines
- is approved by **Ansaldo Energia** against TG02-0171-E00000/B
- is approved by **Siemens** against TLV 9013 04 for steam and gas turbosets with and without gearbox
- can obtain customer-specific approval from Toshiba (contact Lube Tek at 1-800-LUBE-TEK)

GST 2300 46

- meets and exceeds
  - — **ASTM** D4304-00, Type I and Type II (EP)
  - — **British Standard** 489:1999
  - — **DIN** 51515, L-TD and L-TG
  - — **MAG Cincinnati, Cincinnati Machine** P-55
  - — **Solar** ES 9-224, Class II
- is approved by **Alstom** against HTGD 90117 for non-geared and geared gas and steam turbines
- is approved by **Ansaldo Energia** against TG02-0171-E00000/B
- is approved by **Siemens** against TLV 9013 04 for steam and gas turbosets with and without gearbox
- replaces GST Oil EP 46

Do not use in high pressure systems in the vicinity of flames, sparks, and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

TYPICAL TEST DATA

ISO Grade	32	46
Product Number	*253090*	*253091*
SDS Number	*12798*	*12798*
AGMA Grade	—	1
API Gravity	32.7	32.0
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 30.4 5.2	 43.7 6.6
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 157 43.8	 225 48.2
Viscosity Index	102	101
Flash Point, °C(°F)	222(432)	224(435)
Pour Point, °C(°F)	-33(-27)	-33(-27)
Oxidation Stability ASTM D943[a] ASTM D2272[b]	 > 10,000 2,300	 > 10,000 2,300
FZG, Fail stage, DIN 51354	 12	 12

a Hours to 2.0 mg KOH/g acid number D943.
b Minutes to 25 psi pressure drop.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

GST® 2300 ISOCLEAN® Certified Lubricant

32, 46

Product Description

GST® 2300 ISOCLEAN® Certified Lubricants are formulated with premium base oil technology and are highly recommended for use in gas and steam turbines with and without loaded gearboxes. GST 2300 oils are designed to meet the critical lubrication demands of:

- combined cycle turbines
- large heavy duty industrial gas turbines
- gas and steam turbines

They are an excellent recommendation for many other industrial applications including air compression and where R&O type oils are recommended.

Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

Customer Benefits

GST 2300 ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Outstanding oxidation stability** for long service at elevated temperatures. Formulated with premium base oil technology and an ashless, zinc-free formulation.
- **Minimal sludge and varnish formation**
- **Rapid water separation** keeps water in oil to a minimum
- **Rust and corrosion protection**
- **High viscosity index** assures minimum viscosity change with temperature variations
- **Resistance to foam formation** helps prevent reservoir overflow
- **Quick air release** minimizes the possibility of pump cavitation in systems with high circulation rates and small reservoirs

Features

GST 2300 ISOCLEAN Certified Lubricants are formulated with premium base oil technology and an ashless, zinc-free formulation that provides exceptional oxidation stability, water separability, and protection against rust and corrosion.

Higher temperatures in advanced gas and steam turbines require a circulating system oil with exceptional high temperature **thermal stability, oxidation resistance** and low sludging potential. GST 2300 ISOCLEAN Certified Lubricants have **outstanding thermal and oxidation stability and excellent sludge control**.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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IO-83 ISOCLEAN

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Corrosion inhibition protects turbine shafts, gears and lubrication system parts from corrosion and rusting.

GST® 2300 ISOCLEAN® Certified Lubricants have excellent **water separability** characteristics which allow these oils to maintain a high film strength coating on critical wear points of bearings and gear reducers and to help ensure rapid removal of water contamination.

Foam inhibition helps to prevent sump overflow.

APPLICATIONS

GST 2300 ISOCLEAN Certified Lubricants are highly recommended for use in gas and steam turbines with and without loaded gearboxes. GST 2300 ISOCLEAN Certified Lubricants are designed to meet the critical lubrication demands of combined cycle turbines, large heavy duty industrial gas turbines, and gas and steam turbines with loaded gears. They are an excellent recommendation for many other industrial applications including air compression where R&O type oils are recommended.

The following viscosity grades are formulated to meet the specified OEM requirements:

GST 2300 ISOCLEAN Certified Lubricant 32

- meets and exceeds
  - **ASTM** D4304-00, Type I and Type II (EP)
  - **British Standard** 489:1999
  - **DIN** 51515, L-TD and L-TG
  - **General Electric** GEK-32568j, GEK-101941A, GEK-28143A, GEK-28143B, GEK-46506D, GEK-27070
  - **MAG Cincinnati, Cincinnati Machine** P-38
  - **Siemens Westinghouse** M spec 55125Z3
  - **Solar** ES 9-224, Class II
- is approved by **Alstom** against HTGD 90117 for non-geared and geared gas and steam turbines
- is approved by **Ansaldo Energia** against TG02-0171-E00000/B
- is approved by **Siemens** against TLV 9013 04 for steam and gas turbosets with and without gearbox
- can obtain customer-specific approval from Toshiba (contact Lube Tek at 1-800-LUBE-TEK)

GST 2300 ISOCLEAN Certified Lubricant 46

- meets and exceeds
  - **ASTM** D4304-00, Type I and Type II (EP)
  - **British Standard** 489:1999
  - **DIN** 51515, L-TD and L-TG
  - **MAG Cincinnati, Cincinnati Machine** P-55
  - **Solar** ES 9-224, Class II
- is approved by **Alstom** against HTGD 90117 for non-geared and geared gas and steam turbines
- is approved by **Ansaldo Energia** against TG02-0171-E00000/B
- is approved by **Siemens** against TLV 9013 04 for steam and gas turbosets with and without gearbox
- replaces GST Oil EP 46

Do not use in high pressure systems in the vicinity of flames, sparks, and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	32	46
Product Number	*278070*	*278071*
SDS Number	*12798*	*12798*
AGMA Grade	—	1
API Gravity	32.7	32.0
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 30.4 5.2	 43.7 6.6
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 157 43.8	 225 48.2
Viscosity Index	102	101
Flash Point, °C(°F)	222(432)	224(435)
Pour Point, °C(°F)	-33(-27)	-33(-27)
Oxidation Stability ASTM D943[a] ASTM D2272[b]	 > 10,000 2,300	 > 10,000 2,300
FZG, Fail stage, DIN 51354	 12	 12

a Hours to 2.0 mg KOH/g acid number D943.
b Minutes to 25 psi pressure drop.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

GST® OIL
32, 46, 68, 100

PRODUCT DESCRIPTION

GST® Oils are formulated with premium base oil technology designed to meet the critical demands of:

- non-geared gas, steam, and hydroelectric turbine bearing lubrication
- reduction gear lubrication in marine operations

They are an excellent recommendation for many other industrial applications including air compression where R&O type oils are recommended.

CUSTOMER BENEFITS

GST Oils deliver value through:

- **Exceptional oxidation stability** for long service life at elevated temperatures. Formulated with premium base oil technology and an ashless, zinc-free formulation.
- **Rust and corrosion protection**
- **High viscosity index** helps ensure minimum viscosity change when variations in temperature occur.
- **Minimum foam** helps prevent sump overflow or erratic governor operation.
- **Fast air release** minimizes possibility of pump cavitation in systems with high circulation rates and small reservoirs.
- **Exceptional thermal stability** minimizes deposit formation.
- **Rapid water separation** keeps water in oil to a minimum.
- **Hydraulic fluid service** — GST Oils 32, 46 and 68 are excellent hydraulic fluids in low pressure systems up to 1000 psi.
- **Air compressor** lubricant when OEM recommends R&O type oil.

FEATURES

GST Oils are formulated with premium base oil technology and an ashless, zinc-free formulation that provides exceptional oxidation stability, water separability, and protection against rust and corrosion.

Higher temperatures in advanced gas and steam turbines require circulating system oil with exceptional high temperature stability. GST Oils have outstanding **thermal and oxidation stability**.

Nonvolatile **oxidation inhibition** minimizes the evaporative loss of the inhibitors, a common problem with turbine oils where bearing temperatures are high and system capacities are limited. With retained oxidation resistance for long periods under high temperature conditions, GST Oils will promote long oil service life and help minimize turbine down time.

Corrosion inhibition protects costly turbine shafts and gears from corrosion and rusting.

GST Oils have excellent demulsibility characteristics which allow these oils to maintain a high film strength coating on critical wear points of bearings and gear reducers and assure fast removal of water contamination.

Foam inhibition helps prevent sump overflow and erratic governor operation.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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APPLICATIONS

GST® Oils are formulated to meet the critical demands of non-geared gas, steam, and hydroelectric turbine bearing lubrication, and reduction gear lubrication in marine operations. They are an excellent recommendation for many other industrial applications including air compression where R&O type oils are recommended.

The following viscosity grades are formulated to meet the specified OEM requirements:

GST Oil 32

- meets and exceeds
  - **ASTM D4304 Type I**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - **General Electric** GEK-32568j, GEK 28143A, GEK-46506D, GEK-27070
  - **Solar** ES 9-224, Class II
- meets
  - **MAG Cincinnati, Cincinnati Machine** P-38
- is approved by
  - **Alstom Power** HTGD 90117 (for non-geared turbines)
  - **Siemens** TLV 901305
  - **Siemens Westinghouse** M spec 55125Z3

GST Oil 46

- meets
  - **ASTM D4304 Type I**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - **MAG Cincinnati, Cincinnati Machine** P-55
  - **Solar** ES 9 224 requirements for gas turbine oils
- is approved by
  - **Alstom Power** HTGD 90117 (for non-geared turbines)
  - **Ansaldo Energia** TG02-0171-E00000/B
  - **Siemens** TLV 901305
- successfully used in some reactor coolant pump motor bearings.

GST Oil 68

- meets
  - **ASTM D4304 Type I**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - **MAG Cincinnati, Cincinnati Machine** P-54
- suitable for use in hydroelectric turbines, land and marine steam turbines, and associated reduction gears when OEM recommends R&O type oil.

GST Oil 100

- meets
  - **ASTM D4304 Type I**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
- suitable for use in hydroelectric turbines, land and marine steam turbines, and associated reduction gears when OEM recommends R&O type oil.

GST Oil 32, 46, 68, 100 are registered by **NSF** and are acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	32	46	68	100
Product Number	*253026*	*253027*	*253028*	*253029*
SDS Number	*6710*	*6710*	*6710*	*6710*
AGMA Grade	—	1	2	3
API Gravity	32.7	32.0	31.7	31.4
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 32.0 5.4	 43.7 6.6	 68.0 8.8	 100.0 11.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 165 44.4	 225 48.2	 352 55.9	 520 65.4
Viscosity Index	102	101	102	100
Flash Point, °C(°F)	222(432)	224(435)	245(473)	262(504)
Pour Point, °C(°F)	-36(-33)	-36(-33)	-33(-27)	-30(-22)
Oxidation Stability ASTM D943[a] ASTM D2272[b]	 17,000 1700	 12,000 1400	 11,000 1400	 11,000 1400

a Hours to 2.0 mg KOH/g acid number modified D943, allowed to run beyond 10,000 h.
b Minutes to 25 psi pressure drop.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

GST® OIL
ISOCLEAN® Certified Lubricant
32, 46, 68, 100

PRODUCT DESCRIPTION

GST® ISOCLEAN® Certified Lubricants are formulated with premium base oil technology designed to meet the critical demands of:

- non-geared gas, steam, and hydroelectric turbine bearing lubrication
- reduction gear lubrication in marine operations

They are an excellent recommendation for many other industrial applications including air compression where R&O type oils are recommended. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

GST Oil ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Exceptional oxidation stability** for long service life at elevated temperatures. Formulated with premium base oil technology and an ashless, zinc-free formulation.
- **Rust and corrosion protection**
- **High viscosity index** helps ensure minimum viscosity change when variations in temperature occur.
- **Minimum foam** helps prevent sump overflow or erratic governor operation.
- **Fast air release** minimizes possibility of pump cavitation in systems with high circulation rates and small reservoirs.
- **Exceptional thermal stability** minimizes deposit formation.
- **Rapid water separation** keeps water in oil to a minimum.
- **Hydraulic fluid service** — GST Oils 32, 46 and 68 are excellent hydraulic fluids in low pressure systems up to 1000 psi.
- **Air compressor** lubricant when OEM recommends R&O type oil.

FEATURES

GST ISOCLEAN Certified Lubricants are formulated with premium base oil technology and an ashless, zinc-free formulation that provides exceptional oxidation stability, water separability, and protection against rust and corrosion.

Higher temperatures in advanced gas and steam turbines require circulating system oil with exceptional high temperature stability. GST ISOCLEAN Certified Lubricants have outstanding **thermal and oxidation stability**.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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IO-85 ISOCLEAN

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Nonvolatile **oxidation inhibition** minimizes the evaporative loss of the inhibitors, a common problem with turbine oils where bearing temperatures are high and system capacities are limited. With retained oxidation resistance for long periods under high temperature conditions, GST® ISOCLEAN® Certified Lubricants will promote long oil service life and help minimize turbine down time.

Corrosion inhibition protects costly turbine shafts and gears from corrosion and rusting.

GST ISOCLEAN Certified Lubricants have excellent demulsibility characteristics which allow these oils to maintain a high film strength coating on critical wear points of bearings and gear reducers and assure fast removal of water contamination.

Foam inhibition helps prevent sump overflow and erratic governor operation.

APPLICATIONS

GST ISOCLEAN Certified Lubricants are formulated to meet the critical demands of non-geared gas, steam, and hydroelectric turbine bearing lubrication, and reduction gear lubrication in marine operations. They are an excellent recommendation for many other industrial applications including air compression where R&O type oils are recommended.

The following viscosity grades are formulated to meet the specified OEM requirements:

GST ISOCLEAN Certified Lubricant 32

- meets and exceeds
  - **ASTM D4304 Type I**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - **General Electric** GEK-32568j, GEK 28143A, GEK-46506D, GEK-27070
  - **Solar** ES 9-224, Class II
- meets
  - **MAG Cincinnati, Cincinnati Machine** P-38
- is approved by
  - **Alstom Power** HTGD 90117 (for non-geared turbines)
  - **Siemens** TLV 901305
  - **Siemens Westinghouse** M spec 55125Z3

GST ISOCLEAN Certified Lubricant 46

- meets
  - **ASTM D4304 Type I**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - **MAG Cincinnati, Cincinnati Machine** P-55
  - **Solar** ES 9 224 requirements for gas turbine oils
- is approved by
  - **Alstom Power** HTGD 90117 (for non-geared turbines)
  - **Ansaldo Energia** TG02-0171-E00000/B
  - **Siemens** TLV 901305
- successfully used in some reactor coolant pump motor bearings.

GST ISOCLEAN Certified Lubricant 68

- meets
  - **ASTM D4304 Type I**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - **MAG Cincinnati, Cincinnati Machine** P-54
- suitable for use in hydroelectric turbines, land and marine steam turbines, and associated reduction gears when OEM recommends R&O type oil.

GST ISOCLEAN Certified Lubricant 100

- meets
  - **ASTM D4304 Type I**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
- suitable for use in hydroelectric turbines, land and marine steam turbines, and associated reduction gears when OEM recommends R&O type oil.

GST ISOCLEAN Certified 32, 46, 68, 100 are registered by **NSF** and are acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Do not use in breathing air apparatus or medical equipment.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN® Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

ISO Grade	32	46	68	100
Product Number	*254606*	*254607*	*254608*	*278069*
SDS Number	*6710*	*6710*	*6710*	*6710*
AGMA Grade	—	1	2	3
API Gravity	32.7	32.0	31.7	31.4
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 32.0 5.4	 43.7 6.6	 68.0 8.8	 100.0 11.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 165 44.4	 225 48.2	 352 55.9	 520 65.4
Viscosity Index	102	101	102	100
Flash Point, °C(°F)	222(432)	224(435)	245(473)	262(504)
Pour Point, °C(°F)	-36(-33)	-36(-33)	-33(-27)	-30(-22)
Oxidation Stability ASTM D943[a] ASTM D2272[b]	 17,000 1700	 12,000 1400	 11,000 1400	 11,000 1400

a Hours to 2.0 mg KOH/g acid number modified D943, allowed to run beyond 10,000 h.
b Minutes to 25 psi pressure drop.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

GST® PREMIUM 32

PRODUCT DESCRIPTION

GST® Premium 32 is formulated with premium base oil technology designed to meet the critical demands of:

- MHPS (Mitsubishi Hitachi Power Systems), formerly MHI (Mitsubishi Heavy Industries), non-geared gas and steam turbines requiring a MS04-MA-CL002 product.

CUSTOMER BENEFITS

GST Premium 32 delivers value through:

- **Exceptional Oxidation and Thermal Stability** for long service life at severe temperatures with Minimal Deposit Formation as dictated by the stringent MHPS MS04-MA-CL001 / CL002 specification. Formulated with premium base oil technology and an ashless, zinc-free formulation.
- **Outstanding Rust and Corrosion Protection**
- **High Viscosity Index** helps ensure minimum viscosity change when variations in temperature occur.
- **Minimum Foaming** helps prevent sump overflow or erratic governor operation.
- **Fast Air Release** minimizes possibility of pump cavitation in systems with high circulation rates and lesser residence time.
- **Rapid Water Separation** facilitates water removal.
- **Hydraulic Fluid Service** for systems requiring an ISO 32 viscosity oil and pressures not exceeding 1000 psi.
- **Air Compressor Lubricant** for systems requiring an ISO 32 viscosity R&O oil.

FEATURES

GST Premium 32 has exceptional thermal and oxidative stability and is approved for Mitsubishi Hitachi Power Systems MS04-MA-CL002. It is suitable for use in non-geared gas and steam turbines where extreme temperatures are experienced and require circulation systems with exceptional high temperature stability.

GST Premium 32 combines highly refined group II base stocks and a unique ashless, zinc-free formulation minimizing the formation of deposits in reservoirs, high temperature bearings and other hot areas of the turbine.

APPLICATIONS

GST Premium 32 is formulated to meet the critical demands of non-geared gas, steam and hydroelectric turbine bearing lubrication and R&O service in marine reduction gears. They are additionally suitable for industrial severe service requiring an R&O, ISO 32 circulating oil with extended service capability.

GST Premium 32 is approved for:

- **Alstom** HTGD 90117 (for non-geared turbines)
- **Mitsubishi Hitachi Power Systems** MS04-MA-CL002
- **Siemens** TLV 901304 and TLV 901305

GST Premium 32 meets requirements of the following specifications:

- **ANSI/AGMA** 9005-E02 R&O
- **ASTM** D4304 Type 1
- **British Standard** 489:1999
- **DIN** 51515/1 and 51515/2
- **General Electric** GEK-32568j, GEK-28143b, GEK-27070 and GEK-46506e
- **ISO** 8068 L-TGA
- **MAN** Diesel & Turbo TQLT2

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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- **Solar Turbine** ES 9-224 Class II

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

TYPICAL TEST DATA

ISO Grade	32
Product Number	*253092*
SDS Number	*32230*
API Gravity	32.5
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 31.5 5.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 162.3 44.4
Viscosity Index	105
Flash Point, °C(°F)	224(435)
Pour Point, °C(°F)	-14(7)
Oxidation Stability ASTM D943[a] ASTM D2272[b] IP 280 (TOP), m %	 10,000 1,500 0.08
Air Release D3427 at 50°C, minutes	 1.4

a Hours to 2.0 mg KOH/g acid number D943.
b Minutes to 25 psi pressure drop.

Minor variations in product typical test data are to be expected in normal manufacturing.

GST® PREMIUM 32 ISOCLEAN® Certified Lubricant

PRODUCT DESCRIPTION

GST® Premium 32 ISOCLEAN® Certified Lubricant is formulated with premium base oil technology designed to meet the critical demands of:

- MHPS (Mitsubishi Hitachi Power Systems), formerly MHI (Mitsubishi Heavy Industries), non-geared gas and steam turbines requiring a MS04-MA-CL002 product.

Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

GST Premium 32 ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Exceptional Oxidation and Thermal Stability** for long service life at severe temperatures with Minimal Deposit Formation as dictated by the stringent MHPS MS04-MA-CL001 / CL002 specification. Formulated with premium base oil technology and an ashless, zinc-free formulation.
- **Outstanding Rust and Corrosion Protection**
- **High Viscosity Index** helps ensure minimum viscosity change when variations in temperature occur.
- **Minimum Foaming** helps prevent sump overflow or erratic governor operation.
- **Fast Air Release** minimizes possibility of pump cavitation in systems with high circulation rates and lesser residence time.
- **Rapid Water Separation** facilitates water removal.
- **Hydraulic Fluid Service** for systems requiring an ISO 32 viscosity oil and pressures not exceeding 1000 psi.
- **Air Compressor Lubricant** for systems requiring an ISO 32 viscosity R&O oil.

FEATURES

GST Premium 32 ISOCLEAN Certified Lubricant has exceptional thermal and oxidative stability and is approved for Mitsubishi Hitachi Power Systems MS04-MA-CL002. It is suitable for use in non-geared gas and steam turbines where extreme temperatures are experienced and require circulation systems with exceptional high temperature stability.

GST Premium 32 ISOCLEAN Certified Lubricant combines highly refined group II base stocks and a unique ashless, zinc-free formulation minimizing the formation of deposits in reservoirs, high temperature bearings and other hot areas of the turbine.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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IO-87 ISOCLEAN

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APPLICATIONS

GST® Premium 32 ISOCLEAN® Certified Lubricant is formulated to meet the critical demands of non-geared gas, steam and hydroelectric turbine bearing lubrication and R&O service in marine reduction gears. They are additionally suitable for industrial severe service requiring an R&O, ISO 32 circulating oil with extended service capability.

GST Premium 32 ISOCLEAN Certified Lubricant is approved for:

- **Alstom** HTGD 90117 (for non-geared turbines)
- **Mitsubishi Hitachi Power Systems** MS04-MA-CL002
- **Siemens** TLV 901304 and TLV 901305

GST Premium 32 ISOCLEAN Certified Lubricant meets requirements of the following specifications:

- **ANSI/AGMA** 9005-E02 R&O
- **ASTM** D4304 Type 1
- **British Standard** 489:1999
- **DIN** 51515/1 and 51515/2
- **General Electric** GEK-32568j, GEK-28143b, GEK-27070 and GEK-46506e
- **ISO** 8068 L-TGA
- **MAN** Diesel & Turbo TQLT2
- **Solar Turbine** ES 9-224 Class II

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

TYPICAL TEST DATA

ISO Grade	**32**
Product Number	*278072*
SDS Number	*32230*
API Gravity	32.5
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 31.5 5.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 162.3 44.4
Viscosity Index	105
Flash Point, °C(°F)	224(435)
Pour Point, °C(°F)	-14(7)
Oxidation Stability ASTM D943[a] ASTM D2272[b] IP 280 (TOP), m %	 10,000 1,500 0.08
Air Release D3427 at 50°C, minutes	1.4

a Hours to 2.0 mg KOH/g acid number D943.
b Minutes to 25 psi pressure drop.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON HEAT TRANSFER OIL
Grades 22, 46

PRODUCT DESCRIPTION

Chevron Heat Transfer Oils are mineral oil-type transfer oils for use in heat transfer systems with forced circulation.

CUSTOMER BENEFITS

Chevron Heat Transfer Oils deliver value through:

- **Excellent thermal efficiency and stability** — Helps ensure long oil life through outstanding thermal and oxidation stability which helps prevent sludging or deposit formation inside piping.
- **Good rust and corrosion protection** — Help prevent rusting or corrosive problems in circulating oil system.
- **Excellent performance at temperature extremes** — Outstanding thermal stability helps assure minimal thermal cracking at high temperatures or in repeated cycling from low to high temperatures.
- **Ease of pumping and circulation** — Excellent stability helps assure minimal oxidation and helps prevent sludging or deposit formation inside piping.
- **Minimized makeup oil** — Low vapor pressure combined with low volatility and high flash point means minimum evaporative loss.

FEATURES

Chevron Heat Transfer Oils are mineral-type transfer oils for use in secondary or indirect heating systems.

They are formulated with premium base oil technology.

Chevron Heat Transfer Oils are noncorrosive, low odor level, excellent seal compatibility fluids that can absorb heat quickly and transport it to the material or fluid requiring heat.

Their excellent thermal and oxidation stability promotes long service life and clean heat exchanger systems.

There are many uses of heat in processing materials. There are also many ways of transferring heat to the material or fluid that needs to be heated. Chevron Heat Transfer Oils are excellent for this purpose and offer many advantages. They can be used at low pressures. In most applications, the equipment required to apply the oils is relatively inexpensive. The application equipment can also be portable and, therefore, used where it is needed.

APPLICATIONS

Chevron Heat Transfer Oils are recommended for use in heat transfer systems where fuel oil, gas, or electricity is used to heat a fluid, which then transfers the heat to the point of application.

In closed, forced circulation systems equipped with expansion tanks, Chevron Heat Transfer Oil **Grade 22** can be used with bulk oil temperatures up to 316°C (600°F) and skin temperatures up to 343°C (650°F) where good thermal stability and pumpability are required. Chevron Heat Transfer Oil Grade 22 is also ideal where high heat transfer rates combine with high flow rates, and for systems where repeated heating and cooling cycles are required.

In closed or open systems with forced circulation, Chevron Heat Transfer Oil **Grade 46** can be used where bulk oil temperatures do not exceed 288°C (550°F) and skin temperatures may be as high as 316°C (600°F). The oil surface in contact with air in open systems should not exceed 107°C (225°F).

Copper and copper alloys should not be used in heat transfer systems with a hydrocarbon fluid unless air (oxygen) is excluded from contact with the fluid by hermetic sealing and/or an inert gas "blanket."

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

Grade	22	46
Product Number	*231706*	*231709*
SDS/MSDS Number *USA* *Colombia* *El Salvador*	 *4610* *32552* *32551*	 *37644* *33472* *33473*
API Gravity	33.8	32.0
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 23.1 4.47	 41.1 6.32
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 120 41.3	 212 47.4
Viscosity Index	104	101
Flash Point, °C(°F)	210(410)	240(464)
Fire Point, °C(°F)	229(444)	271(520)
Autoignition Point, °C(°F), ASTM E659	345(653)	359(678)
Pour Point, °C(°F)	-13(+9)	-15(+5)
Ramsbottom Carbon Residue, wt %	0.04	0.05

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

THERMAL PROPERTIES

Chevron Heat Transfer Oil Grade 22

Temperature, °C(°F)	0(32)	40(104)	50(122)	100(212)	150(302)	200(392)	250(482)	300(572)	350(662)
Viscosity, Kinematic, cSt	197.75	23.10	16.03	4.47	2.09	1.25	*	*	*
Gravity Specific kg/L	 0.8680 0.8649	 0.8401 0.8396	 0.8330 0.8331	 0.8003 0.8000	 0.7658 0.7655	 0.7290 0.7294	 0.6916 0.6914	 0.6550 0.6512	 0.6083 0.6083
Specific heat BTU/lb-°F, Calories/gm/°C	0.443	0.490	0.502	0.556	0.608	0.655	0.698	0.738	0.774
Thermal conductivity BTU/hr-ft-°F	0.0758	0.0725	0.0717	0.0676	0.0635	0.0594	0.0553	0.0512	0.0471
Vapor Pressure, mm-Hg	Nil	0.000003	0.0001	0.0011	0.065	0.75	8	19	50
Coefficient of Thermal Expansion, °C	0.00072	0.00077	0.00078	0.00084	0.00092	0.00102	0.00113	0.00127	0.00146
Volume Change from 60°F, %	-1.13	+1.86	+2.65	+6.89	+11.71	+17.24	+23.68	*	*

Chevron Heat Transfer Oil Grade 46

Temperature, °C(°F)	0(32)	40(104)	50(122)	100(212)	150(302)	200(392)	250(482)	300(572)	350(662)
Viscosity, Kinematic, cSt	489.96	41.10	27.02	6.32	2.70	1.54	*	*	*
Gravity Specific kg/L	 0.8745 0.8742	 0.8473 0.8491	 0.8425 0.8428	 0.8105 0.8101	 0.7763 0.7760	 0.7416 0.7404	 0.7032 0.7030	 0.6680 0.6635	 0.6215 0.6215
Specific heat BTU/lb- F, Calories/gm/°C	0.440	0.488	0.499	0.554	0.606	0.653	0.697	0.737	0.773
Thermal conductivity BTU/hr-ft- °F	0.0758	0.0725	0.0717	0.0676	0.0635	0.0594	0.0553	0.0512	0.0471
Vapor Pressure, mm-Hg	Nil	0.0000004	0.00003	0.0002	0.017	0.35	5	16	40
Coefficient of Thermal Expansion, °C	0.00071	0.00075	0.00076	0.00082	0.00090	0.00099	0.00109	0.00123	0.00140
Volume Change from 60°F, %	-1.18	+1.82	+2.59	+6.73	+11.41	+16.77	+22.98	*	*

* Estimated values. Values for shaded areas are not shown, as values would represent extrapolation beyond reasonable accuracy.

CHEVRON HYDRAULIC OIL 5606A

PRODUCT DESCRIPTION

Chevron Hydraulic Oil 5606A is manufactured to be used broadly as a hydraulic medium in automotive and industrial equipment operating in unusually cold conditions such as the Alaska North Slope where conventional hydraulic oils are not suitable.

CUSTOMER BENEFITS

Chevron Hydraulic Oil 5606A delivers value through:

- **Minimum viscosity change** over a wide range of operating temperatures.
- **Low pour point** permits operation at low temperatures.
- **Shear stability** for long fluid life.

FEATURES

Chevron Hydraulic Oil 5606A is manufactured from specially selected, highly refined, low viscosity and low pour point petroleum base stocks. It contains a shear resistant viscosity index improver, which provides an extremely high viscosity index. It also contains an antiwear agent and an oxidation inhibitor. It contains a red colored dye to hasten identification.

The low viscosity of the base stock used in this fluid and combined with a shear stable viscosity index improver provides the extremely high viscosity index (300+) which is critical for a lubricant or hydraulic fluid operating over the broad temperature range of -54°C to 60°C (-65°F to 140°F).

Since this is a conventional petroleum base stock, and not a synthetic, the low pour point is critical to minimize filter plugging.

In addition, the antiwear additive and foam inhibitor help prevent pump cavitation and promote long pump and servo valve life.

APPLICATIONS

Chevron Hydraulic Oil 5606A is manufactured to be used broadly as a hydraulic medium in automotive and industrial equipment operating in unusually cold conditions.

Chevron Hydraulic Oil 5606A can be used in hydraulic systems employing synthetic rubber packing and seals. It is not to be used in systems designed for castor oil-alcohol base fluids.

Chevron Hydraulic Oil 5606A is not recommended for any aviation applications. This product is designed for land use only.

Chevron Hydraulic Oil 5606A may not be suitable for extremely high shearing pumps or equipment. Refer to the service manual of the equipment to ensure that the minimum fluid viscosity requirements are met at the highest operating temperature. Please consult with your equipment manufacturer if equipment is operating outside normal operating conditions.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TYPICAL TEST DATA

Product Number	*247707*
SDS Number	*818*
API Gravity	29.7
Viscosity, Kinematic cSt at -40°C cSt at 40°C cSt at 100°C	 510 15.0 5.5
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 80 45
Viscosity Index	300+
Flash Point, °C(°F)	82(180)
Pour Point, °C(°F)	-63(-81)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON HYDRAULIC OIL AW
32, 46, 68

PRODUCT DESCRIPTION

Chevron Hydraulic Oils AW are designed to give excellent hydraulic pump protection.

CUSTOMER BENEFITS

Chevron Hydraulic Oils AW deliver value through:

- **Good oxidation stability** — Provide good service life in high pressure service.
- **Rust and corrosion protection** — Give excellent protection against corrosion of both copper and steel, and passes the ASTM D665A distilled water rust test and ASTM D665B synthetic sea water rust test.
- **Minimum viscosity change** over a wide temperature range.
- **Good foam inhibition** — Contain special foam suppressant, minimizing both foaming and aeration problems.
- **Excellent antiwear properties**
- **Meets major pump manufacturer's requirements** — ISO 32, 46 and 68 meet the requirements of leading hydraulic pump manufacturers for antiwear-type hydraulic fluids in both vane- and piston-type pumps.
- **Good stability in the presence of water** by ASTM D2619 Hydrolytic Stability test and the Denison hybrid T6H20C Wet Pump test.
- **Good thermal stability** in the presence of copper and steel by the MAG Cincinnati Machine Thermal Stability, Procedure A, test.
- **Fast water separation** — Minimize rust problems by fast release of water.

FEATURES

Chevron Hydraulic Oils AW are formulated with refined paraffinic base oils. They provide excellent antiwear protection, oxidation and corrosion inhibition, as well as foam and aeration suppression. All grades have excellent demulsibility characteristics.

Hydraulic systems, due to the nature of their operation, experience accelerated wear unless they are protected by clean, high quality antiwear hydraulic oils. Surging pressures in pumps and valves can increase metal-to-metal contact unless antiwear protection is present. The antiwear additives in Chevron Hydraulic Oils AW create a protective film on the metal surfaces. This protective film minimizes metal-to-metal contact, which is most severe in vane- and gear-type pumps. As hydraulic pressures increase over 1000 psi, the need for antiwear protection increases proportionally.

APPLICATIONS

Chevron Hydraulic Oils AW are versatile lubricants available in ISO viscosity grades 32, 46 and 68.

ISO 32, **46** and **68** grades are most commonly used for hydraulics with vane-, piston-, or gear-type pumps, especially where pressures exceed 1000 psi. They can also be used to lubricate lightly loaded reciprocating compressors.

Chevron Hydraulic Oils AW **32**, **46** and **68**:

- meet major pump manufacturer requirements including **Eaton-Vickers** 35VQ25A for M-2950-S (Mobile) and I-286-S (Stationary), **Parker Hannifin (Denison)** HF0/HF2/T6H20C, and **Bosch Rexroth Racine** Model S
- meet **ASTM** D6158 HM
- meet **DIN** 51524-2
- meet **ISO** 11158 L-HM

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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- meet **MAG Cincinnati, Cincinnati Machine** specifications P-68 (ISO 32), P-70 (ISO 46), and P-69 (ISO 68)

Chevron Hydraulic Oils AW 32, 46 and 68 are registered by **NSF** and are acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Please consult with your equipment manufacturer if equipment is operating outside normal operating conditions. Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

ISO Grade	32	46	68
Product Number	*255675*	*255674*	*255673*
SDS Number *Colombia* *El Salvador*	*7457* - -	*7457* *32564* *32563*	*7457* - -
API Gravity	32.6	31.8	31.6
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 30.4 5.2	 43.7 6.5	 64.6 8.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 157 44	 225 48	 334 55
Viscosity Index	98	98	99
Flash Point, °C(°F)	220(428)	226(439)	235(455)
Pour Point, °C(°F)	-25(-13)	-23(-9)	-22(-8)
Oxidation Stability Hours to 2.0 mg KOH/g acid number, ASTM D943	 > 2000	 > 2000	 > 2000

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON HYDRAULIC OIL AW ISOCLEAN® CERTIFIED LUBRICANT

32, 46, 68

PRODUCT DESCRIPTION

Chevron Hydraulic Oils AW ISOCLEAN® Certified Lubricants are designed to give excellent hydraulic pump protection. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Chevron Hydraulic Oils AW ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Good oxidation stability** — Provide good service life in high pressure service.
- **Rust and corrosion protection** — Give excellent protection against corrosion of both copper and steel, and passes the ASTM D665A distilled water rust test and ASTM D665B synthetic sea water rust test.
- **Minimum viscosity change** over a wide temperature range.
- **Good foam inhibition** — Contain special foam suppressant, minimizing both foaming and aeration problems.
- **Excellent antiwear properties**
- **Meets major pump manufacturer's requirements** — ISO 32, 46 and 68 meet the requirements of leading hydraulic pump manufacturers for antiwear-type hydraulic fluids in both vane- and piston-type pumps.
- **Good stability in the presence of water** by ASTM D2619 Hydrolytic Stability test and the Denison hybrid T6H20C Wet Pump test.
- **Good thermal stability** in the presence of copper and steel by the MAG Cincinnati Machine Thermal Stability, Procedure A, test.
- **Fast water separation** — Minimize rust problems by fast release of water.

FEATURES

Chevron Hydraulic Oils AW are formulated with refined paraffinic base oils. They provide excellent antiwear protection, oxidation and corrosion inhibition, as well as foam and aeration suppression. All grades have excellent demulsibility characteristics.

Hydraulic systems, due to the nature of their operation, experience accelerated wear unless they are protected by clean, high quality antiwear hydraulic oils. Surging pressures in pumps and valves can increase metal-to-metal contact unless antiwear protection is present. The antiwear additives in Chevron Hydraulic Oils AW create a protective film on the metal surfaces. This protective film minimizes metal-to-metal contact, which is most severe in vane- and gear-type pumps. As hydraulic pressures increase over 1000 psi, the need for antiwear protection increases proportionally.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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APPLICATIONS

Chevron Hydraulic Oils AW ISOCLEAN® Certified Lubricants are versatile lubricants available in ISO viscosity grades 32, 46 and 68.

ISO 32, **46** and **68** grades are most commonly used for hydraulics with vane-, piston-, or gear-type pumps, especially where pressures exceed 1000 psi. They can also be used to lubricate lightly loaded reciprocating compressors.

Chevron Hydraulic Oils AW ISOCLEAN Certified Lubricants **32**, **46** and **68**:

- meet major pump manufacturer requirements including **Eaton-Vickers** 35VQ25A for M-2950-S (Mobile) and I-286-S (Stationary), **Parker Hannifin (Denison)** HF0/HF2/T6H20C, and **Bosch Rexroth Racine** Model S
- meet **ASTM** D6158 HM
- meet **DIN** 51524-2
- meet **ISO** 11158 L-HM
- meet **MAG Cincinnati, Cincinnati Machine** specifications P-68 (ISO 32), P-70 (ISO 46), and P-69 (ISO 68)

Chevron Hydraulic Oils AW ISOCLEAN Certified 32, 46, 68 are registered by **NSF** and are acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Please consult with your equipment manufacturer if equipment is operating outside normal operating conditions. Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

ISO Grade	**32**	**46**	**68**
Product Number	*293130*	*293131*	*293132*
SDS Number *Colombia* *El Salvador*	*7457* - -	*7457* *32564* *32563*	*7457* - -
API Gravity	32.6	31.8	31.6
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 30.4 5.2	 43.7 6.5	 64.6 8.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 157 44	 225 48	 334 55
Viscosity Index	98	98	99
Flash Point, °C(°F)	220(428)	226(439)	235(455)
Pour Point, °C(°F)	-25(-13)	-23(-9)	-22(-8)
Oxidation Stability Hours to 2.0 mg KOH/g acid number, ASTM D943	 > 2000	 > 2000	 > 2000

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

RANDO® HD

10, 22, 32, 46, 68, 100, 150, 220, 320

PRODUCT DESCRIPTION

Rando® HD oils are formulated with premium base oil technology and designed to give robust protection to hydraulic pumps in mobile and stationary systems.

CUSTOMER BENEFITS

Rando HD oils deliver value through:

- **Long equipment life** — Special antiwear additive package minimizes wear by protecting surfaces when load causes breakdown of the lubricant film.
- **Minimized downtime** — Effective rust and oxidation inhibitor system helps prevent the production of abrasive particles from rust formation, and deposits, varnishes and sludges from oil breakdown, which can damage equipment surfaces and seals, and block filters prematurely.
- **Smooth operation** — Good hydrolytic stability and water separation characteristics promote excellent filterability in the presence of water contamination. Good anti-foam and air release help ensure smooth operation and system efficiency.
- **Optimal oil service life** — High oxidation stability resists oil thickening and deposit formation in service, minimizing the possibility of an unscheduled change of hydraulic fluid.

FEATURES

Rando HD **ISO 32**, **46**, and **68** are formulated with Group II base stocks.

Rando HD **ISO 100**, **150**, **220,** and **320** are designed for lubricant applications requiring an AGMA R&O gear oil lubricant in the applicable viscosity grade.

Rando HD oils provide excellent:

- antiwear protection
- oxidation and corrosion inhibition
- foam and aeration suppression

Under moderate loads and temperatures, the high viscosity index of Rando HD oils help ensure good film strength between metal surfaces and is further enhanced by antiwear additive protection.

APPLICATIONS

Rando HD **ISO 10** and **22** can be used as spindle lubricants where zinc-free oils are not a requirement.

Rando HD **ISO 32**, **46**, or **68** are recommended for:

- vane-, piston-, or gear-type pumps, especially where pressures exceed 1000 psi
- lightly loaded reciprocating compressors

Rando HD **ISO 100**, **150**, **220,** or **320** are recommended for applications where AGMA rust and oxidation inhibited oils are required:

- hydraulic equipment reduction gears where EP is not required
- plain and antifriction bearings
- circulating oil systems

Rando HD oils are approved for:

- **Eaton-Vickers** 35VQ25A pump, M-2950-S (Mobile) and I-286-S (Stationary) (ISO 32, 46, 68)
- **Fives Cincinnati** (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-68 (ISO 32), P-70 (ISO 46), P-69 (ISO 68)
- **Parker Hannifin (Denison)** HFO, HF1, HF2, T6H2OC (ISO 32, 46, 68)

Rando HD oils meet the requirements of:

- **AFNOR** NF E 48-603 HM (ISO 32, 46, 68)
- **ANSI/AGMA** 9005-EO2, *Industrial Gear Lubrication*, for gear lubrication as rust and oxidation inhibited gear oils (ISO 46, 68, 100, 150, 220)

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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- **ASTM** D6158 HM (ISO 32, 46, 68, 100, 150)
- **Bosch Rexroth** former specification RE 90220-01 (ISO 32, 46, 68)
- **DIN** 51524-2 (ISO 32, 46, 68)
- **General Motors** LS2 Specification, LH for anti-wear hydraulic fluids (ISO 32, 46, 68)
- **ISO** 11158 L-HM
- **Joy** HO-S (ISO 68)
- **US Steel** 126, 127 (ISO 32, 46, 68)

Rando HD **32**, **46**, **68**, **100**, **150**, **220**, **320** are registered by **NSF** and are acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

TYPICAL TEST DATA

ISO Grade	10	22	32	46	68
Product Number	*273252*	*273276*	*273277*	*273278*	*273279*
SDS/MSDS Number					
USA	*23706*	*23548*	*23556*	*23556*	*23556*
Colombia	—	—	*33476*	*33476*	*33476*
El Salvador	—	—	*33477*	*33477*	*33477*
AGMA Grade	—	—	—	1	2
API Gravity	27.7	33.7	32.6	31.8	31.6
Viscosity, Kinematic					
cSt at 40°C	10.3	23.1	30.4	43.7	64.6
cSt at 100°C	2.5	4.4	5.2	6.5	8.4
Viscosity, Saybolt					
SUS at 100°F	63	120	157	225	334
SUS at 210°F	35	41	44	48	54
Viscosity Index	48	98	99	97	98
Flash Point, °C(°F)	154(309)	177(351)	220(428)	226(439)	235(455)
Pour Point, °C(°F)	-39(-38)	-36(-33)	-33(-27)	-30(-22)	-30(-22)
Oxidation Stability					
Hours to 2.0 mg KOH/g acid number, ASTM D943	—	—	>5000	>5000	>5000

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	100	150	220	320
Product Number	*273228*	*273280*	*273281*	277316
SDS/MSDS Number *USA* *Colombia* *El Salvador*	 *23550* *33474* *33475*	 *23550* *33474* *33475*	 *23550* — —	 23550 — —
AGMA Grade	3	4	5	6
API Gravity	30.1	29.7	28.5	27.4
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 95.0 11.0	 143 14.2	 209 18.2	 304 23.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 495 64	 751 76	 1105 93	 1617 117
Viscosity Index	100	97	96	96
Flash Point, °C(°F)	250(482)	260(500)	271(520)	277(531)
Pour Point, °C(°F)	-15(+5)	-12(+10)	-12(+10)	-12(+10)
Oxidation Stability Hours to 2.0 mg KOH/g acid number, ASTM D943	 >2000	 >1500	 >1000	 >1000

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

RANDO® HD ISOCLEAN® CERTIFIED LUBRICANT

10, 22, 32, 46, 68, 100, 150, 220, 320

PRODUCT DESCRIPTION

Rando® HD ISOCLEAN® Certified Lubricants are formulated with premium base oil technology and designed to give robust protection to hydraulic pumps in mobile and stationary systems. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Rando HD ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Long equipment life** — Special antiwear additive package minimizes wear by protecting surfaces when load causes breakdown of the lubricant film.
- **Minimized downtime** — Effective rust and oxidation inhibitor system helps prevent the production of abrasive particles from rust formation, and deposits, varnishes and sludges from oil breakdown, which can damage equipment surfaces and seals, and block filters prematurely.
- **Smooth operation** — Good hydrolytic stability and water separation characteristics promote excellent filterability in the presence of water contamination. Good anti-foam and air release help ensure smooth operation and system efficiency.
- **Optimal oil service life** — High oxidation stability resists oil thickening and deposit formation in service, minimizing the possibility of an unscheduled change of hydraulic fluid.

FEATURES

Rando HD ISOCLEAN Certified Lubricants **32**, **46**, and **68** are formulated with Group II base stocks.

Rando HD ISOCLEAN Certified Lubricants **100, 150**, **220,** and **320** are designed for lubricant applications requiring an AGMA R&O gear oil lubricant in the applicable viscosity grade.

Rando HD ISOCLEAN Certified Lubricants provide excellent:

- antiwear protection
- oxidation and corrosion inhibition
- foam and aeration suppression

Under moderate loads and temperatures, the high viscosity index of Rando HD ISOCLEAN Certified Lubricants help ensure good film strength between metal surfaces and is further enhanced by antiwear additive protection.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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APPLICATIONS

Rando® HD ISOCLEAN® Certified **10** and **22** can be used as spindle lubricants where zinc-free oils are not a requirement.

Rando HD ISOCLEAN Certified **32**, **46**, or **68** are recommended for:

- vane-, piston-, or gear-type pumps, especially where pressures exceed 1000 psi
- lightly loaded reciprocating compressors

Rando HD ISOCLEAN Certified **100, 150**, **220,** or **320** are recommended for applications where AGMA rust and oxidation inhibited oils are required:

- hydraulic equipment reduction gears where EP is not required
- plain and antifriction bearings
- circulating oil systems

Rando HD oils are approved for:

- **Eaton-Vickers** 35VQ25A pump, M-2950-S (Mobile) and I-286-S (Stationary) (ISO 32, 46, 68)
- **Fives Cincinnati** (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-68 (ISO 32), P-70 (ISO 46), P-69 (ISO 68)
- **Parker Hannifin (Denison)** HFO, HF1, HF2, T6H2OC (ISO 32, 46, 68)

Rando HD oils meet the requirements of:

- **AFNOR** NF E 48-603 HM (ISO 32, 46, 68)
- **ANSI/AGMA** 9005-EO2, *Industrial Gear Lubrication*, for gear lubrication as rust and oxidation inhibited gear oils (ISO 46, 68, 100, 150, 220)
- **ASTM** D6158 HM (ISO 32, 46, 68, 100, 150)
- **Bosch Rexroth** former specification RE 90220-01 (ISO 32, 46, 68)
- **DIN** 51524-2 (ISO 32, 46, 68)
- **General Motors** LS2 Specification, LH for anti-wear hydraulic fluids (ISO 32, 46, 68)
- **ISO** 11158 L-HM
- **Joy** HO-S (ISO 68)
- **US Steel** 126, 127 (ISO 32, 46, 68)

Rando HD ISOCLEAN Certified **32**, **46**, **68, 100**, **150**, **220** and **320** are registered by **NSF** and are acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	10	22	32	46	68
Product Number	*274302*	*254616*	*254612*	*254613*	*254614*
SDS/MSDS Number					
USA	*23706*	*23548*	*23556*	*23556*	*23556*
Canada	*24836*	*23549*	*23557*	*23557*	*23557*
Mexico	*24837*	*24835*	*23558*	*23558*	*23558*
Colombia	—	—	*33476*	*33476*	*33476*
El Salvador	—	—	*33477*	*33477*	*33477*
AGMA Grade	—	—	—	1	2
API Gravity	27.7	33.7	32.6	31.8	31.6
Viscosity, Kinematic					
cSt at 40°C	10.3	23.1	30.4	43.7	64.6
cSt at 100°C	2.5	4.4	5.2	6.5	8.4
Viscosity, Saybolt					
SUS at 100°F	63	120	157	225	334
SUS at 210°F	35	41	44	48	54
Viscosity Index	48	98	99	97	98
Flash Point, °C(°F)	154(309)	177(351)	220(428)	226(439)	235(455)
Pour Point, °C(°F)	-39(-38)	-36(-33)	-33(-27)	-30(-22)	-30(-22)
Oxidation Stability					
Hours to 2.0 mg KOH/g acid number, ASTM D943	—	—	>5000	>5000	>5000

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	100	150	220	320
Product Number	*254615*	*274303*	*274304*	274305
SDS/MSDS Number				
USA	*43810*	*23550*	*23550*	23550
Canada	*43811*	*23554*	*23554*	23554
Mexico	*25219MEX*	*23555*	*23555*	23555
Colombia	*33474*	—	—	—
El Salvador	*33475*	—	—	—
AGMA Grade	3	4	5	6
API Gravity	30.1	29.7	28.5	27.4
Viscosity, Kinematic				
cSt at 40°C	95.0	143	209	304
cSt at 100°C	11.0	14.2	18.2	23.4
Viscosity, Saybolt				
SUS at 100°F	495	751	1105	1617
SUS at 210°F	64	76	93	117
Viscosity Index	100	97	96	96
Flash Point, °C(°F)	250(482)	260(500)	271(520)	277(531)
Pour Point, °C(°F)	-15(+5)	-12(+10)	-12(+10)	-12(+10)
Oxidation Stability				
Hours to 2.0 mg KOH/g acid number, ASTM D943	>2000	>1500	>1000	>1000

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

RANDO® HD PREMIUM OIL MV

PRODUCT DESCRIPTION

Rando® HD Premium Oil MV is a versatile multiviscosity lubricant designed to give robust protection to hydraulic pumps.

CUSTOMER BENEFITS

Rando HD Premium Oil MV delivers value through:

- **High oxidation stability** — Long service life in high pressure service.
- **Excellent protection against rust and corrosion** — Gives excellent protection against corrosion of both copper and steel. Passes the ASTM D665A distilled water rust test and ASTM D665B salt water rust test.
- **High viscosity index** — Minimum change in viscosity over wide operating temperatures.
- **Foam inhibition** — Contains special foam suppressant.
- **Seal conditioning** — For long seal life and leak resistance.
- **Excellent antiwear properties** — Provides excellent wear protection.
- **Good stability** in the presence of water in the ASTM D2619 Hydrolytic Stability Test.
- **Fast water separation and excellent demulsibility** — Protects against rust problems by fast release of water.
- **Good filterability** — Excellent thermal and hydrolytic stability help prevent formation of deposits which may interfere with filtration in equipment having close tolerances.

FEATURES

The multiviscosity feature of Rando HD Premium Oil MV promotes even and continuous power transmission over a wide temperature range with a minimum of shudder.

Hydraulic systems, due to the nature of their operation, experience accelerated wear unless they are protected by clean, high quality antiwear hydraulic oils.

Surging pressures in pumps and valves can increase metal-to-metal contact unless antiwear protection is present. The antiwear additives in Rando HD Premium Oil MV plate out on the metal surfaces and minimize the metal-to-metal contact that is most severe in vane-, piston-, and gear-type pumps.

As hydraulic pressures increase over 1000 psi, the need for antiwear protection increases proportionally.

In laboratory efficiency testing, Rando® HD Premium Oil MV provided up to 4% improvement in overall hydraulic pump efficiency when compared to a typical monograde hydraulic oil like Hydraulic Oil AW (a lower VI product with VI<105).

APPLICATIONS

Rando HD Premium Oil MV is recommended for hydraulic or circulating oil systems, including marine on-deck machinery, hydraulic actuated loading bins, or hydraulic equipment that require a wider operating temperature as compared to a single viscosity grade oil. Refer to the service manual of the equipment to ensure that the minimum fluid viscosity requirements are met at the highest operating temperature. Please consult with your equipment manufacturer if equipment is operating outside normal operating conditions.

Rando HD Premium Oil MV meets the requirements of:

- **ASTM** D6158, D6158 HV
- **Bosch Rexroth** former specification RE 90220-01

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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- **DIN** 51524-3, HVLP
- **ISO** 6743-4 HV
- **Fives Cincinnati** (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-68
- **Vickers** M-2950S, I-286

In a clean, dry environment, Rando HD Premium Oil MV typically meets a typical dielectric strength of 35 kV[1] (ASTM D877[2]).

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

Product Number	*277314*
SDS Number	*23695*
ISO Grade	32
API Gravity	31.6
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 32.5 6.9
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 164.9 48.8
Viscosity Index	180
Flash Point, °C(°F)	190(374)
Pour Point, °C(°F)	-50(-58)
Brookfield Viscosity, ASTM D2983, cP at -20°C	1040
Brookfield Viscosity, ASTM D2983, cP at -30°C	3310
Brookfield Viscosity, ASTM D2983, cP at -40°C	14800

Minor variations in product typical test data are to be expected in normal manufacturing.

1 Dielectric strength value applies only to "point of manufacture" of packaged products produced at a Chevron manufacturing facility. (Does not apply to bulk packaging). The oil will quickly lose its high dielectric strength value when exposed to contamination and to very small amounts of moisture and water.

2 Industry standard test method for measuring kV values is not precise and test results can differ significantly.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

RANDO® HD PREMIUM OIL MV ISOCLEAN® CERTIFIED LUBRICANT

PRODUCT DESCRIPTION

Rando® HD Premium Oil MV ISOCLEAN® Certified Lubricant is a versatile multiviscosity lubricant designed to give robust protection to hydraulic pumps. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Rando HD Premium Oil MV ISOCLEAN Certified Lubricant delivers value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **High oxidation stability** — Long service life in high pressure service.
- **Excellent protection against rust and corrosion** — Gives excellent protection against corrosion of both copper and steel. Passes the ASTM D665A distilled water rust test and ASTM D665B salt water rust test.
- **High viscosity index** — Minimum change in viscosity over wide operating temperatures.
- **Foam inhibition** — Contains special foam suppressant.
- **Seal conditioning** — For long seal life and leak resistance.
- **Excellent antiwear properties** — Provides excellent wear protection.
- **Good stability** in the presence of water in the ASTM D2619 Hydrolytic Stability Test.
- **Fast water separation and excellent demulsibility** — Protects against rust problems by fast release of water.
- **Good filterability** — Excellent thermal and hydrolytic stability help prevent formation of deposits which may interfere with filtration in equipment having close tolerances.

FEATURES

The multiviscosity feature of Rando HD Premium Oil MV ISOCLEAN Certified Lubricant promotes even and continuous power transmission over a wide temperature range with a minimum of shudder.

Hydraulic systems, due to the nature of their operation, experience accelerated wear unless they are protected by clean, high quality antiwear hydraulic oils.

Surging pressures in pumps and valves can increase metal-to-metal contact unless antiwear protection is present. The antiwear additives in Rando HD Premium Oil MV ISOCLEAN Certified Lubricant plate out on the metal surfaces and minimize the metal-to-metal contact that is most severe in vane-, piston-, and gear-type pumps.

As hydraulic pressures increase over 1000 psi, the need for antiwear protection increases proportionally.

In laboratory efficiency testing, Rando HD Premium Oil MV ISOCLEAN Certified Lubricant provided up to 4% improvement in overall hydraulic pump efficiency when compared to a typical monograde hydraulic oil like Hydraulic Oil AW (a lower VI product with VI<105).

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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APPLICATIONS

Rando® HD Premium Oil MV ISOCLEAN® Certified Lubricant is recommended for hydraulic or circulating oil systems, including marine on-deck machinery, hydraulic actuated loading bins, or hydraulic equipment that require a wider operating temperature as compared to a single viscosity grade oil. Refer to the service manual of the equipment to ensure that the minimum fluid viscosity requirements are met at the highest operating temperature. Please consult with your equipment manufacturer if equipment is operating outside normal operating conditions.

Rando HD Premium Oil MV ISOCLEAN Certified Lubricant meets the requirements of:

- **ASTM** D6158, D6158 HV
- **Bosch Rexroth** former specification RE 90220-01
- **DIN** 51524-3, HVLP
- **ISO** 6743-4 HV
- **Fives Cincinnati** (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-68
- **Vickers** M-2950S, I-286

In a clean, dry environment, Rando HD Premium Oil MV ISOCLEAN Certified Lubricant typically meets a typical dielectric strength of 35 kV[1] (ASTM D877[2]).

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN® Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

TYPICAL TEST DATA

Product Number	*278066*
SDS Number	*23695*
ISO Grade	32
API Gravity	31.6
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 32.5 6.9
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 164.9 48.8
Viscosity Index	180
Flash Point, °C(°F)	190(374)
Pour Point, °C(°F)	-50(-58)
Brookfield Viscosity, ASTM D2983, cP at -20°C	1040
Brookfield Viscosity, ASTM D2983, cP at -30°C	3310
Brookfield Viscosity, ASTM D2983, cP at -40°C	14800

Minor variations in product typical test data are to be expected in normal manufacturing.

1 Dielectric strength value applies only to "point of manufacture" of packaged products produced at a Chevron manufacturing facility. (Does not apply to bulk packaging). The oil will quickly lose its high dielectric strength value when exposed to contamination and to very small amounts of moisture and water.

2 Industry standard test method for measuring kV values is not precise and test results can differ significantly.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

RANDO® HDZ

15, 22, 32, 46, 68, 100

PRODUCT DESCRIPTION

Rando® HDZ oils are formulated with premium base oil technology and designed to give robust protection to hydraulic pumps.

CUSTOMER BENEFITS

Rando HDZ oils deliver value through:

- **High oxidation stability** — Long service life in high pressure service.
- **Protection against rust and corrosion** — Gives excellent protection against corrosion of both copper and steel. Passes the ASTM D665A distilled water rust test and ASTM D665B salt water rust test.
- **High viscosity index** — Minimum change in viscosity over a wide range of operating temperatures.
- **Foam inhibition** — Contains special foam suppressant.
- **Excellent antiwear properties** — Provides excellent wear protection.
- **Good stability** — in the presence of water in the ASTM D2619 Hydrolytic Stability Test and in the presence of copper and steel in the MAG Cincinnati Machine Thermal Stability Test.
- **Fast water separation** — Protects against rust problems by fast release of water.
- **Good filterability** — Excellent thermal and hydrolytic stability helps prevent formation of deposits which may interfere with filtration in equipment having close tolerances.

FEATURES

Rando HDZ oils incorporate antiwear additives, oxidation and corrosion inhibitors, foam and aeration suppressants, and a shear stable viscosity index improver.

Hydraulic systems, due to the nature of their operation, experience accelerated wear unless they are protected by clean, high quality antiwear hydraulic oils. Surging pressures in pumps and valves can increase metal-to-metal contact unless antiwear protection is present. The antiwear additives in Rando HDZ oils plate out on the metal surfaces. This plating minimizes metal-to-metal contact, which is most severe in vane-, piston-, and gear-type pumps. As hydraulic pressures increase over 1000 psi, the need for antiwear protection increases proportionally.

In laboratory efficiency testing, Rando HDZ oils provided up to 5% improvement in overall hydraulic pump efficiency when compared to a typical monograde hydraulic oil like Hydraulic Oil AW (a lower VI product with VI<105).

APPLICATIONS

Rando HDZ oils are versatile lubricants available in multiviscosity ISO 15, 22, 32, 46, 68 and 100 grades. The multiviscosity feature promotes even and continuous power transmission over a wide temperature range with a minimum of shudder, and maximum accuracy.

They are recommended for hydraulic or circulating oil systems, including marine on-deck machinery, hydraulic actuated loading bins, or equipment that require a wider operating temperature as compared to a single viscosity grade oil.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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Rando HDZ oils are approved for:

- **Eaton-Vickers** I-286-S, M-2950-S, 35VQ25A (ISO 32, 46, 68)
- **Fives Cincinnati** (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-68 (ISO 32), P-70 (ISO 46), P-69 (ISO 68)
- **Parker Hannifin (Denison)** HF0, HF1, HF2, using T6H20C pump (ISO 32, 46, 68)

Rando HDZ oils meet the requirements of:

- **Arburg** (ISO 46)
- **ASTM** D6158, HV (ISO 15, 22, 32, 46, 68, 100)
- **Bosch Rexroth** former specification RE 90220-01 (ISO 32, 46, 68)
- **DIN** 51524-3 (ISO 15, 22, 32, 46, 68, 100)
- **Frank Mohn, Framo** hydraulic cargo pumping (ISO 46)
- **ISO** 11158 L-HV (ISO 15, 22, 32, 46, 68, 100)
- **JCMAS** HK-1 (ISO 32, 46)

In a clean, dry environment, Rando HDZ 15, 22, 32, 46, 68 and 100 typically meet a dielectric strength of 35 kV[a] (ASTM D877[b]).

Refer to the service manual of the equipment to ensure that the minimum fluid viscosity requirements are met at the highest operating temperature. Please consult with your equipment manufacturer if equipment is operating outside normal operating conditions.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

ISO Grade	15	22	32	46	68	100
Product Number	*273282*	*273264*	*273260*	*273261*	*273262*	*273263*
SDS Number	*23543*	*23537*	*23537*	*23537*	*23537*	*23537*
API Gravity	28.4	31.7	33.1	32.2	31.1	30.9
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 16.0 3.9	 22.5 5.1	 32.0 6.3	 46.0 8.2	 68.0 11.0	 100.0 14.2
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 81.4 39.1	 108 43.0	 150 46.9	 214 53.1	 316 62.8	 464 74.8
Viscosity Index	140	160	153	153	154	145
Flash Point, °C(°F)	150(302)	188(370)	220(428)	216(420)	212(414)	232(450)
Pour Point, °C(°F)	-54(-65)	-53(-63)	-50(-58)	-45(-49)	-42(-44)	-39(-38)
Brookfield Viscosity, ASTM D2983, cP at -20°C	500	750	1290	2330	4450	8040
Brookfield Viscosity, ASTM D2983, cP at -30°C	1660	2340	4900	9120	19300	—
Brookfield Viscosity, ASTM D2983, cP at -40°C	6920	9120	25100	—	—	—
Oxidation Stability Hours to 2.0 mg KOH/g acid number, ASTM D943	 —	 —	 >5000	 >5000	 >5000	 >3000
Dielectric Strength, kV[a], ASTM D877[b]	35	35	35	35	35	35

a Dielectric strength value applies only to "point of manufacture" of packaged products produced at a Chevron manufacturing facility. (Does not apply to bulk packaging). The oil will quickly lose its high dielectric strength value when exposed to contamination and to very small amounts of moisture and water.

b Industry standard test method for measuring kV values is not precise and test results can differ significantly.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

RANDO® HDZ ISOCLEAN® CERTIFIED LUBRICANT

15, 22, 32, 46, 68

PRODUCT DESCRIPTION

Rando® HDZ ISOCLEAN® Certified Lubricants are formulated with premium base oil technology and designed to give robust protection to hydraulic pumps. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Rando HDZ ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **High oxidation stability** — Long service life in high pressure service.
- **Protection against rust and corrosion** — Gives excellent protection against corrosion of both copper and steel. Passes the ASTM D665A distilled water rust test and ASTM D665B salt water rust test.
- **High viscosity index** — Minimum change in viscosity over a wide range of operating temperatures.
- **Foam inhibition** — Contains special foam suppressant.
- **Excellent antiwear properties** — Provides excellent wear protection.
- **Good stability** — in the presence of water in the ASTM D2619 Hydrolytic Stability Test and in the presence of copper and steel in the MAG Cincinnati Machine Thermal Stability Test.
- **Fast water separation** — Protects against rust problems by fast release of water.
- **Good filterability** — Excellent thermal and hydrolytic stability helps prevent formation of deposits which may interfere with filtration in equipment having close tolerances.

FEATURES

Rando HDZ ISOCLEAN Certified Lubricants incorporate antiwear additives, oxidation and corrosion inhibitors, foam and aeration suppressants, and a shear stable viscosity index improver.

Hydraulic systems, due to the nature of their operation, experience accelerated wear unless they are protected by clean, high quality antiwear hydraulic oils. Surging pressures in pumps and valves can increase metal-to-metal contact unless antiwear protection is present. The antiwear additives in Rando HDZ ISOCLEAN Certified Lubricants plate out on the metal surfaces. This plating minimizes metal-to-metal contact, which is most severe in vane-, piston-, and gear-type pumps. As hydraulic pressures increase over 1000 psi, the need for antiwear protection increases proportionally.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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In laboratory efficiency testing, Rando® HDZ ISOCLEAN® Certified Lubricants provided up to 5% improvement in overall hydraulic pump efficiency when compared to a typical monograde hydraulic oil like Hydraulic Oil AW (a lower VI product with VI<105).

APPLICATIONS

Rando HDZ ISOCLEAN Certified Lubricants are versatile lubricants available in multiviscosity ISO 15, 22, 32, 46 and 68 grades. The multiviscosity feature promotes even and continuous power transmission over a wide temperature range with a minimum of shudder, and maximum accuracy.

They are recommended for hydraulic or circulating oil systems, including marine on-deck machinery, hydraulic actuated loading bins, or equipment that require a wider operating temperature as compared to a single viscosity grade oil.

Rando HDZ ISOCLEAN Certified Lubricants are approved for:

- **Eaton-Vickers** I-286-S, M-2950-S, 35VQ25A (ISO 32, 46, 68)
- **Fives Cincinnati** (formerly MAG Cincinnati, Cin Machine, Cin Milacron) P-68 (ISO 32), P-70 (ISO 46), P-69 (ISO 68)
- **Parker Hannifin (Denison)** HF0, HF1, HF2, using T6H20C pump (ISO 32, 46, 68)

Rando HDZ ISOCLEAN Certified Lubricants meet the requirements of:

- **Arburg** (ISO 46)
- **ASTM** D6158, HV (ISO 15, 22, 32, 46, 68)
- **Bosch Rexroth** former specification RE 90220-01 (ISO 32, 46, 68)
- **DIN** 51524-3 (ISO 15, 22, 32, 46, 68)
- **Frank Mohn, Framo** hydraulic cargo pumping (ISO 46)
- **ISO** 11158 L-HV (ISO 15, 22, 32, 46, 68)
- **JCMAS** HK-1 (ISO 32, 46)

In a clean, dry environment, Rando HDZ ISOCLEAN Certified Lubricants 15, 22, 32, 46 and 68 typically meet a dielectric strength of 35 kV[a] (ASTM D877[b]).

Refer to the service manual of the equipment to ensure that the minimum fluid viscosity requirements are met at the highest operating temperature. Please consult with your equipment manufacturer if equipment is operating outside normal operating conditions.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

ISO Grade	15	22	32	46	68
Product Number	*278064*	*278065*	*254609*	*254610*	*254611*
SDS Number					
U.S.	*23543*	*42265*	*23537*	*23537*	*23537*
Canada	*23544*	*42266*	*23538*	*23538*	*23538*
Mexico	*23545*	*42267*	*23529*	*23529*	*23529*
API Gravity	28.4	31.7	33.1	32.2	31.1
Viscosity, Kinematic					
cSt at 40°C	16.0	22.5	32.0	46.0	68.0
cSt at 100°C	3.9	5.1	6.3	8.2	11.0
Viscosity, Saybolt					
SUS at 100°F	81.4	108	150	214	316
SUS at 210°F	39.1	43.0	46.9	53.1	62.8
Viscosity Index	140	160	153	153	154
Flash Point, °C(°F)	150(302)	188(370)	220(428)	216(420)	212(414)
Pour Point, °C(°F)	-54(-65)	-53(-63)	-50(-58)	-45(-49)	-42(-44)
Brookfield Viscosity, ASTM D2983, cP at -20°C	500	750	1290	2330	4450
Brookfield Viscosity, ASTM D2983, cP at -30°C	1660	2340	4900	9120	19300
Brookfield Viscosity, ASTM D2983, cP at -40°C	6920	9120	25100	—	—
Oxidation Stability Hours to 2.0 mg KOH/g acid number, ASTM D943	—	—	>5000	>5000	>5000
Dielectric Strength, kV[a], ASTM D877[b]	35	35	35	35	35

a Dielectric strength value applies only to "point of manufacture" of packaged products produced at a Chevron manufacturing facility. (Does not apply to bulk packaging). The oil will quickly lose its high dielectric strength value when exposed to contamination and to very small amounts of moisture and water.

b Industry standard test method for measuring kV values is not precise and test results can differ significantly.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

RANDO® WM 32

PRODUCT DESCRIPTION

Rando® WM 32 is a high performance multigrade hydraulic fluid designed for use in wind turbine systems and a wide range of other applications. Rando WM 32 offers high level protection and performance under severe operating conditions.

Rando WM 32 provides good low temperature fluidity with a high viscosity index (VI) and therefore offers a wide operating temperature window. This product complies with Swedish Standard SS 15 54.34.

CUSTOMER BENEFITS

Rando WM 32 delivers value through:

- **Reliable low temperature fluidity** — Helps promote good pumpability and critical component wear protection during cold system start-up
- **Robust anti-wear and corrosion inhibitor systems** — Helps contribute to greater system uptime performance and reduced maintenance costs
- **Thermal stability performance** — Helps to protect against oil degradation, deposit formation and helps promote extended fluid service life
- **Dependable filtration characteristics in the presence of water contamination** — Helps reduce maintenance downtime
- **High shear stability** — Helps to assist reliable protection and trouble-free performance for the life of the fluid, under high temperature, high pressure conditions

FEATURES

Rando WM 32 offers:

- Wide temperature performance and extended service life
- Low temperature system start-up wear protection
- System wear and corrosion protection
- Reliable filtration performance in the presence of water
- Trouble-free performance under high temperature, high pressure conditions

APPLICATIONS

Rando WM 32 is recommended for use in wind turbines and in many types of high pressure hydraulic systems operating across a wide ambient and operating temperature range.

Rando WM 32 is suitable for systems with gear, vane, radial and axial piston pumps.

Rando WM 32 is approved for:

- **Vestas Wind Systems** 0000-2843

Rando WM 32 meets the requirements of:

- **ASTM** D6158
- **DIN** 51524-3, HVLP
- **ISO** 6743-4 HV, 11158
- **Swedish Standard** SS 15 54 34, SMR 1996-2
- **Vickers** M-2950S, I-286

Refer to the service manual of the equipment to ensure that the minimum fluid viscosity requirements are met at the highest operating temperature. Please consult with your equipment manufacturer if equipment is operating outside normal operating conditions.

Product(s) manufactured in Belgium.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

TYPICAL TEST DATA

	32
Product Number	*273284*
SDS Number	*26304*
API Gravity	27.4
Density, ASTM D1298, kg/L @ 15°C	0.89
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 32.5 6.9
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 164.9 48.8
Viscosity Index	180
Flash Point, °C(°F)	150(302)
Pour Point, °C(°F)	-48(-54)
Kinematic Viscosity, ASTM D445, mm²/s @ -30°C after 72 hours	 3000
FZG, DIN 51354, Fail load stage	10

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

REGAL® R&O

22, 32, 46, 68, 100, 115, 150, 220, 320, 460, 680

PRODUCT DESCRIPTION

Regal® R&O oils are turbine oils designed to give outstanding performance in steam and hydroelectric turbines.

CUSTOMER BENEFITS

Regal R&O oils deliver value through:

- **Long lubricant life** provided by excellent thermal and oxidation stability. Formulated with an ashless, zinc-free formulation.
- **Excellent demulsibility** helps ensure good lubricant film strength and minimal wear through quick water separation.
- **Excellent air release** in turbine oil reservoir systems by the foam inhibitor hastening the release of foam and entrained air.
- **Rust protection** of metal surfaces due to the use of an effective rust and corrosion inhibitor.
- **Environmental benefits** — All grades are ashless. This facilitates reclaiming and recycling of the used oils.

FEATURES

Regal R&O oils provide rust protection, oxidation inhibition, and foam suppression.

They pass the Fresh Water Corrosion Test (ASTM D665, Procedure A), and the severe Synthetic Sea Water Rust Test (ASTM D665, Procedure B).

The thermal and oxidation stability of these lubricants, due to their high level of refinement, has been further enhanced by their unique ashless, zinc-free formulation. The high thermal and oxidation stability help protect against oxidation deposit formation or the generation of acidic material.

Regal R&O oils have very good demulsibility characteristics allowing quick release of moisture.

Regal R&O oils minimize entrained air which otherwise could result in low lubricant film strength between moving parts and pump cavitation.

APPLICATIONS

Regal R&O oils ISO 32 through ISO 150 are recommended for use in most electric motor bearings, air compressors, gears, hydroelectric turbines, steam turbines, marine turbines, and non-heavy duty hydraulic systems where OEM recommends R&O type oils (for heavy duty hydraulic systems, customers should consider Rando HD oils).

These products can also be used as a general purpose machine oil for shop use when R&O type oil is needed or is recommended. The multifunctional characteristics of Regal R&O type oils may allow them to replace other special application lubricants, which can result in reduced inventory and operating cost.

Regal R&O 32

- meets:
  - **Alstom** HTGD 90117
  - **ASTM** D4304 Type I, **British Standard** 489, and **DIN** 51515 standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - **General Electric** GEK 28143b, GEK 46506D
  - **MAG Cincinnati, Cincinnati Machine** P-38
  - **Siemens** TLV 901304

Regal R&O 46

- meets:
  - **Alstom** HTGD 90117
  - **ASTM** D4304 Type I, **British Standard** 489, and **DIN** 51515 standard organization

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - — **General Electric** GEK 28143b
  - — **MAG Cincinnati, Cincinnati Machine** P-55
  - — **Siemens** TLV 901304

Regal R&O 68

- meets:
  - — **ASTM** D4304 Type I, **British Standard** 489, and **DIN** 51515 standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - — **MAG Cincinnati, Cincinnati Machine** P-54
- suitable for use in **General Electric, Alstom,** and **Westinghouse** hydroelectric turbines, land and marine steam turbines, and associated reduction gears when OEM recommends R&O type oil

Regal R&O 100

- meets:
  - — **ASTM** D4304 Type I, **British Standard** 489, and **DIN** 51515 standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
- suitable for use in **General Electric, Alstom,** and **Westinghouse** hydroelectric turbines, land and marine steam turbines, and associated reduction gears when OEM recommends R&O type oil

Do not use Regal R&O in large and high temperature gas turbines. GST® Oils are recommended for these gas turbines.

Do not use Regal R&O 32, 46, or 68 in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

Note that finished lubricants may affect the adherence of applied protective coatings (such as paint). If this product is used where coating applications are performed, the coating manufacturer should be consulted regarding adequate surface preparation.

TYPICAL TEST DATA

	ASTM	115[a]	22	32	46	68
Product Number		*277311*	*277312*	*273209*	*273210*	*273211*
SDS/MSDS Number *USA* *Colombia* *El Salvador*		 *23566* — —	 *23566* — —	 *23566* *33490* *33491*	 *23566* *33490* *33491*	 *23566* *33490* *33491*
API Gravity[b]	D287	30.5(27.6)	34.2(32.1)	32.9(31.3)	31.7(30.2)	31.2(29.1)
Viscosity, Kinematic cSt at 40°C cSt at 100°C	D445	 115 12.2	 23.1 4.4	 30.4 5.2	 43.7 6.5	 64.6 8.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	D445	 602 68.5	 120 41.2	 157 43.7	 226 48.0	 335 54.5
Viscosity Index	D2270	96	102	100	98	99
Flash Point, °C(°F)	D92	278(532)	220(428)	222(432)	224(435)	245(473)
Pour Point, °C(°F)	D97	-15(+5)	-15(+5)	-30(-22)	-27(-17)	-24(-11)
Rust Test, Procedure B, 24 h	D665	Pass	Pass	Pass	Pass	Pass
Oxidation Stability[b] Hours to 2.0 mg KOH/g acid number Minutes to 25 psi pressure drop	 D943 D2272	 — (>2000) — (>400)	 >6000 (>3000) >1000 (>600)	 >6000 (>3000) >900 (>600)	 >6000 (>3000) >900 (>500)	 >5500 (>2500) >900 (>400)
FZG, Pass Stage[c], DIN 51354		—	—	10	10	10

a Available in the Midwest and East.
b Typical values for products from the "East of the Rockies" plants (Bayonne, Charleston, Cicero, Louisville, and Port Arthur) are in parentheses.
c FZG, Pass Stage, DIN 51354 is not applicable to products manufactured in Colombia and El Salvador.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

	ASTM	100	150	220	320	460	680
Product Number		*273212*	*273213*	*273215*	*273214*	*273275*	*277313*
SDS/MSDS Number							
USA		*23566*	*23566*	*23569*	*23569*	*23569*	*23569*
Colombia		*33482*	*33482*	*33482*	—	—	—
El Salvador		*33484*	*33484*	*33484*	—	—	—
API Gravity[a]	D287	30.7(28.1)	29.8(27.1)	28.5(26.1)	27.5(25.4)	26.4	26.3
Viscosity, Kinematic	D445						
cSt at 40°C		95.0	143	220	304	460	646
cSt at 100°C		10.8	14.2	19.0	23.2	31.3	39.6
Viscosity, Saybolt	D445						
SUS at 100°F		495	750	1163	1618	2463	3474
SUS at 210°F		63.1	76.4	96.8	116	152	193
Viscosity Index	D2270	97	96	97	95	97	99
Flash Point, °C(°F)	D92	262(504)	284(543)	294(561)	298(568)	310(590)	312(594)
Pour Point, °C(°F)	D97	-15(+5)	-21(+5)	-18(+10)	-12(+10)	-12(+10)	-12(+10)
Rust Test, Procedure B, 24 h	D665	Pass	Pass	Pass	Pass	Pass	Pass
Oxidation Stability[a]							
Hours to 2.0 mg KOH/g acid number	D943	>5500 (>2000)	>3500 (>1500)	>2200 (>1200)	>1800 (>1100)	>900 (>900)	>900
Minutes to 25 psi pressure drop	D2272	>900 (>400)	>450	>425	>400	>275	>275
FZG, Pass Stage[b], DIN 51354		10	—	—	—	—	—

a Typical values for products from the "East of the Rockies" plants (Bayonne, Charleston, Cicero, Louisville, and Port Arthur) are in parentheses.

b FZG, Pass Stage, DIN 51354 is not applicable to products manufactured in Colombia and El Salvador.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

REGAL® R&O ISOCLEAN® CERTIFIED LUBRICANT

22, 32, 46, 68, 100, 115, 150, 220

PRODUCT DESCRIPTION

Regal® R&O ISOCLEAN® Certified Lubricants are turbine oils designed to give outstanding performance in steam and hydroelectric turbines. Chevron ISOCLEAN Certified Lubricants have been certified to meet specified ISO Cleanliness standards at point of delivery using industry leading filtration and testing technology. ISOCLEAN Certified products are the first step for contamination control and maximizing component life.

CUSTOMER BENEFITS

Regal R&O ISOCLEAN Certified Lubricants deliver value through:

- **Ready to use** — Enables users to meet stringent original equipment manufacturers' cleanliness standards for fill lubricants.
- **Flexibility** — ISO Cleanliness targets can be customized to fit your business application needs.
- **Peace of mind** — Each delivery of Chevron ISOCLEAN Certified Lubricant includes an ISOCLEAN Certificate of Analysis.
- **OE fluid cleanliness requirements** — Customized to meet specific equipment manufacturers' fluid cleanliness requirements.
- **Long lubricant life** provided by excellent thermal and oxidation stability. Formulated with an ashless, zinc-free formulation.
- **Excellent demulsibility** helps ensure good lubricant film strength and minimal wear through quick water separation.
- **Excellent air release** in turbine oil reservoir systems by the foam inhibitor hastening the release of foam and entrained air.
- **Rust protection** of metal surfaces due to the use of an effective rust and corrosion inhibitor.
- **Environmental benefits** — All grades are ashless. This facilitates reclaiming and recycling of the used oils.

FEATURES

Regal R&O ISOCLEAN Certified Lubricants provide rust protection, oxidation inhibition, and foam suppression.

They pass the Fresh Water Corrosion Test (ASTM D665, Procedure A), and the severe Synthetic Sea Water Rust Test (ASTM D665, Procedure B).

The thermal and oxidation stability of these lubricants, due to their high level of refinement, has been further enhanced by their unique ashless, zinc-free formulation. The high thermal and oxidation stability help protect against oxidation deposit formation or the generation of acidic material.

Regal R&O ISOCLEAN Certified Lubricants have very good demulsibility characteristics allowing quick release of moisture.

Regal R&O ISOCLEAN Certified Lubricants minimize entrained air which otherwise could result in low lubricant film strength between moving parts and pump cavitation.

Product(s) manufactured in the USA, Colombia and El Salvador.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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IO-185 ISOCLEAN

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APPLICATIONS

Regal® R&O ISOCLEAN® Certified Lubricants ISO 32 through ISO 150 are recommended for use in most electric motor bearings, air compressors, gears, hydroelectric turbines, steam turbines, marine turbines, and non-heavy duty hydraulic systems where OEM recommends R&O type oils (for heavy duty hydraulic systems, customers should consider Rando HD ISOCLEAN Certified Lubricants).

These products can also be used as a general purpose machine oil for shop use when R&O type oil is needed or is recommended. The multifunctional characteristics of Regal R&O type oils may allow them to replace other special application lubricants, which can result in reduced inventory and operating cost.

Regal R&O ISOCLEAN Certified Lubricant 32

- meets:
  - **Alstom** HTGD 90117
  - **ASTM** D4304 Type I, **British Standard** 489, and **DIN** 51515 standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - **General Electric** GEK 28143b, GEK 46506D
  - **MAG Cincinnati, Cincinnati Machine** P-38
  - **Siemens** TLV 901304

Regal R&O ISOCLEAN Certified Lubricant 46

- meets:
  - **Alstom** HTGD 90117
  - **ASTM** D4304 Type I, **British Standard** 489, and **DIN** 51515 standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - **General Electric** GEK 28143b
  - **MAG Cincinnati, Cincinnati Machine** P-55
  - **Siemens** TLV 901304

Regal R&O ISOCLEAN Certified Lubricant 68

- meets:
  - **ASTM** D4304 Type I, **British Standard** 489, and **DIN** 51515 standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
  - **MAG Cincinnati, Cincinnati Machine** P-54
- suitable for use in **General Electric, Alstom,** and **Westinghouse** hydroelectric turbines, land and marine steam turbines, and associated reduction gears when OEM recommends R&O type oil

Regal R&O ISOCLEAN Certified Lubricant 100

- meets:
  - **ASTM** D4304 Type I, **British Standard** 489, and **DIN** 51515 standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
- suitable for use in **General Electric, Alstom,** and **Westinghouse** hydroelectric turbines, land and marine steam turbines, and associated reduction gears when OEM recommends R&O type oil

Do not use Regal R&O in large and high temperature gas turbines. GST® Oils are recommended for these gas turbines.

Do not use Regal R&O ISOCLEAN Certified Lubricants 32, 46, or 68 in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

Note that finished lubricants may affect the adherence of applied protective coatings (such as paint). If this product is used where coating applications are performed, the coating manufacturer should be consulted regarding adequate surface preparation.

Consult with your Chevron Lubricant Representative or Chevron ISOCLEAN Certified Lubricants Marketer to set specific ISO Cleanliness targets for your business application.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

	ASTM	115[a]	22	32	46	68
Product Number		*278051*	*278048*	*278034*	*278049*	*278035*
SDS/MSDS Number *USA* *Canada* *Mexico*		 *23566* *23567* *23568*	 *23566* *23567* *23568*	 *23566* *23567* *23568*	 *23566* *23567* *23568*	 *23566* *23567* *23568*
API Gravity[b]	D287	30.5(27.6)	34.2(32.1)	32.9(31.3)	31.7(30.2)	31.2(29.1)
Viscosity, Kinematic cSt at 40°C cSt at 100°C	D445	 115 12.2	 23.1 4.4	 30.4 5.2	 43.7 6.5	 64.6 8.4
Viscosity, Saybolt SUS at 100°F SUS at 210°F	D445	 602 68.5	 120 41.2	 157 43.7	 226 48.0	 335 54.5
Viscosity Index	D2270	96	102	100	98	99
Flash Point, °C(°F)	D92	278(532)	220(428)	222(432)	224(435)	245(473)
Pour Point, °C(°F)	D97	-15(+5)	-15(+5)	-30(-22)	-27(-17)	-24(-11)
Rust Test, Procedure B, 24 h	D665	Pass	Pass	Pass	Pass	Pass
Oxidation Stability[b] Hours to 2.0 mg KOH/g acid number Minutes to 25 psi pressure drop	 D943 D2272	 — (>2000) — (>400)	 >6000 (>3000) >1000 (>600)	 >6000 (>3000) >900 (>600)	 >6000 (>3000) >900 (>500)	 >5500 (>2500) >900 (>400)
FZG, Pass Stage[c], DIN 51354		—	—	10	10	10

a Available in the Midwest and East.
b Typical values for products from the "East of the Rockies" plants (Bayonne, Charleston, Cicero, Louisville, and Port Arthur) are in parentheses.
c FZG, Pass Stage, DIN 51354 is not applicable to products manufactured in Colombia and El Salvador.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

	ASTM	100	150	220
Product Number		*278050*	*278036*	*278052*
SDS/MSDS Number *USA* *Canada* *Mexico*		 *23566* *23567* *23568*	 *23566* *23567* *23568*	 *23566* *23567* *23568*
API Gravity[a]	D287	30.7(28.1)	29.8(27.1)	28.5(26.1)
Viscosity, Kinematic cSt at 40°C cSt at 100°C	D445	 95.0 10.8	 143 14.2	 220 19.0
Viscosity, Saybolt SUS at 100°F SUS at 210°F	D445	 495 63.1	 750 76.4	 1163 96.8
Viscosity Index	D2270	97	96	97
Flash Point, °C(°F)	D92	262(504)	284(543)	294(561)
Pour Point, °C(°F)	D97	-15(+5)	-21(+5)	-18(+10)
Rust Test, Procedure B, 24 h	D665	Pass	Pass	Pass
Oxidation Stability[a] Hours to 2.0 mg KOH/g acid number Minutes to 25 psi pressure drop	 D943 D2272	 >5500 (>2000) >900 (>400)	 >3500 (>1500) >450	 >2200 (>1200) >425
FZG, Pass Stage[b], DIN 51354		10	—	—

a Typical values for products from the "East of the Rockies" plants (Bayonne, Charleston, Cicero, Louisville, and Port Arthur) are in parentheses.

b FZG, Pass Stage, DIN 51354 is not applicable to products manufactured in Colombia and El Salvador.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

REGAL® SGT 22

PRODUCT DESCRIPTION

Regal® SGT 22 is designed for use in modified aviation-type gas turbines in non-aviation stationary applications such as in industrial power generation and in marine service.

CUSTOMER BENEFITS

Regal SGT 22 delivers value through:

- **Long service life** — Excellent oxidation and thermal stability of the synthetic polyolester base fluid and special additive system helps resist oil breakdown under severe, high temperature, high load conditions. The low volatility of the synthetic ester helps minimize evaporative losses.
- **Minimal maintenance and downtime —** Minimal coking tendency of the synthetic ester base fluid and additive system helps minimize deposit formation on bearings and other areas exposed to the heat of the hot gases. High load carrying capacity helps ensure excellent protection against wear. The oil is compatible with normal engine and accessory metallic construction materials and elastomeric sealing compounds.
- **Excellent all-temperature performance —** Excellent viscosity-temperature characteristics of the synthetic ester help promote outstanding low temperature fluidity to facilitate starting at low temperatures, while helping to ensure that an effective lubricant film is always available under the most severe, high temperature conditions to protect critical components against wear.

FEATURES

Regal SGT 22 is a premium performance, synthetic polyol ester-based turbine lubricant for use in modified aviation-type gas turbines in stationary and marine service. A special additive system imparts excellent high temperature thermal and oxidation stability.

APPLICATIONS

Regal SGT 22 has well over 2.5 million fired hours with excellent performance. It is designed for modified aviation-type gas turbines exposed to the most severe operating environment in non-aviation applications such as industrial power generation and marine propulsion.

Regal SGT 22 is approved for:

- U.S. Military Specification **MIL-PRF-23699G, Class STD**
- **General Electric** LM Series Aeroderivitive Turbines
- **Siemens (Allison)** 501K
- **Siemens (Rolls Royce)** Avon, Olympus, Tyne and Spey models
- **Siemens (Rolls Royce)** RB 211 Gas Turbines

Regal SGT 22 meets the requirements of:

- **Turbomeca** Makila TL

Regal SGT 22 is compatible with other lubricants approved under MIL-PRF-23699G. Regal SGT 22 is compatible with metals, paints, coatings and elastomers such as Viton, Teflon, fluorosilicone and Buna N (NBR).

Regal SGT 22 is not to be used in aircraft service. Regal SGT 22 is not recommended for gas turbines that require MIL-PRF-23699F, Class C/I (Corrosion Inhibiting) or HTS (High Thermal Stability).

Product(s) manufactured in USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

Product Number	*278016*
SDS Number	*37008*
Viscosity, Kinematic cSt at -40°C cSt at 40°C cSt at 100°C	 9,800 25.6 5.12
Operating Temperature °C(°F) Minimum Maximum	 -40(-40) 204(400)
Flash Point, °C(°F)	270(518)
Pour Point, °C(°F)	-60(-76)
Acid number, mg KOH/g	0.16

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON SHINGLE OIL

PRODUCT DESCRIPTION

Chevron Shingle Oil is designed for use on shake roofs, log homes, wood siding, and fences.

CUSTOMER BENEFITS

Chevron Shingle Oil delivers value through:

- **Improved appearance** — Helps maintain the structural strength and stability of the wood by reducing cupping, cracking, and splitting caused by cyclical exposure to sun and rain.
- **Prolonged useful life** — Helps prolong wood's useful life by reducing the effects of weathering.
- **Ability to retard aging** — Helps absorb into the wood and improves the appearance of shake roofs, log homes, wood siding, and fencing.

FEATURES

Chevron Shingle Oil is a straw colored, low viscosity oil designed for use as a shingle or shake dressing for shake roofs, wooden fencing, wood siding, and log homes.

Chevron Shingle Oil penetrates the wood surface to enhance or replace natural oils and resins leached out by cyclical exposure to sun and rain.

Although Chevron Shingle Oil retards the aging process, it will not renew wood that is already weather damaged.

APPLICATIONS

Loose dirt and debris should be removed before the oil is applied. The roof should be hosed with water 24 hours prior to application to lessen the possibility of over application. Alternatively, a licensed contractor can power wash the roof thereby removing weather-damaged wood, allowing oil to absorb into new wood.

Chevron Shingle Oil may be applied by brushing or spraying. The typical application rate is 150-300 square feet per gallon. Application rate depends on the type of wood and the rate at which the oil saturates the wood.

Do not overapply — Over application may lead to shingle or shake "cupping" and the presence of oil in rainwater runoff.

Do not add color pigments — as they will lump and settle out.

Do not walk on treated surfaces — Chevron Shingle Oil is a petroleum oil and is slippery.

Do not use on flat surfaces, such as decks.

Properly licensed contractors may add certain chemicals, such as antifungal agents and other substances, to Chevron Shingle Oil. Be sure to find out what safety or health restrictions may apply to these additives.

To prevent possible damage to foliage:

- Avoid spraying in windy conditions
- Avoid spraying directly on plants

TYPICAL TEST DATA

Product Number	*213304*
SDS Number	*4223*
API Gravity	23.4
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 21.7 3.5
Volatile Organic Compound, g/L	130
Flash Point, COC, °C(°F)	183(361)
Pour Point, °C(°F)	-38(-36)
Color, ASTM	0.5

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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TEGRA® SYNTHETIC BARRIER FLUID

PRODUCT DESCRIPTION

Tegra® Synthetic Barrier Fluid is used as a barrier fluid in dual mechanical seals found in pumps handling hydrocarbon liquids.

CUSTOMER BENEFITS

Tegra Synthetic Barrier Fluid delivers value through:

- **Exceptional thermal and oxidation stability** — Long fluid life in high temperature operation.
- **Low coefficient of friction** helps minimize the operating face temperature of the seal to prevent blistering of the carbon seal face.
- **Excellent wear protection** helps minimize surface wear that can lead to early seal failure.
- **Protection in extreme conditions** — The barrier fluid's inhibition against rust and corrosion, foaming and oil oxidation provides excellent protection in extreme conditions.

FEATURES

Tegra Synthetic Barrier Fluid is formulated to perform as a barrier fluid in dual mechanical seals.

Manufactured from the highest quality polyalphaolefin base fluids, it helps provide protection against wear, oxidation, rust and corrosion, and foaming.

It has a low viscosity and excellent friction reducing ability. The fluid provides excellent low temperature fluidity and high temperature stability for performance over a wide temperature range.

Its light viscosity, high viscosity index, and friction reducing ability helps minimize high face wear and high operating face temperatures that can lead to blistering of carbon seal faces.

Tegra Synthetic Barrier Fluid's excellent oxidation stability, rust protection and foam inhibition helps provide protection to the seal under extreme conditions or in corrosive environments.

APPLICATIONS

Tegra Synthetic Barrier Fluid is designed to meet the needs of a barrier fluid for dual mechanical seals per API Standard 682, *Shaft Sealing Systems for Centrifugal and Rotary Pumps*. Dual mechanical seals are used to control emissions of volatile air pollutants from industrial equipment. Leading seal manufacturers recommend the use of low viscosity synthetic fluids for extended seal life of API Standard 682 dual mechanical seals.

Tegra Synthetic Barrier Fluid is compatible with a wide range of:

- process liquids and does not contain impurities that could lead to catalyst poisoning should it enter the process stream.
- seal elastomers, including Buna N, nitrile, Neoprene, polyacrylate, fluorosilicone, Hypalon, and fluorocarbon.

It has a low Volatile Organic Compound (VOC) level, so that the barrier fluid itself will not be the source of volatile air pollutants in higher temperature applications.

Use of Tegra Synthetic Barrier Fluid will help provide very stable seal performance over a wide temperature range.

Tegra Synthetic Barrier Fluid helps maximize the life of the dual mechanical seal by minimizing the operating face temperature and surface wear.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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TYPICAL TEST DATA

Product Number	*210448*
SDS Number	*6952*
API Gravity	40.9
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 17.1 3.9
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 91.5 39.5
Viscosity Index	127
Flash Point, °C(°F)	228(442)
Pour Point, °C(°F)	-73(-99)
Volatile Organic Compound (VOC), g/liter, ASTM E1868-10	< 10.0

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Chevron Turbine Oil Symbol 2190 TEP

Product Description

Chevron Turbine Oil Symbol 2190 TEP is formulated for use in circulating oil systems for marine gear turbine sets.

Customer Benefits

Chevron Turbine Oil Symbol 2190 TEP delivers value through:

- **Long lubricant life** because of selected base stocks and additives.
- **Extreme pressure characteristics** help provide high film strength to protect gears and bearings engaged in heavy-duty service.
- **MIL-PRF-17331J and MIL-PRF-17331K approved** — Meets stringent military specifications for Navy vessels and submarines.
- **High viscosity index** — Minimal viscosity change in broad operating temperature range enhances lubricant film strength.

Features

Chevron Turbine Oil Symbol 2190 TEP was developed primarily as a circulating system oil for marine gear turbine sets.

Chevron Turbine Oil Symbol 2190 TEP provides mild extreme pressure protection as well as resistance to rust, oxidation, corrosion, and foaming.

Chevron Turbine Oil Symbol 2190 TEP has outstanding thermal and oxidation stability which allows it to withstand the high temperatures found in turbine bearing and gear lubrication.

The foam inhibition helps prevent the buildup of foam in the sump tank with possible vent pipe overflow.

Its excellent stability, high viscosity index, and rust and corrosion inhibition help assure high film strength lubrication for gears and bearings, as well as rust and corrosion protection. Together, these qualities promote both long lubricant and equipment life.

Applications

Chevron Turbine Oil Symbol 2190 TEP is recommended for use in marine turbine reduction gears, where heavy tooth loading and shock loads are encountered.

The extreme pressure properties enable Chevron Turbine Oil Symbol 2190 TEP to meet the requirements of MIL-PRF-17331J and MIL-PRF-17331K.

Do not filter through Fuller's Earth-type filtration systems since this would deplete the additive package.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Typical Test Data

Product Number	*253030*
SDS Number	*4764*
API Gravity	31.9
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 79.8 9.7
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 415 59.1
Viscosity Index	99
Flash Point, °C(°F)	246(475)
Pour Point, °C(°F)	-12(+10)
Color, ASTM D1500	0.5
Conradson Carbon Residue, mass %	0.1
Sulfated Ash, wt %	< 0.001
Corrosion, Copper Strip, 3 h at 100°C	1
Acid Number, ASTM D974, mg KOH/g	0.16

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

24 April 2014
IO-250

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CHEVRON WAY LUBRICANT
32, 68, 220

PRODUCT DESCRIPTION

Chevron Way Lubricants are designed for use in the lubrication of slides and ways of machine tools.

CUSTOMER BENEFITS

Chevron Way Lubricants deliver value through:

- **Excellent separation from metalworking coolants** — The SKC (SKC Gleittechnik) coolant separation test showed excellent separation from a wide variety of commercial coolants.
- **Excellent adhesion** — Stringiness agent minimizes leakage and helps control lubrication costs.
- **Smooth tool motion** — Low coefficient of static friction minimizes the chances of "stick-slip" or jerky movement of machine tool sliding parts which have cast iron or plastic moving on cast iron.

FEATURES

Chevron Way Lubricants are high quality lubricants designed to help meet the critical lubrication demands for the slides and ways of machine tools.

Chevron Way Lubricants are formulated with high quality base stocks and an additive system that help provide extreme pressure and antiwear protection, foam suppression, thermal stability, and demulsification.

These lubricants help provide an unusual adhesive or tacky quality. Chevron Way Lubricants help minimize leakage and adhere to metal surfaces providing a tenacious lubricant film. Due to their adhesiveness, these oils form a tenacious film which helps resist being wiped away by the slowly moving parallel surfaces of the way or being washed away by cutting fluids.

Chevron Way Lubricants are friction modified to meet the exacting lubrication demands for the slides and ways of machine tools. Their inherent low coefficient of static friction minimizes the chances of "stick-slip" or jerky motion of sliding parts on machine tools, which maximizes the operating efficiency of the tools and promotes smooth overall operation.

Chevron Way Lubricants are formulated to help provide excellent way oil separation from the metalworking coolant in the reservoir, minimizing the adverse affect of tramp oil on the coolant stability. Results may vary depending on the chemistry of the metalworking coolant used.

Their antiwear and extreme pressure properties help protect the sliding surfaces.

These oils help protect cast iron and bronze surfaces from rust and corrosion, and are resistant to oxidation to promote long lubricant life.

APPLICATIONS

Chevron Way Lubricants have proven excellence in the lubrication of ways in many types of machine tools, e.g. lathes, planers, shapers, drilling and tapping machines, etc., including those operating at high loads.

These oils perform well in the lubrication of lightly loaded enclosed gears and industrial plain and antifriction bearings. Additionally, their tacky quality makes these oils suitable for once-through applications, e.g. lubrication of chain drives.

Chevron Way lubricants meet the requirements of:

- **MAG Cincinnati, Cincinnati Machine** under their P-53 (ISO 32), P-47 (ISO 68), and P-50 (ISO 220) specifications for way lubricants.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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IO-278

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TYPICAL TEST DATA

ISO Grade	32	68	220
Product Number	*277315*	*273110*	*273111*
SDS Number	*23581*	*23581*	*23581*
AGMA Grade	0	2	5
API Gravity	32.9	31.0	28.5
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 33.6 5.8	 64.6 8.6	 209 18.8
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 173 45.7	 334 55.2	 1102 95.9
Viscosity Index	115	104	100
Flash Point, °C(°F)	220(428)	250(482)	264(507)
Pour Point, °C(°F)	-18(0)	-18(0)	-15(+5)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

WAY OIL VISTAC®
68, 220

PRODUCT DESCRIPTION

Way Oils Vistac® are designed for use in the lubrication of slides and ways of machine tools.

CUSTOMER BENEFITS

Way Oils Vistac deliver value through:

- **Excellent adhesion** — Stringiness agent helps minimize leakage and helps control lubrication costs.
- **Oxidation stability** — Resists deterioration from oxidation and promotes long service life.
- **Smooth tool motion** — Low coefficient of static friction helps minimize stick-slip or jerky movement of sliding parts on machine tools.

FEATURES

Way Oils Vistac help provide extreme pressure and antiwear protection and have stringiness and oiliness characteristics. As indicated by part of the name, Vistac, these lubricants have an unusual adhesive or tacky quality.

Way Oils Vistac minimize leakage and adhere to metal surfaces providing a tenacious lubricant film.

Way Oils Vistac are formulated to meet the critical lubrication demands for the slides and ways of machine tools.

Their inherent low coefficient of static friction minimizes stick-slip or jerky motion of sliding parts on machine tools which maximize operating efficiency of the tools and promotes smooth overall operation.

Due to their adhesiveness, these oils form a tenacious film which resists being wiped away by the slowly moving parallel surfaces of the way or being washed away by cutting fluids.

Their antiwear and extreme pressure properties help protect the sliding surfaces.

These oils also help protect cast iron and bronze surfaces from rust and corrosion, and are resistant to oxidation to promote long lubricant life.

APPLICATIONS

Way Oils Vistac have proven excellence in the lubrication of ways in many types of machine tools, e.g., lathes, planers, shapers, drilling and tapping machines, etc., including those operating at high loads.

These oils can also be used to lubricate bearings found in slides and ways of machine tools.

Their tacky quality makes these oils suitable for once-through applications, e.g., lubrication of chain drives.

If contamination with soluble oils is a problem, Way Lubricants are recommended.

Way Oils Vistac meet the requirements of:

- **MAG Cincinnati, Cincinnati Machine** P-47 (ISO 68), P-50 (ISO 220) specifications for way lubricants

Way Oils Vistac are registered by **NSF** and are acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

15 July 2015
IO-280

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TYPICAL TEST DATA

ISO Grade	68	220
Product Number	*232511*	*232512*
SDS Number	*7459*	*7459*
API Gravity	25.4	25.7
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 64.6 7.3	 209 15.0
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 338 50.8	 1121 79.9
Viscosity Index	61	60
Flash Point, °C(°F)	200(392)	234(453)
Pour Point, °C(°F)	-24(-11)	-15(+5)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

FUEL ADDITIVES

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TECHRON® CONCENTRATE PLUS

Complete Fuel System Cleaner

PRODUCT DESCRIPTION

Techron® Concentrate Plus is a **Complete Fuel System Cleaner** that works in one tankful. It is formulated for gasoline powered passenger cars and light trucks, including carbureted, two-stroke, port fuel injected and direct injected engines.

CUSTOMER BENEFITS

Techron Concentrate Plus, Complete Fuel System Cleaner, is recommended by many major automakers, the world over. It is an *unsurpassed*, complete fuel system cleaner, that can help:

- Clean deposits from fuel injectors, carburetors, intake valves, and combustion chambers
- Cleans, restores, and protects the entire fuel system, including sulfur-contaminated fuel gauge sensors

One tankful of fuel treated with Techron Concentrate Plus, Complete Fuel System Cleaner, can help:

- **Maximize fuel economy**[1]
- **Restore lost power and performance**
- **Restore and protect operation of the fuel gauge sensor**
- **Minimize harmful exhaust emissions**
- **Relieve cold start problems**
- **Minimize deposit-related knock and ping**
- **Restore lost acceleration**
- **Remove deposits from two-stroke engines**[2]

FEATURES

Techron Concentrate Plus, Complete Fuel System Cleaner, with its exclusive formula, is ***unsurpassed*** in cleaning the entire fuel system (fuel injectors, intake valves and combustion chambers) in one tankful. Its use can maximize fuel economy[1] and restore lost power, performance and acceleration.

Techron Concentrate Plus, Complete Fuel System Cleaner, is formulated with a proprietary deposit control additive which can clean sulfur corrosion, a possible cause of fuel gauge malfunction. Regular use can help prevent harmful sulfur components in gasoline from attacking sensitive electronic fuel sending units on some vehicles.

Techron Concentrate Plus, Complete Fuel System Cleaner, works in one tankful and is unbeatable at helping your engine achieve maximum performance and operate with the lowest possible harmful emissions. Also, by cleaning combustion chamber deposits, it can relieve cold start problems and minimize deposit-related knock and ping.

Techron Concentrate Plus, Complete Fuel System Cleaner, is fully compatible and protective in all commercially available ethanol blends (E10, E85, etc).

1 Restores lost fuel economy by removing harmful fuel injector and intake valve deposits.
2 Treat fuel at 1 ounce per gallon (30 ml per 3.78 L).

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

14 April 2015
FA-41

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APPLICATIONS

Techron® Concentrate Plus, Complete Fuel System Cleaner, is designed for gasoline carbureted or fuel injected spark ignition engines. To keep the entire fuel system clean, use Techron Concentrate Plus, Complete Fuel System Cleaner, every 3,000 miles (4,800 km) or at scheduled oil change intervals, not to exceed twice per oil change.

Recommended for use in:

- Spark ignition engines with gasoline, ethanol and gasoline/ethanol blends
- Direct injected gasoline engines (DISI)
- Gasoline hybrid vehicles

Suitable for use in:

- Gasoline two-stroke air-cooled engines (motorcycle or chainsaw)
- Gasoline two-stroke water-cooled engines (motorcycle or marine)
- Gasoline four-stroke lawnmower, motorcycle and marine engines

Will not harm catalytic converters and oxygen sensors.

Not recommended for diesel engines.

PRODUCT AND SDS NUMBERS

Product Number	*266701*
SDS Number	*36726*

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TECHRON® D CONCENTRATE

Diesel Fuel System Cleaner

PRODUCT DESCRIPTION

Techron® D Concentrate, Diesel Fuel System Cleaner is an ultra-high performance, one-tank cleanup, diesel fuel system cleaner designed for use in diesel pickup truck and passenger car engines. The powerful, patented formulation offers superior deposit cleanup, control and engine protection. Its advanced chemistry promotes the efficient removal of harmful conventional nozzle deposits, as well as internal diesel injector deposits (IDID). It is effective in older engines and the latest generation common-rail diesel engines, and offers highly effective performance when used with mineral diesel or biodiesel fuels blends.

CUSTOMER BENEFITS

Techron D Concentrate, Diesel Fuel System Cleaner helps:

- Maximize fuel economy by restoring dirty fuel injectors to like-new condition
- Removal of the natural buildup of carbon deposits through the entire fuel system
- Clean internal diesel injector deposits (IDID), and indirect injection (IDI) and high speed direct injection (HSDI) nozzle-coking deposits
- Restore lost engine power
- Improve engine responsiveness, drivability and engine noise reduction
- Cetane boost, improving combustion for reduced emissions and improved cold starting
- Prevent fuel injector sticking and failure

FEATURES

Techron D Concentrate, Diesel Fuel System Cleaner is uniquely designed to be a one-tank cleanup solution that will clean diesel injectors and keep them performing like new. It can be used with all types of diesel fuel including ultra-low sulfur diesel, bio diesel and bio diesel blends.

APPLICATIONS

One 20-oz. bottle of Techron D Concentrate, Diesel Fuel System Cleaner treats up to 35 gallons of diesel fuel every 3,000 miles (not recommended for gasoline engines).

Techron D Concentrate, Diesel Fuel System Cleaner:

- Will not harm after treatment devices such as Diesel Particulate Filters (DPFs)
- Complies with the federal low-sulfur content requirements for use in diesel motor vehicles
- Is effective in conventional as well as biodiesel blend fuels

TYPICAL TEST DATA

Product Number	*266373*
SDS Number *USA* *Canada* *Mexico*	 *42369* *42377* *42376*
Viscosity, Kinematic mm^2/s at 40°C	 3.0
Density at 15°C	0.854
Flash Point, PM, °C	69 (62)
Appearance	Clear, bright liquid

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

1 February 2017
FA-42

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TECHRON® FUEL INJECTOR CLEANER

PRODUCT DESCRIPTION

Techron® Fuel Injector Cleaner is an aftermarket fuel additive designed to clean gasoline fuel injectors in one tankful.

CUSTOMER BENEFITS

Techron Fuel Injector Cleaner **cleans harmful deposits** from clogged fuel injectors and dirty carburetors in one tankful.

FEATURES

Engines that are sensitive or in severe service can have performance problems caused by fuel injector deposits. Improvements in gasoline that became mandatory January 1, 1995 may not solve all of these problems. Techron Fuel Injector Cleaner with its exclusive Chevron Techron technology can remove deposits from clogged fuel injectors in one tankful. Fuel injector deposits at the injector tip can impact fuel flow, upsetting the air/fuel mixture. The symptoms of these deposits can be:

- Hesitation or stumble during acceleration
- Loss of power
- Increased emissions of hydrocarbons and carbon monoxide

Techron Fuel Injector Cleaner can clean up these deposits in one tankful.

APPLICATIONS

Techron Fuel Injector Cleaner is designed for all carbureted or fuel injected spark ignition engines.

Safe to use every 1,000 miles or as needed to keep fuel injectors clean.

Suitable for use in two-stroke engines.

Will not harm catalytic converters and oxygen sensors.

Not recommended for diesel engines.

PRODUCT AND SDS NUMBERS

Product Number	*266703*
SDS Number	*36730*

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

12 November 2015
FA-50

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TECHRON® PROTECTION PLUS

Marine Fuel System Cleaner

PRODUCT DESCRIPTION

Techron® Protection Plus, Marine Fuel System Treatment is a multi-functional gasoline additive specifically formulated for superior protection and performance, as well as the cleaning power of Techron in the marine environment. Techron Marine is formulated for use in gasoline, and ethyl alcohol (ethanol) blended fuels such as E0 to E85. It is safe for use in all gasoline engines including carbureted, two-stroke, four stroke, port or electronic fuel injected and direct injected engines. For continuous protection, use Techron Marine with every fill-up.

CUSTOMER BENEFITS

- **Alcohol-free formulation** - Uniquely formulated to not contribute to water absorption and is alcohol free, which helps reduce the risk of engine damage caused by excess water in the fuel during the combustion process.
- **Detergency cleans, removes and prevents intake valve deposits** in port fuel injected engines which improves engine operability issues such as rough idle and accelerator / throttle responsiveness.
- **Cleans and controls carbon and combustion chamber deposits**, minimizing cold start problems and deposit-related knock and ping. Prevents gum and varnish and disperses any that already exist in the fuel system.
- **Maximum corrosion (rust) control** of the entire fuel system in the most severe conditions. Test data shows that Techron Marine maximizes corrosion protection in both salt and fresh water environments.[1]
- **Stabilizes fuel for up to 24 months**, delivering more than 4X fuel oxidation stability over pump fuel alone.
- **Restores power and performance** by cleaning fuel injectors, throttle body, carburetor and combustion chamber.
- **Minimizes harmful exhaust emissions** by keeping vital engine parts clean.

FEATURES

Techron Marine is uniquely formulated to be the preferred choice for gasoline engines burning ethanol-free or ethanol-blended fuel, such as E0 to E85. This formulation combines best-in-class corrosion protection, excellent fuel stability, an alcohol-free formula that won't contribute to water absorption, plus the trusted cleaning power of Techron to protect your investment and your engine during the combustion process.

Techron Marine restores power, performance and fuel economy[2], preventing the hassles and expense of corrosion.

1 ASTM D665A / D665B.

2 Restores lost fuel economy by removing harmful fuel injector and intake valve deposits.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

9 July 2018
CPC-55

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APPLICATIONS

Techron® Marine keeps the entire fuel system clean with every fill up. Techron Marine is designed for gasoline carbureted or fuel injected spark ignited engines. For best results before a long period of no use or seasonal storage, add Techron Marine as directed and top off the tank to 7/8 full to allow for any expansion.

Treat rate:

- 1 oz. of Techron Marine treats 10 gallons of gasoline
- One 10 oz. bottle of Techron Marine treats 100 gallons of fuel

Recommended for use in:

- Gasoline engines including carbureted, two-stroke, four stroke, port or electronic fuel injected and direct injected engines. Not for aviation.
- Engines burning ethanol-blended fuel, such as E10, E15 and E85

Will not harm catalytic converters or oxygen sensors.

Not recommended for diesel engines.

For more Techron product options try: Techron Concentrate Plus Complete Fuel System Cleaner, Techron Fuel Injector Cleaner, Techron D Concentrate Diesel Fuel System Cleaner, and Techron Protection Plus Powersports & Small Engine Fuel System Cleaner.

PRODUCT AND SDS NUMBERS

Product Number	*266708*
SDS Number	*46213*

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TECHRON® PROTECTION PLUS

Powersports & Small Engine Fuel System Cleaner

PRODUCT DESCRIPTION

Techron® Protection Plus, Powersports & Small Engine Fuel System Treatment is a multi-functional gasoline additive specifically formulated for superior performance and protection, as well as the cleaning power of Techron in the on- and off-road environments, such as: all types professional outdoor power and lawn care equipment, motorcycles, scooters, ATVs, UTVs, side-by-sides (SXS), dune buggies, go carts and snow mobiles. Techron Powersports & Small Engine Fuel System Cleaner is formulated for use in gasoline, and ethanol-blended fuels such as E0 to E85. It is safe to use in all gasoline engines including carbureted, two-stroke, four stroke, port or electronic fuel injected and direct injected engines.

CUSTOMER BENEFITS

- **Alcohol-free formulation** - Uniquely formulated to not contribute to water absorption, and is alcohol free, which helps reduce the risk of engine damage caused by excess water in the fuel during the combustion process.
- **Maximum corrosion (rust) control** of the entire fuel system in the most severe off-road and performance conditions.
- **Stabilizes fuel for up to 24 months**, delivering more than 4X fuel oxidation stability over pump fuel alone.
- **Restores power and performance** by cleaning fuel injectors, throttle body, carburetor and combustion chamber.
- **Detergency cleans, removes and prevents intake valve deposits** in port fuel injected engines, which improves engine operability issues, such as rough idle and accelerator / throttle responsiveness.
- **Cleans and controls carbon and combustion chamber deposits**, minimizing cold start problems and deposit-related knock and ping. Prevents gum and varnish and disperses any that already exist in the fuel system.
- **Minimizes harmful exhaust emissions** by keeping vital engine parts clean.

FEATURES

Techron Powersports & Small Engine is uniquely formulated to be the preferred choice for gasoline engines burning ethanol-free or ethanol-blended fuel, such as E0 to E85. This formulation combines best-in-class corrosion protection, excellent fuel stability, an alcohol-free formula that won't contribute to water absorption, plus the trusted cleaning power of Techron to protect your investment and your engine during the combustion process.

Techron Powersports & Small Engine stabilizes fuel for long term storage and protects engines from carbon accumulation - restoring power, performance and fuel economy[1], preventing the hassles and expense of corrosion.

1 Restores lost fuel economy by removing harmful fuel injector and intake valve deposits.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

9 July 2018
CPC-56

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APPLICATIONS

Techron® Powersports & Small Engine keeps the entire fuel system clean with every fill-up. Techron Powersports & Small Engine is designed for gasoline carbureted or fuel injected spark ignited engines. For best results before a long period of no use or seasonal storage, add Techron Powersports & Small Engine as directed and top off the tank to 7/8 full to allow for any expansion.

Treat rate:

- 1 oz. of Techron Powersports & Small Engine treates 4 gallons of gasoline
- One 10 oz. bottle of Techron Powersports & Small Engine treats 40 gallons of fuel

Recommended for use in:

- Gasoline engines, including carbureted, two-stroke, four stroke, port or electronic fuel injected and direct injected engines. Not for aviation
- Engines burning ethanol-blended fuel, such as E10, E15 and E85
- Farm and construction equipment

Will not harm catalytic converters and oxygen sensors.

Not recommended for diesel engines.

For more Techron product options try: Techron Concentrate Plus Complete Fuel System Cleaner, Techron Fuel Injector Cleaner, Techron D Concentrate Diesel Fuel System Cleaner, and Techron Protection Plus Marine Fuel System Cleaner.

PRODUCT AND SDS NUMBERS

Product Number	*226707*
SDS Number	*46207*

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

ANTIFREEZE/COOLANTS

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DELO® ELC ANTIFREEZE/COOLANT

PRODUCT DESCRIPTION

Delo® ELC Antifreeze/Coolant products are single phase, ethylene glycol based NOAT (Nitrited Organic Additive Technology) products available in various dilutions that are based on patented aliphatic carboxylate corrosion inhibitor technology specifically formulated for heavy duty cooling system applications that require nitrite.

CUSTOMER BENEFITS

Delo ELC Antifreeze/Coolant products deliver value through:

- **Managing Costs** — Helps eliminate the cost of using SCAs (supplemental coolant additives), regular testing and the manpower required to perform these tasks effectively eliminating those costs when compared to conventional or fully formulated coolants.
- **Long Service Life** — Service life of 1,000,000 miles / 1,600,000 km on-road use / 15,000 hours off-highway use, or 8 years, or 1,500,000 miles/ 2,400,000 km / 20,000 hours of diesel engine coolant system protection when properly maintained with a Delo FleetFix® CME addition at 750,000 miles / 1,200,000 km / 10,000 hours or 4 years.
- **Optimal Cooling System Operation** — The silicate free formula improves heat transfer when compared to silicate containing formulations. Silicates deposits can reduce heat transfer and increase downtime due to over-heating.
- **Maximum Hardware Life** — Maximum water pump life due to minimal water pump seal wear resulting from the silicate free formulation.
- **Excellent Protection** — Effective, long term corrosion protection, even at elevated temperatures, of commonly found cooling system metals. Effective at protecting aluminum in high temperature applications.
- **Variable Applications** — Recommended for use in on-road, off-road and stationary engine applications that call for an extended life, silicate and phosphate free formulation that contains nitrite and molybdate. Can be used in engines using variable fuel types and variable emission control protocols. Check with your OEM for specific product application requirements.
- **Compatibility** — Compatible with other coolant formulations and supplemental coolant additives. Chevron recommends that this product not be diluted by more than 25% with other coolant formulations. Dilution by more than 25% will reduce extended life performance.
- **Biodegradability** — Biodegradable in its unused form.
- **Stability** — Storage stable for a minimum of 8 years as purchased.

FEATURES

Delo ELC Antifreeze/Coolant products are heavy duty engine coolants that use a patented organic corrosion inhibitor technology called aliphatic carboxylates. Delo ELC is free of nitrates, borates, silicates, phosphates and amines. These products contain nitrites and molybdates for additional cylinder liner protection.

Delo ELC Antifreeze/Coolant products are recommended for use in a wide variety of cooling system applications including on-road, off-road and stationary engine applications. These products are also recommended in mixed fleet applications where heavy duty and light duty trucks are present. Please check your OEM's coolant recommendations.

Delo ELC Antifreeze/Coolant products do not require the addition of supplemental coolant additives to obtain their service life of 1,000,000 miles / 1,600,000 km / 15,000 hours, or 8 years, when properly maintained. Routine visual inspections, coolant top-off and annual laboratory testing are recommended to ensure maximum service life.

Delo ELC Antifreeze/Coolant products have been fully tested under the CAT EC-1 specification and have been

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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1 March 2018
COOL-40

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found to meet all the chemical and performance requirements of this specification.

APPLICATIONS

Recommended applications for Delo® ELC Antifreeze/Coolant products:

- Heavy duty engines regardless of fuel type or environmental controls being used where the OEM recommends a silicate free, extended life coolant that contains nitrites[1]
- Mixed fleets where both light duty and heavy duty trucks are present
- Stationary engine applications regardless of fuel type being used
- Marine cooling systems where freeze protection is needed and a nitrite containing coolant is recommended

Delo ELC Antifreeze/Coolant is approved for:

- **Deutz** DQC CB-14

Delo ELC Antifreeze/Coolant meets the specifications of:

- **ASTM** D6210
- **ASTM** D3306
- **Caterpillar** EC-1
- **Detroit** Series 60 and DD15 engines per SVC BRO 0002
- **Navistar** B1 Type 3
- **TMC** RP 329, 302A, 351 (color)

Delo ELC Antifreeze/Coolant is recommended for:

- **Caterpillar** Stationary Natural Gas Engines
- **Cummins** QSK, QST, ISX 15, ISX, ISM, ISL, ISC and ISB Diesel Engines
- **Cummins Westport** ISX 12G and ISL G CNG engines
- **Freightliner and Western Star** Truck Diesel Engines
- **GE - Jenbacher** Stationary Natural Gas Engines
- **Hino** Truck Diesel Engines
- **Isuzu** Truck Diesel Engines
- **Kenworth and Peterbilt** Truck Diesel Engines
- **Kobelco** Construction Equipment Diesel Engines
- **Komatsu** Construction Equipment Diesel Engines
- **MTU** 4000 Diesel Engines
- **Navistar** Truck Diesel Engines
- **Scania and MAN** Truck Diesel Engines
- **Volvo and Mack** Truck Diesel Engines
- **Wärtsilä** Stationary Diesel Engines
- **Waukesha** Stationary Natural Gas Engines
- **White-Superior** Stationary Natural Gas Engines

Note: It is recommended that this product not be diluted with other coolant formulations by more than 25% in order to maintain performance claims.

PRODUCT DILUTION AND BOIL OVER RECOMMENDATIONS FOR DELO ELC ANTIFREEZE/COOLANT - CONCENTRATE

Boiling Protection, °F/°C (using a 15 lb pressure cap) 50% 1:1 (1 part antifreeze/1 part water)	 265/129
Freezing Protection, °F/°C 40% 2:3 (2 parts antifreeze/3 parts water) 50% 1:1 (1 part antifreeze/1 part water) 60% 3:2 (3 parts antifreeze/2 parts water)	 -12/-24 -34/-37 -62/-52

Notes

- Product concentrates should be agitated before use or dilution.
- Delo ELC Antifreeze/Coolant - Premixed 50/50 should be used as purchased. No dilution is recommended.
- For maximum protection against freezing in extremely cold areas, a 60 percent solution of Delo ELC Antifreeze/Coolant - Concentrate (3 parts antifreeze/2 parts water) can be used. Concentrations greater than 67 percent are not recommended.
- Always dispose of used coolant in accordance with local, state and federal guidelines.

1 Some OEMs recommend the use of nitrite free coolants. Check with your OEM.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

PRODUCT REFERENCE

Note: Bitterant is a flavor aversive that may help reduce the accidental ingestion of this product. These products contain bitterant.

Product Number 227808
SDS Number USA 10652
MSDS Number Colombia 33059
Delo® ELC Antifreeze/Coolant - Concentrate

Product Number 227811
SDS Number USA 10673
MSDS Number Colombia 33053
Delo ELC Antifreeze/Coolant - Premixed 50/50

Product Number 275111
SDS Number USA 23721
Delo ELC Antifreeze/Coolant - Premixed 60/40

Product Number 227025
SDS Number USA 38110
Delo FleetFix® CME

TYPICAL TEST DATA

Delo ELC Antifreeze/Coolant - Concentrate

Appearance	Red
Specific gravity 15/15°C	1.130
Freezing point, °C[a] ASTM D1177	-37
pH[b], ASTM D 1287	8.3
Reserve alkalinity[c], ASTM D1121	6.0
Silicate, %[d]	None

a 50 vol % aqueous solution.
b 1:2 dilution with water.
c As received.
d As anhydrous alkali metasilicate.

Minor variations in product typical test data are to be expected in normal manufacturing**.**

Delo ELC Antifreeze/Coolant
ASTM D1384 Glassware Corrosion Test

Delo ELC Antifreeze/Coolant ASTM D1384 Glassware Corrosion Test		
	ASTM Limit	Weight loss, mg per coupon[a]
Copper	10 max	2
Solder	30 max	0
Brass	10 max	-1
Steel	10 max	-1
Iron	10 max	-1
Aluminum	30 max	3

a Negative indicates net gain.

pH AND RA COMPARISON OF DELO ELC ANTIFREEZE/COOLANT VERSUS TRADITIONAL COOLANTS IS SHOWN BELOW:

	Delo ELC Antifreeze/ Coolant	Traditional Antifreeze/ Coolant
Typical pH	8.3	10.5
Typical RA[a] (mL)	6.0	12.0

a RA is defined as the amount in milliliters (mL), of 0.1 normal hydrochloric acid required to reduce the pH of 10 ml of antifreeze to 5.5.

DELO FLEETFIX CME ADDS VALUE THROUGH:

- **Product Specific Formulation** — Specifically formulated to work with Delo ELC. Delo FleetFix CME should be added at 750,000 miles / 1,200,000 km / 10,000 hours, or 4 years, in order to obtain up to 1,500,000 miles / 2,400,000 km / 20,000 hours, or 8 years of diesel engine coolant system protection.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Quantity of Delo FleetFix CME needed at 750,000 miles / 1,200,000 km of on-road use (4 years or 10,000 hours of off-highway use)		
Cooling System Capacity		**Delo FleetFix CME Quantity**
Gallons	Liters	Quarts
1-5	4-19	0.5 quart
6-8	23-30	1 quart
9-12	34-45	1.5 quarts

Delo FleetFix CME should only be used with Delo ELC Antifreeze/Coolants.

TYPICAL TEST DATA
For Delo FleetFix CME

Appearance	Red
Specific gravity	1.06
Silicate, %	None

Minor variations in product typical test data are to be expected in normal manufacturing.

HANDLING PRACTICES

The primary limiting factor in the shelf life of a coolant is silicate instability. Since silicate will eventually polymerize to silicate gel, silicate containing coolants have a shelf life of about 18 months. Delo ELC Antifreeze/Coolant is silicate-free and therefore can be stored for at least 8 years, provided the integrity of the container is maintained. Product should be agitated before use.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® ELC PG ANTIFREEZE/COOLANT

PRODUCT DESCRIPTION

Delo® ELC PG Antifreeze/Coolants are single phase, propylene glycol type products based on Chevron's patented aliphatic carboxylate inhibitor system with nitrite and molybdate added and are available as a concentrate or a 50/50 pre-dilute.

CUSTOMER BENEFITS

Delo ELC PG Antifreeze/Coolants deliver value through:

- **Improved economics** — Eliminates the cost of using SCAs (supplemental coolant additives), regular testing and the manpower required to perform these tasks effectively eliminating those costs when compared to conventional of fully formulated coolants.
- **Long Service Life** — 750,000 miles/1,200,000 km on-road use (8 years or 12,000 hours off-highway use) or 1,000,000 miles/1,600,000 km/20,000 hours/8 years with a Delo FleetFix® CME addition at 500,000 miles/800,000 km/10,000 hours/4 years.
- **Improved cooling system operation** — The silicate free formula improves heat transfer compared to silicate containing formulations. Silicate deposits can reduce heat transfer and increase downtime due to over-heating.
- **Improved Hardware Life** — Improved water pump life due to reduced water pump seal wear resulting from silicate free formulation.
- **Excellent Protection** — Effective, long term corrosion protection, even at elevated temperatures, of commonly found cooling system metals. Effective at protecting aluminum in high temperature applications.
- **Variable Applications** — Recommended for use in on-road, off-road and stationary engine applications that recommend a PG based extended life, silicate and phosphate free coolant containing nitrites. Can be used in engines using variable fuel types and variable emission control protocols.[1] Check with your OEM for specific product application requirements.
- **Compatibility** — Compatible with other coolant formulations and supplemental coolant additives. Mixing of ethylene glycol and propylene glycol based coolant/antifreeze products is not recommended. Chevron recommends that this product not be diluted by more than 25% with other coolant formulations. Dilution by more than 25% will reduce extended life properties.
- **Biodegradability** — Readily biodegradable in its unused form.
- **Less Toxic** — Uses a propylene glycol base that is less acutely toxic than ethylene glycol.
- **Stability** — Storage stable for a minimum of 8 years as purchased.

FEATURES

Delo ELC PG Antifreeze/Coolants are heavy duty engine coolants that contains a patented organic corrosion inhibitor technology called aliphatic carboxylates. Delo ELC PG Antifreeze/Coolant is free of nitrates, borates, silicates, phosphates and amines. These products contain nitrites and molybdates for additional cylinder liner protection.

Delo ELC PG Antifreeze/Coolants are recommended for use in a wide variety of cooling system applications including on-road, off-road and stationary engine applications.

1 Some OEMs recommend the use of nitrite free coolants. Some OEMs also do not recommend the use of PG based coolants. Check with your OEM for specific recommendations.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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Delo® ELC PG Antifreeze/Coolants are also recommended for use in mix fleet applications where heavy duty and light duty trucks are present. Please check your OEM's coolant recommendations.

Delo ELC PG Antifreeze/Coolants do not require the addition of supplemental coolant additives to obtain a service life of 750,000 miles/1,200,000 km/8 years/ 12,000 hours with correct top-up practices.

Delo ELC PG Antifreeze/Coolants meet the CAT EC-1 specification.

APPLICATIONS

Recommended applications for Delo ELC PG Antifreeze/ Coolants:

- Heavy duty engines regardless of fuel type or environmental controls being used where the OEM recommends an extended life, PG based, silicate and phosphate free coolant that contains nitrites[2]
- Mixed fleets where both light duty and heavy duty trucks are present
- Stationary engine applications regardless of fuel type being used
- Marine cooling systems where freeze protection is needed and a nitrite containing coolant is recommended
- Environments where freeze protection and a low acute toxicity base fluid is needed
- Meets or Exceeds: **CAT** EC-1, **ASTM** D6210

PRODUCT DILUTION AND BOIL OVER RECOMMENDATIONS FOR DELO ELC PG ANTIFREEZE/COOLANT - CONCENTRATE

Boiling Protection, °C/°F (using a 15 lb pressure cap) 50% 1:1 (1 part antifreeze/1 part water)	 126.7/260
Freezing Protection, °C/°F 40% 2:3 (2 parts antifreeze/3 parts water) 50% 1:1 (1 part antifreeze/1 part water) 60% 3:2 (3 parts antifreeze/2 parts water)	 -21.6/-7 -32.7/-27 -56.7/-70

Notes

- Product concentrates should be agitated before use or dilution.
- Prediluted 50/50 products should be used as purchased.
- For maximum protection against freezing in extremely cold areas, a 60 percent solution of Delo ELC PG Antifreeze/Coolant - Concentrate (3 parts antifreeze/2 parts water) can be used. Concentrations greater than 67 percent are not recommended.
- Always dispose of used coolant in accordance with local, state and federal guidelines.

PRODUCT REFERENCE

Product Number 275110
SDS Number 23711
Delo ELC PG Antifreeze/Coolant - Concentrate

Product Number 275109
SDS Number 23715
Delo ELC PG Antifreeze/Coolant - Premixed 50/50

Product Number 227025
SDS Number 38110
Delo FleetFix® CME

2 Some OEMs recommend the use of nitrite free coolants. Some OEMs also do not recommend the use of PG based coolants. Check with your OEM for specific recommendations.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

Delo® ELC PG Antifreeze/Coolant - Concentrate

	ASTM 3306 requirements	Method used	
Propylene glycol	Base		91.5% w/w glycol
Other glycols	5% w/w max.		0.5% max.
Inhibitor content			5% w/w
Water content	5% w/w max	ASTM D1123	4% w/w max
Ash content	5% w/w max	ASTM D1119	1.4% w/w
Nitrite content			1100
Color			Pink
Specific gravity, 15°C	1.030 to 1.065	ASTM D1122	
Specific gravity, 20°C		ASTM D1122	1.042
Equilibrium boiling point	> 152°C	ASTM D1120	165°C
Reserve alkalinity	report	ASTM D1121	6.3
Refractive index			1.431

Minor variations in product typical test data are to be expected in normal manufacturing.

Delo ELC PG Antifreeze/Coolant - Premixed 50/50

	ASTM 3306 requirements	Method used	
pH	7.5 to 11.0	ASTM D1287	8.5
Foaming properties at 25°C break time		ASTM D1881	50 ml 5 sec.
Foaming properties at 88°C break time	150 ml max.	ASTM D1881	50 ml 5 sec. typ.
Freezing protection			-33°C

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® FLEETFIX® CME ADDS VALUE THROUGH:

- **Product Specific Formulation** — Specifically formulated to work with Delo ELC PG. Delo FleetFix CME should be added at 500,000 miles, 800,000 km, 10,000 hours or 4 years in order to obtain a service interval of 1,000,000 miles, 1,600,000 km, 20,000 hours or 8 years.

Delo FleetFix CME has been specifically formulated to double the life of Delo ELC PG Antifreeze/Coolant. It should only be added at 500,000 miles/800,000 km/ 10,000 hours/4 years.

Quantity of Delo FleetFix CME needed at 500,000 miles (800,000 km) of on-road use (4 years or 10,000 hours of off-highway use)		
Cooling System Capacity		**Add Required Quantity of Delo FleetFix CME**
Gallons	Liters	Quantity
5-8	22-30	1/2 Quart Bottle
8-13	30-49	1 Quart Bottle
13-22	49-83	1-1/2 Quart Bottles
22-30	83-114	2 Quart Bottles
30-41	114-155	3 Quart Bottles
41-52	155-197	4 Quart Bottles
52-64	197-243	5 Quart Bottles

Delo FleetFix CME should only be used with Delo PG ELC Coolants.

TYPICAL TEST DATA

Delo FleetFix CME

Appearance	Red
Specific Gravity	1.06
Silicate, %	None

Minor variations in product typical test data are to be expected in normal manufacturing.

HANDLING PRACTICES

The primary limiting factor in the shelf life of a coolant is silicate instability. Since silicate will eventually polymerize to silicate gel, silicate containing coolants have a shelf life of about 18 months. Delo ELC PG Antifreeze/Coolants are silicate-free and therefore can be stored for at least 8 years, provided the integrity of the container is maintained. Products should be agitated before use.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® ELI CORROSION INHIBITOR

PRODUCT DESCRIPTION

Delo® ELI Corrosion Inhibitor is a water-based inhibitor, super concentrate, using a patented synergistic combination of aliphatic carboxylates that also contains nitrite and molybdate as secondary inhibitors.

CUSTOMER BENEFITS

Delo ELI Corrosion Inhibitor delivers value through:

- **Long Service Life** — 600,000 miles, 1,000,000 km, 12,000 hours, 6 years in on-road and off-road engine applications and **32,000 hours** or 8 years in stationary engines with yearly testing required.
- **Corrosion Protection** — Extended life corrosion protection in aqueous solutions for engine metals, including aluminum, iron, steel, brass, copper and solder alloys.
- **Compatibility** — Compatible with glycol-based engine coolants and other water based corrosion inhibitors. Dilution of this product by more than 25% with other inhibitor technologies will reduce inhibitor protection performance. Excellent elastomer compatibility.
- **Wide Application** — Recommended for use in internal combustion engines regardless of fuel type where freeze point is not needed and the OEM recommends a nitrite containing, silicate free water based extended life coolant.[1] Delo ELI Corrosion Inhibitor has been successfully used in marine, on-road, off-road and stationary application engines. This product also can be used as an extended life heat transfer fluid in circulating systems.
- **Excellent Protection** — Protects cooling system engine metals including aluminum against erosion, corrosion and cavitation. Silicate free formula shows improved water-pump life over silicate containing coolants.
- **Improved economics** — Low depletion rates helps eliminate need for additional supplemental coolant additives. Delo ELI Corrosion Inhibitor is a super concentrate and should be diluted to 5.5%-10% with good quality water before use.
- **Heat Transfer** — Non deposit forming formula helps maintain heat transfer efficiencies.
- **Environmentally friendly** — At the recommended use rate (5.5 - 10wt% in water), Delo ELI Corrosion Inhibitor has low aquatic toxicity and no long-term effects on the environment. The extended life of the in-use product minimizes the need for frequent disposal, further contributing to the protection of the environment. Undiluted Delo ELI Corrosion Inhibitor concentrate could potentially be harmful to the environment if spilled or improperly disposed, so care should be taken to prevent such releases.
- **Stability** — Shelf life of 1 year. Service life of 6 years minimum.

FEATURES

Delo ELI Corrosion Inhibitor is a water based, extended life corrosion inhibitor based on aliphatic carboxylates that is recommended for use in a wide variety of cooling systems in industrial, on-road, off-road and stationary applications.

Delo ELI Corrosion Inhibitor is recommended where complete cooling system protection is needed but where freeze protection is not required.

APPLICATIONS

Delo ELI Corrosion Inhibitor is recommended for use in industrial and commercial cooling systems where the OEM recommends a silicate free, nitrite containing water based corrosion inhibitor system.

Delo ELI Corrosion Inhibitor is recommended for use in **Caterpillar** and other engine OEM applications where a nitrite containing, silicate free extended life coolant is specified.

1 Check for specific OEM recommendations.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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Toxicological & environmental aspects
At the recommended use rate (5.5 - 10wt% in water), Delo® ELI Corrosion Inhibitor has low aquatic toxicity and no long-term effects on the environment. The extended life of the in-use product minimizes the need for frequent disposal, further contributing to the protection of the environment. Undiluted Delo ELI Corrosion Inhibitor concentrate could potentially be harmful to the environment if spilled or improperly disposed, so care should be taken to prevent such releases.

PRODUCT REFERENCE

Product Number 236541
SDS Number 38254
Delo ELI Corrosion Inhibitor - Concentrate

TYPICAL TEST DATA

Delo ELI Corrosion Inhibitor

Technical Characteristics	Method	Delo ELI
Inhibitor content		50% w/w
Water content	ASTM D1123	50% w/w
Amine, phosphate, borate, silicate		None
Color		Red
Specific gravity, 20°C	ASTM D1122	1.08 typ.
pH	ASTM D1287	8.3 typ.
Storage stability		1 year
	Method	**5% dilution**
pH	ASTM D1287	8.3 typ.
Foaming properties at 25°C	ASTM D1881	55 ml typ.
• break Time		3 sec typ.
Effect on non-metals	GME 60 255	no effect
Hard water stability	VW PV 1426	no precipitate

Minor variations in product typical test data are to be expected in normal manufacturing.

Delo ELI Corrosion Inhibitor
ASTM D1384 Glassware Corrosion Test

	ASTM D3306 (max)	5% Delo ELI Weight loss, mg per coupon[a]
Copper	10 max	1.6
Solder	30 max	-0.3
Brass	10 max	1.7
Steel	10 max	0.2
Cast Iron	10 max	1.5
Aluminum	30 max	4.6

a Weight loss AFTER chemical cleaning. All weight losses are in mg/coupon. Weight gain is indicated by a "-" sign.

HANDLING PRACTICES

Delo ELI Corrosion Inhibitor is a water based product and will freeze. This product is not combustible. It is recommended that this product be stored indoors to prevent freezing. If freezing occurs product should be defrosted and agitated before use.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® FLEETFIX® CME

PRODUCT DESCRIPTION

Delo® FleetFix® CME has been formulated to provide an easy conversion, maintenance and extender formula in one package to help customers either convert to or maintain Delo ELC performance levels in their coolant systems for diesel engines.

CUSTOMER BENEFITS

- **Beneficial Formulation** — The concentrated corrosion inhibitors are diluted in a 50/50 mix of water and ethylene glycol. Use of Delo FleetFix CME will not affect the freeze point of a cooling system for either conversion/maintenance/extender as long as the cooling system is currently at a 50/50 dilution.
- **Easy to Use** — Delo Fleetfix CME is easy to use, simply add to the cooling system at the appropriate level, whether it is being used as an extender, maintenance fluid or converting a system to Delo ELC. The Chevron Kool Tools Kit contains easy to use recommendation charts to assist with conversion/maintenance/extending Delo ELC and protecting your cooling system.
- **Convenient Packaging** — Delo FleetFix CME is available in 12/1 quart cases and can be used straight out of the box at the recommended level based on the cooling system requirements.
- **Long Service Life** — When using Delo FleetFix CME properly, the Delo ELC coolant will have a service life of 1,500,000 miles / 2,400,000 km / 20,000 hours, or 8 years, if correct top-up and maintenance practices are followed.
- **Wide Service Application** — The Delo FleetFix CME product can be used by customers with on-road, off-road or industrial cooling systems.

WARNING: Even-though Delo FleetFix CME contains glycol and water, it should not be used as a coolant/antifreeze. Delo FleetFix CME is to be used only as an extender, maintenance or conversion fluid.

APPLICATIONS

Conversion:

Delo FleetFix CME is easy to use but requires a different process than the one used for a conversion done by draining, flushing and refilling or just draining and filling. The cooling system should be cool (< 100°F/38°C) before beginning the conversion procedure.

General Delo FleetFix CME conversion steps:

Step 1: **Pre-test the coolant in-service that is going to be converted.** During this step the coolant that is going to be converted to Delo ELC needs to be tested for freeze point, pH and nitrite levels using the Delo ELC Coolant Maintenance Kit and Kool Tools reference materials. If the tested coolant passes, then go to step 2. If the coolant fails the pre-test, then the reason for failure should be identified and corrected. The cooling system should then be drained, flushed and refilled with a fresh charge of Delo ELC Antifreeze/Coolant - Premixed 50/50.

Step 2: Add Delo FleetFix CME. Delo FleetFix CME should be added based on the cooling system capacity. One gallon (4 quarts) of Delo FleetFix CME should be added for every 9–12 gallons (34-45 liters) of cooling system capacity. The chart below will help determine how much Delo FleetFix CME needs to be added.

Cooling System Capacity		
Gallons	**Liters**	**Delo FleetFix CME needed**
6–8 gallons	23–30 liters	3 quarts
9–12 gallons	34–45 liters	4 quarts
13–21 gallons	49–79 liters	5 quarts
22-30 gallons	83-114 liters	6 quarts
31–40 gallons	117–151 liters	7 quarts
41–51 gallons	155–193 liters	8 quarts

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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COOL-20

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Step 3: Take a sample of the converted coolant. This is done to ensure that the conversion process was done correctly. The post test will evaluate the converted coolant for freeze point, pH, nitrite and carboxylate levels. Carboxylates are the corrosion inhibitors found in Delo® ELC Antifreeze/Coolant. The post test of the converted coolant will identify if the pre-test was done correctly and if enough Delo FleetFix® CME was added. The results of the conversion test will provide instructions to the customer on how to solve any issues that might arise. Another benefit of the post conversion test is that it will provide to both the customer and Chevron a baseline of the converted coolant condition.

Step 4: Attach a Delo ELC Premixed 50/50 Smartfill label. These are found in the Delo ELC Coolant Maintenance Kit to show that the Radiator system has been converted to Delo ELC Premixed 50/50. These labels should be attached to the coolant addition port and be visible to anyone doing cooling system maintenance. These labels should be attached to a clean surface to improve adhesion.

Extender:

Delo FleetFix CME is also specifically formulated to work with Delo ELC and should be added at 750,000 miles / 1,200,000 km / 10,000 hours, or 4 years, in order to obtain a service interval of 1,500,000 miles / 2,400,000 km / 20,000 hours or 8 years.

Quantity of Delo FleetFix CME needed at 750,000 miles/1,200,000 km of on-road use (4 years or 10,000 hours of off-highway use)		
Cooling System Capacity		**Delo FleetFix CME Quantity**
gallons	**liters**	**quarts**
6-8	23-30	1 quart
9-12	34-45	1.5 quarts
13-21	49-79	2 quarts
22-30	83-114	2.5 quarts
31-40	117-151	3 quarts
41-51	155-193	3.5 quarts
52-64	197-242	4 quarts

Maintenance:

Cooling systems converted to Delo ELC will require the same maintenance regardless of the conversion method used.

In general, there are two maintenance steps that are required when using Delo ELC Antifreeze/Coolant - Premixed 50/50.

Step 1: Use only Delo ELC Antifreeze/Coolant - Premixed 50/50 for top-up. If the Delo ELC Antifreeze/Coolant - Premixed 50/50 has been mixed with another coolant (assuming less than 25% mixture in the cooling system), then Delo FleetFix CME can be added to help return the mixed coolant back to the performance properties of Delo ELC Antifreeze/Coolant - Premixed 50/50.

Step 2: Check the freeze point, pH and nitrite levels of the coolant at least two times per year or at every PM.

In order to reduce the likelihood of contamination/ dilution it is recommended that:

- All non-Delo ELC coolants are to be removed from the maintenance shop.
- All chemical water filters or liquid SCAs are to be removed from the maintenance shop.
- Use the Delo ELC Coolant Maintenance Kit to help set up a best in class coolant maintenance program to achieve the optimal performance life of Delo ELC Antifreeze/Coolant - Premixed 50/50.

If a fleet is having problems with contamination/ dilution of Delo ELC with other products, then the customer should consider the use of one of these approved methods for testing:

- **On-site testing options.** Use the Delo FleetFix carboxylate test strips to check carboxylate levels. If this fails, then move to the Delo FleetFix ELC Dilution test kit to check level of contamination and determine the correct steps for fixing the coolant system.
- **Mail-in testing**. Mail-in coolant sample kits are available through Chevron or its Lubricant Marketer channels. Each kit contains 10 tests. Two testing levels are available. The Extended Life Coolant Advanced program will evaluate the coolant sample for pH, freeze point, % water, nitrite, carboxylates, chloride, silicate, phosphate, molybdate and various metals.

PRODUCT RECOMMENDATIONS AND APPROVALS

Cooling systems converted using Delo® FleetFix® CME will meet the performance requirements of most major U.S. OEMs. This process has been used successfully in major engine types including **Detroit Diesel, Caterpillar, Cummins, International, Mack** and **Volvo**.

PRODUCT REFERENCE

Product Number 227025
SDS Number 38110
Delo FleetFix CME

TYPICAL TEST DATA

Delo FleetFix CME

Appearance	Bright Red
Freeze point (as sold)	-34°F(-37°C)

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® FLEETFIX® CMX

PRODUCT DESCRIPTION

Delo® FleetFix® CMX has been formulated to provide an easy conversion, maintenance and extender formula in one package to help customers either convert to or maintain Delo XLC performance levels in their coolant systems for diesel engines.

CUSTOMER BENEFITS

- **Easy to Use** — Simply add Delo Fleetfix CMX to the cooling system at the appropriate level, whether it is being used as an extender, maintenance fluid or converting a system to Delo XLC. The Chevron Kool Tools Kit contains easy to use recommendation charts to assist with conversion/maintenance/ extending Delo XLC and protecting your cooling system.
- **Convenient Packaging** — Delo FleetFix CMX is available in 12/1 quart cases and can be used straight out of the box at the recommended level based on the cooling system requirements.
- **Long Service Life** — When using Delo FleetFix CMX properly, the Delo XLC coolant will have a service life of 1,200,000 miles / 1,900,000 km / 20,000 hours, or 8 years, if correct top-up and maintenance practices are followed.
- **Wide Service Application** — The Delo FleetFix CMX product can be used by customers with on-road, off-road or industrial cooling systems.
- **Delo FleetFix CMX Color** — Is clear to allow for ease of mixture with various color dyes that may be found in cooling systems.

WARNING: Delo FleetFix CMX was not developed as an antifreeze/coolant, it is to be used only as an extender, maintenance or conversion fluid.

APPLICATIONS

Conversion: Delo FleetFix CMX is easy to use but requires a different process than the one used for a conversion done by draining, flushing and refilling or just draining and filling. The cooling system should be cool (< 100°F/38°C) before beginning the conversion procedure.

General Delo FleetFix CMX conversion steps:

Step 1: **Pre-test the in-service coolant that is going to be converted.** During this step the coolant that is going to be converted to Delo XLC needs to be tested for freeze point and pH levels using the Delo XLC Coolant Maintenance Kit and Kool Tools reference materials. If the tested coolant passes, then go to step 2. If the coolant fails the pre-test, then the reason for failure should be identified, corrected, and the cooling system should then be drained, flushed and refilled with a fresh charge of Delo XLC Antifreeze/Coolant - Premixed 50/50.

Step 2: Add Delo FleetFix CMX. Delo FleetFix CMX should be added based on the cooling system capacity. One gallon (4 quarts) of Delo FleetFix CMX should be added for every 9–12 gallons (34-45 liters) of cooling system capacity. The chart below will help determine how much Delo FleetFix CMX needs to be added.

Cooling System Capacity		
Gallons	**Liters**	**Delo FleetFix CMX needed**
1–5 gallons	4–19 liters	2 quarts
6–8 gallons	23–30 liters	3 quarts
9–12 gallons	34–45 liters	4 quarts
13–21 gallons	49–79 liters	5 quarts
22-30 gallons	83-114 liters	6 quarts
31–40 gallons	117–151 liters	7 quarts
41–51 gallons	155–193 liters	8 quarts

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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COOL-25

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Step 3: Take a sample of the converted coolant. This is done to ensure that the conversion process was done correctly. The post test will evaluate the converted coolant for freeze point, pH, and carboxylate levels. Carboxylates are the corrosion inhibitors found in Delo® XLC Antifreeze/Coolant. The post test of the converted coolant will identify if the pre-test was done correctly and if enough Delo FleetFix® CMX was added. The results of the conversion test will provide instructions to the customer on how to solve any issues that might arise. Another benefit of the post conversion test is that it will provide to both the customer and Chevron a baseline of the converted coolant condition.

Step 4: Attach a Delo XLC Premixed 50/50 Smartfill label. These are found in the Delo XLC Coolant Maintenance Kit to show that the coolant system has been converted to Delo XLC Premixed 50/50. These labels should be attached to the coolant addition port and be visible to anyone doing cooling system maintenance. These labels should be attached to a clean surface to improve adhesion.

Extender:

Delo FleetFix CMX is also specifically formulated to work with Delo XLC and should be added at 600,000 miles / 960,000 km / 10,000 hours, or 4 years, in order to obtain a service interval of 1,200,000 miles / 1,900,000 km / 20,000 hours or 8 years.

Quantity of Delo FleetFix CMX needed at 600,000 miles / 960,000 km of on-road use (4 years or 10,000 hours of off-highway use)		
Cooling System Capacity		**Delo FleetFix CMX Quantity**
gallons	**liters**	**quarts**
1-5	4-19	0.5 quart
6-8	23-30	1 quart
9-12	34-45	1.5 quarts
13-21	49-79	2 quarts
22-30	83-114	2.5 quarts
31-40	117-151	3 quarts
41-51	155-193	3.5 quarts
52-64	197-242	4 quarts

Maintenance:

Cooling systems converted to Delo XLC will require the same maintenance regardless of the conversion method used.

In general, there are two maintenance steps that are required when using Delo XLC Antifreeze/Coolant - Premixed 50/50.

Step 1: Use only Delo XLC Antifreeze/Coolant - Premixed 50/50 for top-up. If the Delo XLC Antifreeze/Coolant - Premixed 50/50 has been mixed with another coolant (assuming less than 25% mixture in the cooling system), then Delo FleetFix CMX can be added to help return the mixed coolant back to the performance properties of Delo XLC Antifreeze/Coolant - Premixed 50/50.

Step 2: Check the freeze point and pH levels of the coolant at least two times per year or at every PM.

In order to reduce the likelihood of contamination/ dilution it is recommended that:

- All non-Delo XLC coolants are to be removed from the maintenance shop.
- All chemical water filters or liquid SCAs are to be removed from the maintenance shop.
- Use the Delo XLC Coolant Maintenance Kit to help set up a best in class coolant maintenance program to achieve the optimal performance life of Delo XLC Antifreeze/Coolant - Premixed 50/50.

If a fleet is having problems with contamination/ dilution of Delo XLC with other products, then the customer should consider the use of one of these approved methods for testing:

- **On-site testing options.** Use the Delo FleetFix carboxylate test strips to check carboxylate levels. If this fails, then move to the Delo FleetFix XLC Dilution test kit to check level of contamination and determine the correct steps for fixing the coolant system.
- **Mail-in testing**. Mail-in coolant sample kits are available through Chevron or its Lubricant Marketer channels. Each kit contains 10 tests. Two testing levels are available. The Extended Life Coolant Advanced program will evaluate the coolant sample for pH, freeze point, % water, nitrite, carboxylates, chloride, silicate, phosphate, molybdate and various metals.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

PRODUCT RECOMMENDATIONS AND APPROVALS

Cooling systems converted using Delo® FleetFix® CMX will meet the performance requirements of most major U.S. OEMs. This process has been used successfully in major engine types including **Detroit Diesel, Cummins, International, Mack** and **Volvo**.

PRODUCT REFERENCE

Product Number 227019
SDS Number 43277
Delo FleetFix CMX

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® XLC ANTIFREEZE/COOLANT

PRODUCT DESCRIPTION

Delo® XLC Antifreeze/Coolant is a non-nitrited extended life OAT (Organic Additive Technology) formulation for heavy or light duty vehicles and other equipment. Delo XLC is formulated with an aliphatic carboxylate corrosion inhibitor system available as a concentrate and a premix 50/50.

CUSTOMER BENEFITS

Delo XLC Antifreeze/Coolant products deliver value through:

- **Long Service Life** — Service life of 1,000,000 miles / 1,600,000 km / 15,000 hours, or 8 years, or 1,200,000 miles / 1,900,000 km / 20,000 hours or 8 years of diesel engine coolant system protection when properly maintained with a Delo FleetFix® CMX addition at 600,000 miles / 960,000 km / 10,000 hours or 4 years.
- **Excellent Protection** — Excellent protection against pitting, corrosion and erosion even on hard to protect metals like aluminum.
- **Minimized Maintenance and Related Costs** — Recommend Delo Coolant Maintenance Kit for routine coolant testing to help detect and eliminate cooling system issues.
- **Heat Transfer** — Excellent heat transfer compared to silicate containing coolants.
- **Hardware Life** — Maximum water pump life due to no silicate formula.
- **Various Applications** — Excellent protection for mixed fleets where the OEM specifies a nitrite free coolant. Can be used in heavy duty engines using reduced emission protocols including or combining EGR, DPF, SCR and after-cooler technologies. This product is recommended for mixed fleet applications.[1]
- **Wide Temperature Applications** — Protection against winter freeze-up and summer boil-over.
- **Biodegradability** — Biodegradable in its unused form.
- **Compatibility** — Compatible with conventional antifreeze. Dilution with conventional antifreeze will reduce extended life benefits. Chevron recommends that this product not be diluted by more than 25% with other coolant formulations.
- **Stability** — Can be stored for 8 years in sealed containers without any effect on the product quality or performance.

FEATURES

Delo XLC Antifreeze/Coolant is a heavy-duty, ethylene glycol based engine coolant which incorporates patented organic corrosion inhibitor technology called aliphatic carboxylates. The Delo XLC formula is free of nitrite, nitrate, borate, phosphate, silicate, and amines, and provides maximum protection of the six basic metal alloys found in most heat transfer systems. Delo XLC products do not contain phosphates or silicates which are known to contribute to hard water scale issues. Delo XLC promotes maximum water pump seal life by eliminating inorganic corrosion inhibitors. Delo XLC has a recommended service life of 1,000,000 miles / 1,600,000 km / 15,000 hours or 8 years. This product will not require the addition of supplementary coolant additives (SCA's) to achieve its recommended service life. Routine visual inspections, coolant top-off and annual laboratory testing are recommended to ensure maximum service life.

Note: These products are not to be used to protect the inside of potable water systems against freezing.

APPLICATIONS

Recommended applications for Delo XLC Antifreeze/Coolant:

1 Some OEM's require the use of nitrite in heavy duty engine applications.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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COOL-46

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- Heavy duty engines regardless of fuel type or environmental controls being used where the OEM recommends a nitrite free, silicate free coolant.
- Mixed fleets where automobiles, light duty trucks and heavy duty trucks are being serviced and the OEM recommends a nitrite free, silicate free product.[1]
- Recreational vehicles where a nitrite free, silicate free product is recommended.
- On-road, Off-road and Marine cooling system applications.

Delo® XLC Antifreeze/Coolant is approved for:

- **Cummins** CES 14439
- **Detroit Diesel** DFS93K217ELC
- **Deutz** DQC CB-14
- **Komatsu** KES 07.892
- **MAN** 324 Type SNF
- **MB-Approval** 325.3 (Concentrate)
- **MB-Approval** 326.3 (Premixed 50/50)

Delo XLC Antifreeze/Coolant meets the specifications of:

- **ASTM** D3306
- **ASTM** D6210
- **DAF** 74002
- **MTU** MTL 5048
- **TMC** RP 364

Delo XLC Antifreeze/Coolant is recommended for use in:

- **GE - Jenbacher** Stationary Natural Gas Engines
- **Hino** Truck Diesel Engines
- **Isuzu** Truck Diesel Engines
- **Kobelco** Construction Equipment Diesel Engines
- **MTU** 2000/4000 Diesel Engines
- **Navistar**™ MAXXFORCE Engines
- **Scania** Truck Diesel Engines
- **Volvo** Construction Equipment (VCE) Diesel Engines
- **Volvo and Mack** Truck Diesel Engines
- **Wärtsilä** Stationary Diesel Engines
- **Vestas** Wind Turbine Power Electronics External Coolant System
- European HD OEMs that require both Phosphate-free and Nitrite-free formulations
- Japanese HD OEMs that require Silicate-free formulations

It is recommended that this product not be diluted with other coolant formulations by more than 25% in order to maintain performance claims.

Product Dilution and Boil Over Protection Recommendations for Delo XLC Antifreeze/Coolant - Concentrate

Boiling Protection, °F/°C (using a 15 lb pressure cap) 50% 1:1 (1 part antifreeze/1 part water)	 265/129
Freezing Protection, °F/°C 40% 2:3 (2 parts antifreeze/3 parts water) 50% 1:1 (1 part antifreeze/1 part water) 60% 3:2 (3 parts antifreeze/2 parts water)	 -12/-24 -34/-37 -62/-52

Notes

- Product concentrates should be agitated before use or dilution.
- Delo XLC Antifreeze/Coolant - Premixed 50/50 should be used as purchased. No dilution is recommended.
- For maximum protection against freezing in extremely cold areas, a 60 percent solution of Delo XLC Antifreeze/Coolant - Concentrate (3 parts antifreeze/2 parts water) can be used. Concentrations greater than 67 percent are not recommended.
- Always dispose of used coolant in accordance with local, state and federal guidelines.

Product Reference

Note: Bitterant is a flavor aversive that may help reduce the accidental ingestion of this product. These products contain bitterant.

Product Number 227076
SDS Number 38086
Delo XLC Antifreeze/Coolant - Concentrate

Product Number 227077
SDS Number 38123
Delo XLC Antifreeze/Coolant - Premixed 50/50

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® XLC ANTIFREEZE/COOLANT
ASTM D1384 GLASSWARE CORROSION TESTS

Delo XLC Antifreeze/Coolant ASTM D1384 Glassware Corrosion Test 33% Glycol Solution		
	ASTM Limit	Weight loss, mg per coupon[a]
Copper	10 max	0
Solder	15 max	2
Brass	10 max	0
Steel	10 max	0
Iron	10 max	-1
Aluminum	20 max	2

a Negative indicates net gain.

Delo XLC Antifreeze/Coolant ASTM D1384 Glassware Corrosion Test 70% Glycol Solution		
	ASTM Limit	Weight loss, mg per coupon[a]
Copper	10 max	3
Solder	15 max	1
Brass	10 max	3
Steel	10 max	1
Iron	10 max	1
Aluminum	20 max	-2

a Negative indicates net gain.

DELO XLC ANTIFREEZE/COOLANT
ASTM D4340 HOT SURFACE ALUMINUM TEST

Delo XLC Antifreeze/Coolant ASTM D4340 Hot Surface Aluminum Test		
	ASTM Limit	Weight loss, mg per coupon
Aluminum	1 max	.1

DELO XLC ANTIFREEZE/COOLANT
ASTM D2809 WATER PUMP CAVITATION TEST

Delo XLC Antifreeze/Coolant ASTM D2809 Water Pump Cavitation Test		
	ASTM Limit	Performance Rating
	8 min	10

DELO XLC ANTIFREEZE/COOLANT
ASTM D7583 JD CAVITATION TEST

Delo XLC Antifreeze/Coolant ASTM D7583 JD Cavitation Test		
	ASTM Limit	Number of Pits
	200 max	131

DELO XLC ANTIFREEZE/COOLANT
CUMMINS CAVITATION TEST

Delo XLC Antifreeze/Coolant Cummins Proprietary Test		
	Requirement	Performance
	Pass	Pass

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO FLEETFIX CMX ADDS VALUE THROUGH:

- **Product Specific Formulation** — Specifically formulated to work with Delo XLC. Delo FleetFix CMX should be added at 600,000 miles / 960,000 km /, 10,000 hours or 4 years in order to obtain 1,200,000 miles / 1,900,000 km / 20,000 hours or 8 years of diesel engine coolant system protection.

Quantity of Delo FleetFix CMX needed at 600,000 miles / 960,000 km of on-road use (4 years or 10,000 hours of off-highway use)

Cooling System Capacity		Delo FleetFix CME Quantity
Gallons	Liters	Quarts
1-5	4-19	0.5 quart
6-8	23-30	1 quart
9-12	34-45	1.5 quarts

Delo FleetFix CMX should only be used with Delo XLC Antifreeze/Coolants.

TYPICAL TEST DATA

DELO® XLC ANTIFREEZE/COOLANT - CONCENTRATE

Appearance	Pink
Specific gravity 15/15°C	1.130
Freezing point, °C[a], ASTM D1177	-37
pH[b], ASTM D1287	8.5
Reserve alkalinity[c], ASTM D1121	6.0
Silicate, %[d]	None

a 50 vol % aqueous solution.
b 1:2 dilution with water.
c As received.
d As anhydrous alkali metasilicate.

Minor variations in product typical test data are to be expected in normal manufacturing.

HANDLING PRACTICES

The primary limiting factor in the shelf life of a coolant is silicate instability. Since silicate will eventually polymerize to silicate gel, silicate containing coolants have a shelf life of about 18 months. Delo XLC Antifreeze/Coolant is silicate-free and can be stored for 8 years, provided the container remains sealed. Product should be agitated before use.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

DELO® XLI CORROSION INHIBITOR

PRODUCT DESCRIPTION

Delo® XLI Corrosion Inhibitor - Concentrate is a water based, low toxicity, environmentally friendly, nitrite free carboxylate inhibitor.

CUSTOMER BENEFITS

- **Corrosion Protection** — Corrosion protection for engine metals, including aluminum, iron, copper and solder alloys.
- **Wide Service Application** — Recommended as a coolant for all types of cooling systems not requiring nitrite and where freeze protection is not required.
- **Long service life** — The corrosion inhibitors in Delo XLI Corrosion Inhibitor - Concentrate contain a synergistic combination of mono and di-carboxylates that provide superior protection for a minimum of 600,000 miles, 960,000 km, 12,000 hours, 6 years in on-road and off-road engine applications and 32,000 hours or 6 years in stationary engines. This product does not require regular inhibitor additions if proper maintenance practices are used.
- **Compatibility** — Delo XLI Corrosion Inhibitor - Concentrate is a super concentrate and should be diluted to 5.5%-10% with good quality water before use. Compatible with glycol-based engine coolants but further dilution of the Delo XLI inhibitors by more than 25% with other corrosion inhibitor technologies will reduce the effectiveness of this product.
- **Heat Transfer** — Silicate and phosphate free formulation does not contribute to deposit build up, as can be seen with phosphate and silicate containing coolants, which can help maintain heat transfer efficiency.
- **Improved economics** — No regular inhibitor additions and longer service life means lower overall maintenance costs.
- **Excellent toxicological and environmental aspects** — based on low toxicity inhibitors this product is readily biodegradable. The extended service life characteristic of this product contributes to the protection of the environment due to less frequent fluid disposal.
- **Easy Testing** — inhibitor concentration testing can be easily done using a brix refractometer.

FEATURES

Delo XLI Corrosion Inhibitor - Concentrate provides long life corrosion protection by using optimized and patented aliphatic carboxylate organic inhibitors that provide long lasting protection for cooling system metals and components including hard to protect aluminum.

Delo XLI helps maintain excellent heat transfer since it does not contain silicates and phosphates which can over time create deposits on heat transfer surfaces.

Delo XLI exhibits low depletion rates and does not require the addition of supplemental coolant additives with correct maintenance practices. Dilution of Delo XLI by more than 25% will reduce inhibitor performance.

Delo XLI protects against erosion, corrosion and cavitation of cooling system components.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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COOL-49

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APPLICATIONS

Recommended for the following OEM use as a cooling water inhibitor:

- **Detroit Diesel**
- **Deutz** (TR0199-99-2091)
- **GEC Alsthom Ruston**
- **Liebherr** MD 1-36-130 (DCA)
- **MaK**
- **MAN** 248
- **MAN** Diesel (2-stroke and 4-stroke engines)
- **MB** 312.0
- **MTU** MTL 5049
- **MWM**
- **Newman-Haas Racing**
- **Scania** TI 2-98 0813 TB
- **Sulzer Diesel** ZBS0503.doc
- **Ulstein Bergen**
- **Wärtsilä** 32-9011
- **Yanmar**

Delo® XLI is also recommended for use in any OEM equipment recommending a nitrite free, water based carboxylate based corrosion inhibitor.

Toxicological & environmental aspects

Delo XLI Corrosion Inhibitor - Concentrate is based on low toxicity inhibitors and is readily biodegradable. The extended service life characteristic of this product contributes to the protection of the environment due to less frequent fluid disposal. The toxicological and environmental properties of Delo XLI Corrosion Inhibitor - Concentrate was evaluated by an independent laboratory. The results are listed below:

- LD_{50} >2000 mg/kg (oral toxicity according to OECD guideline No 401)
- LC_{50} >1000 mg/l (fish toxicity according to OECD guideline No 203)
- Biodegradability: 92% (18 days) (test according to OECD guideline No 301E)

PRODUCT REFERENCE

Product Number 236540
SDS Number 38102
Delo XLI Corrosion Inhibitor - Concentrate

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

DELO® XLI CORROSION INHIBITOR - CONCENTRATE

Technical Characteristics	Method	Delo XLI Corrosion Inhibitor - Concentrate
Inhibitor content		50% w/w
Water content	ASTM D1123	50% w/w
Nitrite, amine, phosphate, borate, silicate		Nil
Color		Green Flourescent
Specific gravity, 20°C	ASTM D1122	1.08 typ.
pH	ASTM D1287	8.3 typ.
Storage stability		12 months if stored in non-opaque containers, 36 months if stored in opaque containers.
	Method	**5% dilution**
pH	ASTM D1287	8.1 typ.
Effect on non-metals	GME 60 255	no effect
Hard water stability	VW PV 1426	no precipitate

Minor variations in product typical test data are to be expected in normal manufacturing.

Corrosion Protection

Table 1: Modified ASTM D1384 Glassware Corrosion Tests - 300 ppm chloride

	ASTM D1384 (max)	5% Delo® XLI- Weight loss in mg/coupon[a]
Copper	10 max	0.6
Solder	30 max	4.5
Brass	10 max	0.6
Steel	10 max	0.0
Cast Iron	10 max	0.7
Aluminum	30 max	9.8
AlMn	/	4.8

a Weight loss AFTER chemical cleaning. All weight losses are in mg/coupon. Weight gain is indicated by a "-" sign.

Table 2: Modified MTU High Temperature Corrosion Test (2000 W)

	Weight loss in mg/coupon[a]	
test duration 116 hrs	**5% Delo XLI in D9 water** hot coupon	**5% Delo XLI in FVV-water** hot coupon
Cast Iron	-1.3	-9.0
Aluminum SAE 329	9.3	-16.4
Aluminum AlMg Si1	1.8	40.7

a Weight loss AFTER chemical cleaning. All weight losses are in mg/coupon. Weight gain is indicated by a "-" sign.

HANDLING PRACTICES

Delo XLI - Concentrate has a shelf life of 12 months if stored in non-opaque containers, 36 months if stored in opaque containers and a service life of at least 6 years with correct maintenance practices. This product is water based and will freeze. It is recommended that this product should be stored where it will not freeze. This product is not combustible.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® CONVENTIONAL ANTIFREEZE/COOLANT

PRODUCT DESCRIPTION

Havoline® Conventional Antifreeze/Coolants are low silicate, ethylene glycol based multi-purpose coolants, available as concentrates or 50/50 pre-dilute products, designed for use in automotive engines where silicates are needed and with SCA addition in heavy-duty diesel engines.

CUSTOMER BENEFITS

Havoline Conventional Antifreeze/Coolants deliver value through:

- **Wide Service Application** — These silicate containing products can be used in a wide variety of automotive vehicles where a low silicate product is required[1]. It can also be used in heavy duty engines when SCA's are added. These products are also suitable for use in industrial internal combustion engines where an antifreeze/coolant is required to provide protection against freezing, boil over, and corrosion.
- **Service Life** — 2 years or 50,000 miles (80,500 km) in automotive service or up to 250,000 miles (400,000 km) in heavy duty service when supplemental coolant additives are used and correct top up practices are followed.
- **Protection** — Provides excellent protection to automotive cooling system components including aluminum.
- **Wide temperature application** — Protects against winter freeze up and minimizes the chances of summer boil over.
- **Antifoam properties** — Excellent antifoam package minimizes foaming potential.
- **Compatibility** — Compatible with heavy duty coolant additive filters and liquids. Compatible with most major brands of coolants. Note: This product is not an extended life coolant.

FEATURES

Havoline Conventional Antifreeze/Coolants are single phase, ethylene glycol based products blended with a premium quality additive package. They are low silicate coolants designed for use in both heavy-duty diesel and automotive engines, particularly those containing aluminum alloys. When used in Heavy Duty Diesel application, an initial dose of supplemental coolant additive is required. In addition, routine SCA application will also be required. Please follow engine OEM recommendations regarding coolant maintenance. These products provide antifoam properties, and rust and corrosion protection for aluminum, brass, copper, solder, steel and cast iron. They mix readily with any clean tap water and are compatible with cooling system filters and supplemental additives. Havoline Conventional Antifreeze/Coolant products are free of nitrites and amines.

Havoline Conventional Antifreeze/Coolants have a service life of 2 years/50,000 miles (80,500 km) in automotive applications and 200,000 to 250,000 miles (320,000 to 400,000 km) in heavy duty application when SCA's are added.

Note: These products are not to be used to protect the inside of potable water systems against freezing.

APPLICATIONS

Recommended applications for Havoline Conventional Antifreeze/Coolant products:

- Automobiles requiring a non-extended life, silicate containing coolant meeting ASTM D3306.

1 Some OEMs require the use of silicate free coolants. Always follow your OEM's recommendation.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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COOL-240

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- Heavy duty cooling systems requiring a non-extended life, low silicate coolant that is compatible with supplemental coolant additives.
- Industrial cooling systems, recreational equipment and compressors where a low silicate, non-extended life formulation is recommended.

PRODUCT APPROVALS[2]

Havoline® Conventional Antifreeze/Coolants meet:

- **ASTM** D3306 for automotive service
- **ASTM** D4985 for heavy duty diesel service
- **TMC** of ATA RP-302A

Suitable for use in:[2]

- **AAMVA**
- **General Motors prior to 1994**
- **FCAs (formerly known as Chrysler) prior to 1999**
- **Fords prior to 2001**
- Most heavy duty cooling systems including **John Deere, JI Case, Cummins, Freightliner, Mack and Kenworth/Peterbilt** (Note: Use of supplemental additives may be required.)

PRODUCT DILUTION AND BOIL OVER PROTECTION RECOMMENDATIONS FOR HAVOLINE CONVENTIONAL ANTIFREEZE/COOLANT - CONCENTRATE

Boiling Protection, °F/°C (15 lb pressure cap) 50% (1 part antifreeze/1 part water)	265/129
Freezing Protection, °F/°C 40% (2 parts antifreeze/3 parts water) 50% (1 part antifreeze/1 part water) 60% (3 parts antifreeze/2 parts water)	 -12/-24 -34/-37 -62/-52

Notes

- Product concentrates should be agitated before use or dilution.
- Havoline Conventional Antifreeze/Coolant - Premixed 50/50 should be used as purchased. No dilution is recommended.
- For maximum protection against freezing in extremely cold areas, a 60 percent solution (3 parts antifreeze/2 parts water) can be used. Concentrations greater than 67 percent are not recommended.
- Always dispose of used coolant in accordance with local, state and federal guidelines.

PRODUCT REFERENCE

Note: Bitterant is a flavor aversive that may help reduce the accidental ingestion of this product. These products contain bitterant.

Product Number 226110
SDS Number 10719
Havoline Conventional Antifreeze/Coolant - Concentrate

Product Number 226821
SDS Number 10723
Havoline Conventional Antifreeze/Coolant - Premixed 50/50

TYPICAL TEST DATA

HAVOLINE CONVENTIONAL ANTIFREEZE/COOLANT - CONCENTRATE

Appearance	Fluorescent green
Specific gravity 60/60°C	1.130
Freezing point, °C[a], ASTM D1177	-37
pH[b], ASTM D1287	10.5
Reserve alkalinity[c], ASTM D1121	12.0
Silicate, %[d]	0.09

a 50 vol % aqueous solution.
b 1:2 dilution with water.
c As received.
d As anhydrous alkali metasilicate.

Minor variations in product typical test data are to be expected in normal manufacturing.

2 Always be sure to check with engine OEM's coolant recommendations.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Havoline® Conventional Antifreeze/Coolant - Concentrate
ASTM D1384 Glassware Corrosion Test

	ASTM Limit	Weight loss, mg per coupon[a]
Copper	10 max	3
Solder	30 max	-1
Brass	10 max	3
Steel	10 max	-1
Iron	10 max	1
Aluminum	30 max	4

a Negative indicates net gain.

HANDLING PRACTICES

In order to prevent the formation of silicate gel in storage containers Havoline Conventional Antifreeze/ Coolant products should not be stored longer than eighteen months, and should not be treated with supplemental coolant additives until it is ready to be used.

HAVOLINE® UNIVERSAL ANTIFREEZE/COOLANT

PRODUCT DESCRIPTION

Havoline® Universal products are single phase, ethylene glycol antifreeze/coolants based on patented aliphatic carboxylate corrosion inhibitor systems and are available as a concentrate and a 50/50 pre-dilute.

CUSTOMER BENEFITS

Havoline Universal Antifreeze/Coolants deliver value through:

- **Wide service application** — Recommended use in Domestic, Asian and European automotive and light duty truck applications including newer hybrid vehicles.[1]
- **Long Service Life** — 150,000 miles/240,000 km/5 years of cooling system protection.
- **Beneficial formulation** — Organic additive formulation that is free of silicate, nitrite, borate, phosphate, nitrate and amines and which promotes long service life.
- **Compatibility** — Compatible with other extended life coolant formulations. Note: It is recommended that this product not be diluted by more than 25% with other coolant formulations.
- **Performance** — Exceptional protection at high operating temperatures. Minimizes the occurrence of hard water scale.
- **Wide temperature application** — Protects against winter freeze up and minimizes chances of summer boil over.
- **Managed Inventory Costs** — Can be used in mixed fleet applications where both cars and light duty trucks are present from various manufacturers.[1]
- **Stability** — Storage stability for at least 8 years.

FEATURES

Havoline Universal Antifreeze/Coolants are designed for all makes and all models of automobile and light duty trucks regardless of fuel type built by American, European, or Asian OEMs.[1] This product is dyed yellow, which allows it to be used as top-up in any automobile or light duty truck application without changing the existing coolant color. Havoline Universal is recommended for use in general service applications where cooling system warranty maintenance is not required. Mixing of Havoline Universal with other products will reduce its extended life properties.

Note: These products are not to be used to protect the inside of potable water systems against freezing.

APPLICATIONS

Recommended Applications for Havoline Universal Antifreeze/Coolants:

- All makes and all models of automotive and light duty trucks regardless of fuel type[1]
- Meets or exceeds: **ASTM** D3306
- It is recommended that this product not be diluted with other coolant formulations by more than 25% in order to maintain performance claims.

1 Some OEMs require the use of silicate containing coolants. Follow your OEM's recommendation.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

1 April 2015
COOL-260

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Product Dilution and Boil Over Protection Recommendations for Havoline® Universal Antifreeze/Coolant - Concentrate

Boiling Protection, °F/°C (using a 15 lb pressure cap) 50% 1:1 (1 part antifreeze/1 part water)	 265/129
Freezing Protection, °F/°C 40% 2:3 (2 parts antifreeze/3 parts water) 50% 1:1 (1 part antifreeze/1 part water) 60% 3:2 (3 parts antifreeze/2 parts water)	 -12/-24 -34/-37 -62/-52

Notes

- Product concentrates should be agitated before use or dilution.
- Prediluted 50/50 products should be used as purchased.
- For optimum year round protection against freezing, boiling and corrosion, a 50 percent Havoline Universal (1 part antifreeze/1 part water) is recommended.
- For maximum protection against freezing in extremely cold areas, a 60 percent solution of Havoline Universal Antifreeze/Coolant - Concentrate (3 parts antifreeze/2 parts water) can be used. Concentrations greater than 67 percent are not recommended.
- Always dispose of used coolant in accordance with local, state and federal guidelines.

Product Reference

Note: Bitterant is a flavor aversive that may help reduce the accidental ingestion of this product. These products contain bitterant.

Product Number 227062
SDS Number 14875
Havoline Universal Antifreeze/Coolant - Concentrate

Product Number 227063
SDS Number 14879
Havoline Universal Antifreeze/Coolant - Premixed 50/50

Typical Test Data

Havoline Universal Antifreeze/Coolant - Concentrate

Appearance	Light Yellow
Specific gravity 15/15°C	1.130
Freezing point, °C[a], ASTM D1177	-37
pH[b], ASTM D1287	8.3
Reserve alkalinity[c], ASTM D1121	6.0
Silicate, %[d]	None

a 50 vol % aqueous solution.
b 1:2 dilution with water.
c As received.
d As anhydrous alkali metasilicate.

Minor variations in product typical test data are to be expected in normal manufacturing.

Handling Practices

The primary limiting factor in the shelf life of a coolant is silicate instability. Since silicate will eventually polymerize to silicate gel, silicate containing coolants have a shelf life of about 18 months. Havoline Universal Antifreeze/Coolants are silicate-free and therefore can be stored for at least 8 years, provided the integrity of the container is maintained. Product should be agitated before use.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HAVOLINE® XTENDED LIFE ANTIFREEZE/COOLANT

PRODUCT DESCRIPTION

Havoline® Xtended Life Antifreeze/Coolant is a single phase, ethylene glycol antifreeze/coolants based on an aliphatic corrosion inhibitor system available as a concentrate and a premix 50/50.

CUSTOMER BENEFITS

Havoline Xtended Life Antifreeze/Coolant delivers value through:

- **OEM Approval** — Meets the requirements of Ford WSS-M97B44-D, GM 6277, MB 325.3 and Volkswagen TL 774F specifications.
- **Wide service application** — Recommended for use in Domestic, Asian and European automotive and passenger car diesel applications including newer hybrid vehicles.
- **Heat Transfer** — Improved heat transfer when compared to silicate containing antifreeze/coolant products.
- **Long Service Life** — 150,000 miles/240,000 km/5 years of cooling system protection.
- **Beneficial formulation** — Organic additive formulation that is free of silicate, nitrite, borate, phosphate, nitrate and amines and which allows longer service life.
- **Protection** — Outstanding high temperature protection of cooling systems metals including aluminum.
- **Water Pump Performance** — Compatible with water pump seal materials and minimizes formation of abrasive solids which can help extend water pump life.
- **Performance** — Superior protection at high operating temperatures. Reduces the occurrence of hard water scale.
- **Wide temperature application** — Protects against winter freeze up and minimizes chances of summer boil over.
- **Reduced Inventory** — Can be used in mixed fleet applications where both gasoline and passenger car diesel vehicles are present from various manufacturers.
- **Stability** — Can be stored for approximately 8 years in sealed containers without any effect on the product quality or performance.

FEATURES

Havoline Xtended Life Antifreeze/Coolant is based on a patented aliphatic organic additive formulation that provides a service life of 150,000 miles/240,000 km/5 years and is approved under GM 6277 meeting the GM DEX-COOL® requirements.[1]

The main corrosion inhibitors in Havoline Xtended Life Antifreeze/Coolant have been shown to remain above 95% of their original concentration with proper top off after 150,000 miles/240,000 km in automobiles. This allows much longer intervals between coolant change-outs.

Havoline Xtended Life Antifreeze/Coolant has been formulated without inhibitors such as silicates that have been shown to be abrasive to water pump seals. In comparison taxi field tests versus conventional coolants, Havoline Xtended Life Antifreeze/Coolant reduced the need to replace water pumps during the 100,000 mile/160,900 km test. In addition to fleet tests, this product has also been tested by a major manufacturer of water pump seals and has been found to be more compatible with the seals than other coolants previously tested.

Note: These products are not to be used to protect the inside of potable water systems against freezing.

APPLICATIONS

Havoline® Xtended Life Antifreeze/Coolant meets the specifications of:

1 DEX-COOL is a registered trademark of General Motors Corporation.

Product(s) manufactured in the USA and Colombia.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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- **ASTM** D3306
- **Ford** WSS-M97B44-D
- **GM** 6277
- **MB** 325.3
- **VW** TL 774F

Havoline Xtended Life Antifreeze/Coolant is recommended for use in:

- General Motors vehicles post 1995
- Chrysler vehicles post 2001
- Ford Vehicles post 2003
- European gasoline and diesel automobiles
- Japanese gasoline automobiles, SUVs and Pickup trucks
- Korean gasoline automobiles and SUVs

It is recommended that this product not be diluted with other coolant formulations by more than 25% in order to maintain performance claims.

Product Dilution and Boil Over Protection Recommendations for Havoline Xtended Life Antifreeze/Coolant - Concentrate

Boiling Protection, °F/°C (using a 15 lb pressure cap) 50% 1:1 (1 part antifreeze/1 part water)	265/129
Freezing Protection, °F/°C 40% 2:3 (2 parts antifreeze/3 parts water) 50% 1:1 (1 part antifreeze/1 part water) 60% 3:2 (3 parts antifreeze/2 parts water)	 -12/-24 -34/-37 -62/-52

Notes

- Product concentrates should be mixed before use or dilution.
- Havoline Xtended Life Antifreeze/Coolant - Premixed 50/50 should be used as purchased. No dilution is recommended.
- For maximum protection against freezing in extremely cold areas, a 60 percent solution (3 parts antifreeze/2 parts water) can be used. Concentrations greater than 67 percent are not recommended.
- Always dispose of used coolant in accordance with all local, state, and federal guidelines.

Product Reference

Note: Bitterant is a flavor aversive that may help reduce the accidental ingestion of this product. These products contain bitterant.

Product Number 236542
SDS Number USA 38248
MSDS Number Colombia 38264
Havoline Xtended Life Antifreeze/Coolant - Concentrate

Product Number 236543
SDS Number USA 38257
MSDS Number Colombia 38260
Havoline Xtended Life Antifreeze/Coolant - Premixed 50/50

Typical Test Data

Havoline Xtended Life Antifreeze/Coolant

Appearance/Color	Orange
Specific gravity 15/15°C	1.130
Freezing point, °C[a], ASTM D1177	-37
pH[b], ASTM D1287	8.5
Reserve alkalinity[c], ASTM D1121	6.0
Silicate, %[d]	None

a 50 vol % aqueous solution.
b 1:2 dilution with water.
c As received.
d As anhydrous alkali metasilicate.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Havoline® Xtended Life Antifreeze/Coolant
ASTM D1384 Glassware Corrosion Test

	ASTM Limit	Weight loss, mg per coupon[a]
Copper	10 max	2
Solder	30 max	-2
Brass	10 max	2
Steel	10 max	-1
Iron	10 max	-3
Aluminum	30 max	4

a Negative indicates net gain.

HANDLING PRACTICES

The primary limiting factor in the shelf life of a coolant is silicate instability. Since silicate will eventually polymerize to silicate gel, traditional coolants have a shelf life of about 18 months. Havoline Xtended Life Antifreeze/Coolant is silicate-free and can be stored for at least 8 years, provided the container remains sealed.

HDAX® ELC Antifreeze/Coolant - Premixed 40/60

Product Description

HDAX® ELC Antifreeze/Coolant - Premixed 40/60 is formulated with Chevron's patented carboxylate corrosion inhibitor technology for use in heavy duty stationary natural gas engines that require improved heat transfer performance and long-life cooling system protection in a wide range of operating conditions.

Customer Benefits

HDAX ELC Antifreeze/Coolant - Premixed 40/60 delivers value through:

- **Superb cooling system operation** — The silicate free formula provides improved heat transfer when compared to traditional stationary gas engine coolants that typically contain silicates. When compared to traditional 50/50 stationary gas engine coolants - there is even better heat transfer performance:
  - — Lab tests have measured a 7% improvement in thermal conductivity with this formula.
  - — As a 40/60 blend, there is a 10% increase in thermal conductivity at operating temperature.
  - — These combined benefits can provide up to 17% better heat transfer performance.

  This improved heat transfer supports fewer high temperature engine derating events or shutdowns.
- **Phosphate Free Formulation** — Elimination of phosphates helps reduce the occurrence of hard water and phosphate scale on heat transfer surfaces such as liners, hoses and radiators versus high phosphate-containing heat transfer fluids (typically containing 3000 ppm or greater of Phosphate).
- **Long Service Life** — Up to 32,000 hours of stationary engine coolant life when following OEM coolant maintenance recommendations and maintaining a correct 40/60 dilution ratio. For 32,000 hour life operations, always ensure the system is topped-off with HDAX ELC Antifreeze/Coolant - Premixed 40/60 and take coolant samples every 6 months to check for coolant dilution. Should dilution occur, add either HDAX ELC Antifreeze/Coolant - Premixed 40/60 or Chevron's Delo® FleetFix® CME product to maintain appropriate coolant system protection.
- **Excellent Protection** — Effective, long term corrosion protection, even at elevated temperatures, of commonly found cooling system metals. Effective at protecting aluminum in high temperature applications and protecting against liner cavitation and pitting. Maximizes water pump seal life due to its silicate-free, phosphate-free formulation.
- **Low Maintenance Fluid** — Recommended for use in all stationary gas engine applications. Excellent for operations where stationary engines are in remote locations, or are periodically moved from job site to job site and coolant maintenance is sporadic. Check with your OEM for specific product application and maintenance requirements and always monitor through periodic coolant analysis.
- **Ready to Use Formulation** — No need to add water - product is ready to use. HDAX ELC Antifreeze/Coolant - Premixed 40/60 will provide freeze protection down to -12°F.
- **Compatibility** — Compatible with other coolant formulations and supplemental coolant additives. Chevron recommends that this product not be diluted by more than 20% with other coolant formulations. Dilution by more than 20% will reduce extended life performance.
- **Biodegradability** — Biodegradable in its unused form.
- **Stability** — Storage stability for a minimum of 8 years as purchased.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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PERFORMANCE

HDAX® Extended Life Technology is being utilized today with stationary gas engine operators who report excellent long-life performance, superb cavitation protection, and low maintenance costs. It is used in various engine models including Caterpillar and Waukesha stationary gas engines in severe operating conditions.

Note: This product is not to be used to protect the inside of potable water systems against freezing.

APPLICATIONS

Meets or Exceeds:

- **ASTM** D6210 and D3306

Suitable for use in these stationary gas engines:

- **Ajax**
- **Caterpillar**
- **Cooper-Bessemer**
- **MWM**
- **Wärtsilä**
- **Waukesha**
- **White Superior**

PRODUCT REFERENCE

Note: Bitterant is a flavor aversive that may help reduce the accidental ingestion of this product. This product contains bitterant.

Product Number 227075
SDS Number 32023
HDAX ELC Antifreeze/Coolant - Premixed 40/60

TYPICAL TEST DATA

HDAX ELC ANTIFREEZE/COOLANT - PREMIXED 40/60

Appearance	Red
Specific gravity 15/15°C	1.06
Freezing point, °F/°C[a], ASTM D1177	-12/-24
Boiling Protection, °F/°C (using a 15 lb pressure cap)	262/128
pH[a], ASTM D1287	8.3
Reserve alkalinity[a], ASTM D1121	6.0

a 60 vol % aqueous solution.

Minor variations in product typical test data are to be expected in normal manufacturing.

Notes:

- HDAX ELC Antifreeze/Coolant - Premixed 40/60 should be used as manufactured. No dilution is recommended.
- Always dispose of used coolant in accordance with local, state and federal guidelines.

HDAX ELC Antifreeze/Coolant - Premixed 40/60
ASTM D1384 Glassware Corrosion Test

Data generated on a 33% dilution as per the method.

ASTM D1384 Glassware Corrosion Test		
	ASTM Limit	Weight loss, mg per coupon[a]
Copper	10 max	0
Solder	30 max	3
Brass	10 max	0
Steel	10 max	0
Iron	10 max	-1
Aluminum	30 max	-3

a Negative indicates net gain.

HANDLING PRACTICES

HDAX ELC Antifreeze/Coolant - Premixed 40/60 has a storage shelf life of up to 8 years.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

HDAX® PF ANTIFREEZE/COOLANT - PREMIXED 50/50

PRODUCT DESCRIPTION

HDAX® PF Antifreeze/Coolant - Premixed 50/50 is a single-phase, ethylene glycol based, low silicate coolant/antifreeze designed for use in natural gas engines and in heavy duty on-highway and off-highway diesel engines.

CUSTOMER BENEFITS

HDAX PF Antifreeze/Coolant - Premixed 50/50 delivers value through:

- **Ready to Use Formulation** — Diluted with high quality deionized water this product provides freeze protection down to -34°F (-37°C).
- **Fully Formulated Inhibitor Package** — Pre-charged with a quality inhibitor package this product does not require an initial dose of supplemental coolant additives (SCA). Maintenance doses of SCA's are required. The recommendation of the Original Engine Manufacturers (OEMs) should be followed when adding chemical additives (supplemental coolant additives).
- **Phosphate Free Formulation** — Elimination of phosphates helps reduce the occurrence of hard water scale.
- **Compatibility** — Compatible with commercially available supplemental coolant additives in liquid or filter form and with other low silicate, fully formulated, phosphate free coolants. Also compatible with commercially available test strips.
- **Effective corrosion inhibitor package** — Provides protection for wet sleeve cylinder liners and cooling system metals including aluminum, brass, cast iron, steel, solder, and copper. The antifoam package also reduces the occurrence of foam in the cooling system.
- **Wide temperature application** — Protects against winter freeze up and minimizes chances of summer boil over.
- **Excellent Service Life** — Stationary engines service life is 5,000 hours/2.5 years. Note: Due to differences in how equipment runs and is used, it is recommended that regular inhibitor testing be performed.

FEATURES

HDAX PF Antifreeze/Coolant - Premixed 50/50 uses a low silicate technology and contains a complete supplemental coolant additive package that provides maximum protection for basic metal alloys found in most heat transfer systems. HDAX PF Antifreeze/Coolant - Premixed 50/50 does not require an initial addition of supplemental coolant additives (SCAs), but does require maintenance additions of SCAs to maintain the correct additive balance. This product is phosphate free in order to reduce hard water scale development and contains nitrite for additional liner protection. This product is available in two colors, light purple (fuchsia) or green.

HDAX PF Antifreeze/Coolant - Premixed 50/50 is specifically blended for use in stationary engines using various fuel sources.

Note: This product is not to be used to protect the inside of potable water systems against freezing.

APPLICATIONS

Meets or Exceeds:

- **ASTM** D6210 and D3306
- **TMC** RP 329

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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COOL-57

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Suitable for use in:

- **White Superior**
- **Ajax**
- **Mack Truck**
- **International Truck**
- **PACCAR**
- **Caterpillar**
- **J.I. Case**
- **John Deere**
- **Cooper-Bessemer**
- **Waukesha**

Product Dilution and Boil Over Protection Recommendations for HDAX® PF Antifreeze/Coolant - Premixed 50/50

Boiling Protection, °F(°C) (15 lb pressure cap)	Freezing Protection, °F(°C)
265(129)	-34(-37)

Notes:

- HDAX PF Antifreeze/Coolant - Premixed 50/50 should be used as manufactured. No dilution is recommended.
- Always dispose of used coolant in accordance with local, state and federal guidelines.

Product Reference

Note: Bitterant is a flavor aversive that may help reduce the accidental ingestion of this product. These products contain bitterant.

Product Number 227072
SDS Number 38251
HDAX PF Antifreeze/Coolant - Premixed 50/50

Product Number 275112
SDS Number 37455
HDAX PF Green Antifreeze/Coolant - Premixed 50/50

Typical Test Data

HDAX PF Antifreeze/Coolant - Premixed 50/50

Appearance	Light Purple or Green
Specific gravity 15/15°C	1.074
Freezing point, °F/°C[a], ASTM D1177	-34/-37
pH[a], ASTM D1287	10.5
Reserve alkalinity[a], ASTM D1121	6.0
Silicate, %[b]	0.0125

a 50 vol % aqueous solution.
b As anhydrous alkali metasilicate.

Minor variations in product typical test data are to be expected in normal manufacturing.

HDAX PF Antifreeze/Coolant - Premixed 50/50 ASTM D1384 Glassware Corrosion Test

ASTM D1384 Glassware Corrosion Test		
	ASTM Limit	Weight loss, mg per coupon[a]
Copper	10 max	0
Solder	30 max	3
Brass	10 max	0
Steel	10 max	0
Iron	10 max	-1
Aluminum	30 max	-3

a Negative indicates net gain.

Handling Practices

HDAX PF Antifreeze/Coolant - Premixed 50/50 has a storage shelf life of 18 months. Product should be agitated before use.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Chevron Heavy Duty PF Antifreeze/Coolant

Product Description

Chevron Heavy Duty PF Antifreeze/Coolant is a single-phase, ethylene glycol based fully formulated, heavy-duty diesel engine coolant/antifreeze that is available as a concentrate and a 50/50 pre-dilute.

Customer Benefits

Chevron Heavy Duty PF Antifreeze/Coolant delivers value through:

- **Wide Service Application** — Suitable for gasoline, diesel, and natural gas powered automotive and industrial engines.
- **Beneficial Formulation** — Formulated with nitrite and molybdate to protect against wet cylinder liner pitting. Outstanding corrosion protection for aluminum, brass, cast iron, steel, solder, and copper phosphate-free formula helps reduce hard water scale formation.
- **Ease of Maintenance** — No initial requirement for a pre-charge dose of SCA and reduced SCA use during life of coolant with continued use of this product for top-up.
- **Compatibility** — Formulation is compatible with other fully formulated coolants that are phosphate free, low silicate and that contain molybdate and nitrite for cylinder liner protection. Compatible with commercially available supplemental coolant additives in both filter and liquid form.
- **Long Service Life** — Recommended service life of 200,000 miles to 250,000 miles (320,000 km to 400,000 km) with correct top-up and SCA additions.
- **Wide Temperature applications** — Protects against winter freeze up and minimizes the chance of summer boil over.
- **Multiple colors** — Due to a variety of colors available for fully formulated coolant/antifreeze products in the marketplace we make these products available in a purple or green color.

Features

Chevron Heavy Duty PF Antifreeze/Coolant products are recommended for use in on-road, off-road and stationary applications where a fully formulated, non-extended life coolant is recommended by the OEM.

Chevron Heavy Duty PF Antifreeze/Coolant products contain an effective inhibitor package that protects cooling system metals and components against erosion, corrosion and cavitation.

Chevron Heavy Duty PF Antifreeze/Coolant products are phosphate free which helps reduce the occurrence of hard water scale formation.

Note: This product is not to be used to protect the inside of potable water systems against freezing.

Applications

Recommended applications for Chevron Heavy Duty PF Antifreeze/Coolant:[1]

- On-road, Off-road and Stationary engines regardless of fuel type.
- Mixed fleet operations calling for a coolant antifreeze that meets **ASTM** D3306, **TMC** RP 329 or **ASTM** D6210

Chevron Heavy Duty PF Antifreeze/Coolant products meet or exceed the requirements of:

- **ASTM** D3306 and **ASTM** D6210
- **TMC** RP 329 and RP-302

1 Follow your OEM's recommendations. Some OEM's recommend the use of extended life silicate free coolants.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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COOL-55

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Chevron Heavy Duty PF Antifreeze/Coolant is recommended for use in most heavy duty and light duty engine applications including:

- **Caterpillar**
- **Cummins**
- **Detroit Diesel**
- **Ford** (requiring ESE-M97B44-A)
- **Freightliner**
- **General Motors**
- **International**
- **J.I. Case** JIC501
- **John Deere**
- **Mack Truck**
- **PACCAR** (Peterbilt and Kenworth)
- **Volvo**

Product Dilution and Boil Over Protection Recommedations for Chevron Heavy Duty PF Antifreeze/Coolant - Concentrate

Boiling Protection, °F/°C (15 lb pressure cap) 50% 1:1 (1 part antifreeze/1 part water)	 265/129
Freezing Protection, °F/°C 40% 2:3 (2 parts antifreeze/3 parts water) 50% 1:1 (1 part antifreeze/1 part water) 60% 3:2 (3 parts antifreeze/2 parts water)	 -12/-24 -34/-37 -62/-52

Notes:

- Product concentrates should be mixed before use or dilution.
- 50/50 Pre-diluted products should be used as purchased.
- For maximum protection against freezing in extremely cold areas, a 60 percent solution (3 parts antifreeze/2 parts water) can be used. Concentrations greater than 67percent are not recommended.
- Always dispose of used coolant/antifreeze in accordance with all local, state and federal regulations.

Product Reference

Note: Bitterant is a flavor aversive that may help reduce the accidental ingestion of this product. These products contain bitterant.

Product Number 227043
SDS Number 12144
Chevron Heavy Duty PF Antifreeze/Coolant - Concentrate

Product Number 275114
SDS Number 23730
Chevron Heavy Duty PF Green Antifreeze/Coolant - Concentrate

Product Number 227045
SDS Number 12146
Chevron Heavy Duty PF Antifreeze/Coolant - Premixed 50/50

Product Number 275113
SDS Number 23726
Chevron Heavy Duty PF Green Antifreeze/Coolant - Premixed 50/50

Typical Test Data

Chevron Heavy Duty PF Antifreeze/Coolant - Concentrate

Appearance	Purple or Green
Specific gravity 15/15°C	1.12
Freezing point, °F/°C[a], ASTM D1177	-34/-37
pH[b], ASTM D1287	10.5
Reserve alkalinity[c], ASTM D1121	8.5
Silicate, %[d]	0.025

a 50 vol % aqueous solution.
b 1:2 dilution with water.
c As received.
d As anhydrous alkali metasilicate.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Chevron Heavy Duty PF Antifreeze/Coolant
ASTM D1384 Glassware Corrosion Test

	ASTM Limit	Weight loss, mg per coupon[a]
Copper	10 max	0
Solder	30 max	3
Brass	10 max	0
Steel	10 max	0
Iron	10 max	-1
Aluminum	30 max	-3

a Negative indicates net gain.

HANDLING PRACTICES

Product shelf life is 18 months. Product service life is 200,000 miles to 250,000 miles, 320,000 km to 400,000 km, 5000 hours or 2 ½ years. Product should be agitated before use if it has been standing for an extended period.

CHEVRON HTF E-100

PRODUCT DESCRIPTION

Chevron HTF E-100 is an exceptional quality single phase, silicate free ethylene glycol concentrate used in heat transfer applications or as an industrial coolant/ antifreeze product.

CUSTOMER BENEFITS

Chevron HTF E-100 delivers value through:

- **Performance** — The inhibitor system is designed to protect brass, copper, solder, steel, cast iron, aluminum, and other metals commonly found in industrial cooling and heating systems.
- **Foam Inhibition** — A foam inhibitor is included to minimize foaming tendencies during service.
- **Wide Service Applications** — Can be used in irrigation, power generating systems, oil field operations, line heaters and portable air compressors applications where cavitation protection is not needed. In addition, this product is recommended for use in snow melting systems, loading ramps, walkways, highways, airfield runways, and as a coolant in ice skating rinks and air conditioning systems. This product is not recommended for heavy duty internal combustion engines unless supplemental coolant additives are added. Not recommended for automotive applications.
- **Biodegradable** — Readily biodegradable in its pure unused form.

FEATURES

- Chevron HTF E-100 is a multi-purpose heat transfer fluid blended with a quality additive package that is recommended for use in various applications where cavitation protection is not required.
- Chevron HTF E-100 provides antifoam properties, and rust and corrosion protection for brass, copper, solder, steel and cast iron.
- Chevron HTF E-100 mixes readily with clean tap water and is compatible with cooling system additive filters and liquid supplemental additives.
- Chevron HTF E-100 is borax free, silicate free, nitrite free and amine free.

Note: This product is not to be used to protect the inside of potable water systems against freezing.

APPLICATIONS

Chevron HTF E-100 is recommended for use in heat transfer and cooling systems where a silicate free, nitrite free ethylene glycol based coolant is recommended by the equipment manufacturer (OEM).

PRODUCT DILUTION AND BOIL OVER PROTECTION RECOMMENDATIONS FOR CHEVRON HTF E-100

Boiling Protection, °F/°C (15 lb pressure cap) 50% (1 part antifreeze/1 part water)	 265/129
Freezing Protection, °F/°C 40% (2 parts antifreeze/3 parts water) 50% (1 part antifreeze/1 part water) 60% (3 parts antifreeze/2 parts water)	 -12/-24 -34/-37 -62/-52

Chevron HTF E-100 coolant will require addition of coolant additives over the life of the fluid. Please follow the OEM's recommendations for coolant inhibitor level maintenance and treatment requirements.

Notes

- For optimum year round protection against freezing, boiling and corrosion, a 50 percent Chevron HTF E-100 solution (1 part antifreeze/1 part water) is recommended. For maximum protection against freezing in extremely cold areas a 60 percent solution (3 parts antifreeze/2 parts water) can be used. Concentrations greater than 67 percent are not recommended.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

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COOL-60

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- Original Equipment Manufacturer (OEM) recommendations should be followed when adding supplemental coolant additives, or when changing out cooling systems.
- Always dispose of used coolant in accordance with local, state and federal guidelines.
- Product concentrates should be agitated before use or dilution.

PRODUCT REFERENCE

Product Number 228407
SDS Number 29607
Chevron HTF E-100

TYPICAL TEST DATA

Chevron HTF E-100

Appearance	Pink
Specific gravity 60/60°F	1.130
Freezing point, °F(°C)[a], ASTM D1177	-34(-37)
pH[b], ASTM D1287	10.5
Reserve alkalinity[c], ASTM D1121	12.0
Silicate, %[d]	None

a 50 vol % aqueous solution.
b 1:2 dilution with water.
c As received.
d As anhydrous alkali metasilicate.

Minor variations in product typical test data are to be expected in normal manufacturing.

Chevron HTF E-100
ASTM D1384 Glassware Corrosion Test

	ASTM Limit	Weight loss, mg per coupon
Copper	10 max	3
Solder	30 max	2
Brass	10 max	4
Steel	10 max	0
Iron	10 max	1
Aluminum	30 max	6

HANDLING PRACTICES

Because this product is silicate free, Chevron HTF E-100 coolant can be stored at least 5 years without silicate drop-out or deposit concerns. Product should be agitated before use or dilution.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON HTF P-150

PRODUCT DESCRIPTION

Chevron HTF P-150 is a superior quality single phase, silicate free, propylene glycol concentrate used in heat transfer applications or as an industrial coolant/ antifreeze product.

CUSTOMER BENEFITS

Chevron HTF P-150 delivers value through:

- **Performance** — The inhibitor system is designed to protect brass, copper, solder, steel, cast iron, aluminum, and other metals commonly found in industrial cooling and heating systems.
- **Foam Inhibition** — A foam inhibitor is included to minimize foaming tendencies during service.
- **Wide Service Applications** — Can be used in irrigation, power generating systems, oil field operations, line heaters and portable air compressor applications where cavitation protection is not needed. In addition this product is recommended for use in snow melting systems, loading ramps, walkways, highways, airfield runways, and as a coolant in ice skating rinks and air conditioning systems. This product is not recommended for heavy duty internal combustion engines unless supplemental coolant additives are added. Not recommended for automotive applications.
- **Low Toxicity** — This product is made with a propylene glycol base fluid which has very low acute toxicity in its unused form. Mixing this fluid with ethylene glycol fluids will increase toxicity and is not recommended.
- **Lower Freeze point** — Propylene glycol based fluids provide improved freeze protection than ethylene glycol based fluids.
- **Biodegradable** — Readily biodegradable in its pure unused form.

FEATURES

- Chevron HTF P-150 is a multi-purpose heat transfer fluid blended with a quality additive package that is recommended for use in various applications where cavitation protection is not required.
- Chevron HTF P-150 provides antifoam properties, and rust and corrosion protection for brass, copper, solder, steel and cast iron.
- Chevron HTF P-150 mixes readily with clean tap water and is compatible with cooling system additive filters and liquid supplemental additives.
- Chevron HTF P-150 is borax free, silicate free, nitrite free and amine free.

Note: This product may not to be used to protect the inside of potable water systems against freezing.

APPLICATIONS

Chevron HTF P-150 is recommended for use in heat transfer and cooling systems where a silicate free, nitrite free, propylene glycol based coolant is recommended by the equipment manufacturer (OEM).

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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COOL-58

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Product Dilution and Boil Over Protection Recommendations for Chevron HTF P-150

Boiling Protection, °C/°F (15 lb pressure cap) 50% (1 part antifreeze/1 part water)	 129.4/265
Freezing Protection, °C/°F 40% (2 parts antifreeze/3 parts water) 50% (1 part antifreeze/1 part water) 60% (3 parts antifreeze/2 parts water)	 -24.7/-12 -37.2/-34 -52.2/-62

Chevron HTF P-150 coolant, depending on how it is used, may require addition of coolant additives over the life of the fluid. These additives may increase toxicity of fluid. Please follow the OEM's recommendations for coolant inhibitor level maintenance and treatment requirements. Note additive manufactures warnings concerning toxicity.

Notes

- Product should be agitated before use or dilution.
- For optimum year round protection against freezing, boiling, and corrosion, a 50 percent Chevron HTF P-150 solution (1 part antifreeze/1 part water) is recommended.
- For maximum protection against freezing in extremely cold areas, a 60 percent solution (3 parts antifreeze/2 parts water) can be used. Concentrations greater than 67 percent are not recommended.
- Always dispose of used coolant in accordance with local, state and federal guidelines.

Product Reference

Product Number 275115
SDS Number 23731
Chevron HTF P-150

Typical Test Data

Chevron HTF P-150

Appearance	Pink
Specific gravity 60/60°F	1.130
Freezing point,°C(°F)[a], ASTM D1177	-34
pH[b], ASTM D1287	10.5
Reserve alkalinity[c], ASTM D1121	12.0
Silicate, %[d]	None

a 50 vol % aqueous solution.
b 1:2 dilution with water.
c As received.
d As anhydrous alkali metasilicate.

Minor variations in product typical test data are to be expected in normal manufacturing.

Handling Practices

Because this product is silicate free, Chevron HTF P-150 coolant is storage stable for at least 5 years if container integrity is maintained. Product should be agitated before use or dilution.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON HTF P-200

PRODUCT DESCRIPTION

Chevron HTF P-200 is a single phase, silicate free, propylene glycol (USP) based heat transfer fluid concentrate.

CUSTOMER BENEFITS

Chevron HTF P-200 delivers value through:

- Meeting the requirements of the U.S. Department of Agriculture (USDA) for use in the immersion or spray freezing equipment of packaged poultry or wrapped meat under the Federal Meat and Poultry Products Inspection Program.
- Silicate free formulation that reduces deposits on heat transfer surfaces.
- Providing corrosion protection to heat transfer metals including solder, steel, cast iron, aluminum, and other metals commonly found in industrial cooling and heating systems.
- Inclusion of a foam inhibitor to minimize foaming in use.
- Readily biodegradable in its pure unused form.

FEATURES

Chevron HTF P-200 is a multi-purpose heat transfer fluid formulated with USP propylene glycol.

The Chevron HTF P-200 formulation is free of nitrites, amines and silicates. Extensive laboratory simulated service and actual service tests have proven the effectiveness of this coolant in helping to prevent corrosion.

Chevron HTF P-200 is storage stable for at least 5 years and mixes easily with clean water.

Chevron HTF P-200 is colorless and contains no dyes.

Chevron HTF P-200 is a concentrate and must be mixed with water before use. A 50/50 dilution of Chevron HTF P-200 and water is recommended for maximum corrosion protection.

APPLICATIONS

- Chevron HTF P-200 is an inhibited propylene glycol (USP) based concentrate product meeting the requirements of the U.S. Department of Agriculture (USDA) for use in the immersion or spray freezing equipment of packaged poultry or wrapped meat under the Federal Meat and Poultry Products Inspection Program.
- Recommended for use in industrial cooling and heating systems that require an NSF approved product.

In non-USDA applications, Chevron HTF P-200 may be used in applications where incidental contact with food is possible. This product is not intended for use as a food component or additive.

- **NSF** registered HT1

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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COOL-70

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PRODUCT DILUTION AND BOIL OVER PROTECTION RECOMMENDATIONS FOR CHEVRON HTF P-200

Boiling Protection, °C/°F (15 lb pressure cap) 50% (1 part antifreeze/1 part water)	126.7/260
Freezing Protection, °C/°F 30% (3 parts antifreeze/7 parts water) 40% (2 parts antifreeze/3 parts water) 50% (1 parts antifreeze/1 part water) 60% (3 parts antifreeze/2 parts water)	 -13.9/+7 -21.6/-7 -32.7/-27 -56.7/-70

Notes

- For optimum year round protection against freezing, boiling and corrosion, a 50 percent Chevron HTF P-200 solution (1 part antifreeze/1 part water) is recommended.
- For maximum protection against freezing in extremely cold areas, a 60 percent solution (3 parts antifreeze/2 parts water) can be used. Concentrations greater than 67 percent are not recommended.
- Always dispose of used coolant in accordance with local, state and federal guidelines.

PRODUCT REFERENCE

Product Number 227047
SDS Number 12147
Chevron HTF P-200

TYPICAL TEST DATA

Appearance	Clear
Specific gravity 60/60°C	1.038
Freezing point, °C(°F)[a], ASTM D1177	-33(-27)
pH[b], ASTM D1287	10.0
Reserve alkalinity[c], ASTM D1121	12.0
Silicate, %[d]	None

a 50 vol % aqueous solution.
b 1:2 dilution with water.
c As received.
d As anhydrous alkali metasilicate.

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

CHEVRON SILICATE ADDITIVE

PRODUCT DESCRIPTION

Chevron Silicate Additive has been recommended by Cummins and Chevron for use in selected Cummins engines that have been factory filled with Delo® ELC Antifreeze/Coolant in North America. This silicate containing additive is not recommended for use in any engine manufactured by other engine makers such as Volvo, Mack, Detroit Diesel or Caterpillar.

APPLICATIONS

Chevron Silicate Additive is a silicate containing additive to be used only for treatment of Cummins QSK engines that have been factory filled with Delo ELC Antifreeze/Coolant.

The purpose of this additive is to potentially improve the seal life of the coolant passage seals in Cummins QSK engines. This product is not recommended for use in any engine not built by Cummins.

Chevron Silicate Additive is available in 8 oz containers and should be used based on cooling system capacity. Please check your owner's manual for the cooling system capacity of the vehicle being treated.

How to apply Chevron Silicate Additive:

Step 1: Allow engine to cool and open coolant overflow tank.

Step 2: Add the recommended dose of Chevron Silicate Additive to the coolant overflow tank based on the table below.

Treat rates for using Chevron Silicate Additive in Cummins QSK engines		
Cooling System Capacity		**Chevron Silicate Additive needed**
Gallons	**Liters**	**8 oz bottle**
0–6 gallons	0–23 liters	1/2 bottle
6–8 gallons	24–34 liters	3/4 bottle
9–11 gallons	35–45 liters	1 bottle
12-16 gallons	46-61 liters	1 1/4 bottles
25 gallons	95 liters	2 1/2 bottles
50 gallons	190 liters	5 bottles
100 gallons	379 liters	10 bottles

PRODUCT REFERENCE

Product Number 227029
SDS Number 37412
Chevron Silicate Additive

TYPICAL TEST DATA

Appearance	Clear
Freeze point (as sold)	-34°F(-37°C)

Minor variations in product typical test data are to be expected in normal manufacturing.

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

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COOL-90

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LIGHT PRODUCTS

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CHEVRON AVIATION GASOLINES
100 and 100 Low Lead

FEATURES

Chevron Aviation Gasolines (Avgas) 100 and 100 Low Lead are manufactured to meet the requirements of ASTM D910, *Standard Specification for Aviation Gasolines*. They also may qualify for U.S. military uses, since the ASTM specification is now the basis for acceptance for such uses.

Chevron Avgas 100 is available only in Hawaii.

APPLICATIONS

Chevron Avgas 100 and 100 Low Lead are intended for use in light, personal aircraft, single- and twin-engined executive aircraft, crop dusters, two- and four-engined transports, and certain military light aircraft which require aviation gasoline.

Piston engine aircraft are generally certified for operation on a specific grade of aviation gasoline. The use of a higher grade may be acceptable when the specified grade is not available. However, for engines designed for Grade 80, continued use of Grade 100, with its higher lead content, may result in malfunctioning such as spark plug fouling. Engine manufacturer's recommendations should be followed.

Grade 100 Low Lead is approved by most engine manufacturers for use as an alternate fuel in aircraft engines originally designed for operation on Grade 80 when it is unavailable. Engine manufacturer's recommendations must be strictly adhered to. Check with the airframe or engine manufacturer for details.

PRODUCT AND SDS/MSDS NUMBERS

	Avgas 100	Avgas 100 Low Lead
Product Number	*200205*	*200239*
SDS/MSDS Number	*2647*	*2647*

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LPA-10

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CHEVRON JET FUELS
A, A-1, A-50

FEATURES

Chevron Jet Fuels A, A-1, and A-50 are kerosene-type aviation turbine fuels. They are manufactured to meet the requirements of ASTM D1655, Standard Specification for Aviation Turbine Fuels or Ministry of Defence: Defence Standard 91-91 Turbine Fuel, Aviation Kerosine Type, Jet A-1.

The freezing point specifications for these grades are as follows:

- **Chevron Jet Fuel A** has a maximum freezing point of -40°C (-40°F).
- **Chevron Jet Fuel A-1** has a maximum freezing point of -47°C (-53°F).
- **Chevron Jet Fuel A-50** is offered only in Alaska where a lower freezing point is needed. It has a maximum freezing point of -46°C (-50°F).

APPLICATIONS

Chevron Jet Fuels are recommended for use in all turbo-jet and turbo-prop powered aircraft used in commercial airline and general aviation service for the grade required by the manufacturer.

They may sometimes also be used in certain military aircraft when their use is approved for the application.

Chevron Jet Fuels are recommended in all stationary aircraft turbine conversions for standby power or cogeneration, for the grade required by the manufacturer, and all military nonaircraft uses where one of these fuels is specified.

PRODUCT AND SDS/MSDS NUMBERS

	D1655 A	D1655 A-1	D1655 A-50	DS 91-91 A-1
Product Number	*216103*	*216101*	*216100*	*235611*
SDS/MSDS Number	*0513*	*0513*	*0513*	*0513*

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Chevron Regular Unleaded Gasoline

Customer Benefits

Chevron Regular Unleaded Gasoline delivers value through:

- **Area blending** — Provides top performance for seasonal and location changes.
- **Economical performance** for engines with nonpremium antiknock requirements.
- **Extra value** — Chevron Regular Unleaded Gasoline, with the deposit control additive Techron®, provides intake and fuel-injection system deposit control which helps keep exhaust emissions low and helps maximize engine performance.

Features

Chevron Regular Unleaded Gasoline is a clear, light-yellow colored, regular-grade, unleaded gasoline.

It is composed of carefully blended components to satisfy the octane needs of most cars. Chevron Regular Unleaded Gasoline contains the Techron deposit control additive.

Chevron Regular Unleaded Gasoline meets all state and federal specifications for an unleaded gasoline.

Functions

Chevron Regular Unleaded Gasoline meets the requirements of ASTM D4814, *Standard Specification for Automotive Spark-Ignition Engine Fuel*. It provides good antiknock performance without the addition of organometallic antiknock additives. It may contain up to 10 volume percent ethanol depending on geographic location and time of year. The (R+M)/2 octane rating is 87 minimum (may be slightly lower in some high elevation markets).

It provides the proper volatility for each geographical area, and time of year, to provide good cold starting and warmup characteristics, vapor-lock protection, and fuel economy.

It meets or exceeds industry specifications for oxidation stability and gum formation in storage.

Chevron Regular Unleaded Gasoline contains Chevron's proprietary deposit control additive, Techron, which provides unsurpassed intake system deposit control performance. The Techron additive is Chevron's proprietary gasoline additive that helps keep an engine's entire intake system clean, plus avoids contributing to excessive combustion chamber deposits like some other oil companies' additives. Chevron's gasolines with the Techron additive give unsurpassed performance in avoiding deposit-related problems.

Fuel injector and intake valve deposits can cause hesitation and stumbling, loss of power on acceleration, higher emissions and loss of mileage.

Use of Chevron gasolines with the Techron additive over the years will help cars avoid deposit-related performance deterioration, and will help cars avoid deposit-related increase in emissions.

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APPLICATIONS

Chevron Regular Unleaded Gasoline is designed for use in most spark-ignition engines where the manufacturer specifies the use of an unleaded gasoline. Unleaded gasoline must be used in vehicles equipped with catalytic converters because lead poisons the catalyst and destroys its ability to reduce exhaust pollutants. It is also recommended for leaded fuel vehicles where the engine octane requirement and operating conditions permit the use of an unleaded gasoline.

Chevron Regular Unleaded Gasoline is satisfactory for use in most two-stroke cycle gasoline-powered engines where gasoline-oil mix is used, such as outboard motors, chain saws, scooters, etc., unless the manufacturer specifies leaded gasoline only.

CAUTION — FOR MOTOR FUEL USE ONLY. Do not use as a Pressure Appliance Fuel. This is especially critical in appliances that employ a "generator" system.

WARNING

PORTABLE CONTAINER FIRE HAZARD

Improper filling of portable gasoline containers creates danger of fire.

To fill a container:

- Place approved container on the ground away from vehicle or trailer. DO NOT fill any container that is inside a vehicle or on a truck/trailer bed.
- Keep nozzle in contact with the container while filling.
- Do not use a nozzle lock-open device.

It is unlawful and dangerous to dispense gasoline into unapproved or improperly labeled containers.

CHEVRON PLUS UNLEADED GASOLINE

CUSTOMER BENEFITS

Chevron Plus Unleaded Gasoline delivers value through:

- **Area blending** provides top performance for seasonal and location changes
- **Economical performance** for engines with nonpremium antiknock requirements
- **Extra value**. Chevron Plus Unleaded Gasoline, with deposit control additive Techron®, provides intake and fuel-injection system deposit control which helps keep exhaust emissions low and helps maximize engine performance.

FEATURES

Chevron Plus Unleaded Gasoline is a clear, light-yellow colored, mid-grade, unleaded gasoline.

It provides enhanced antiknock performance with a minimum 89 (R+M)/2 octane rating (CAN BE slightly lower in SOME high elevation markets). Chevron Plus Unleaded Gasoline contains the Techron deposit control additive.

Chevron Plus Unleaded Gasoline meets all state and federal specifications for an unleaded gasoline.

FUNCTIONS

Chevron Plus Unleaded Gasoline meets the requirements of ASTM D4814, *Standard Specification for Automotive Spark-Ignition Engine Fuel*. It provides enhanced antiknock performance without the addition of organometallic or other antiknock additives. It may contain up to 10 volume percent ethanol depending on geographic location and time of year. The (R+M)/2 octane rating is 89 minimum (may be slightly lower in some high elevation markets).

It provides the proper volatility for each geographical area, and time of year, for good cold starting and warmup characteristics, vapor-lock protection, and fuel economy.

It meets or exceeds industry specifications for oxidation stability and gum formation in storage.

Chevron Plus Unleaded Gasoline contains Chevron's proprietary deposit control additive, Techron, which provides unsurpassed intake system deposit control performance. The Techron additive is Chevron's proprietary gasoline additive that helps keep an engine's entire intake system clean, plus avoids contributing to excessive combustion chamber deposits like some other oil companies' additives. Chevron's gasolines with the Techron additive give unsurpassed performance in avoiding deposit-related problems.

Fuel injector and intake valve deposits can cause hesitation and stumbling, loss of power on acceleration, higher emissions and loss of mileage.

Use of Chevron gasolines with the Techron additive over the years will help cars avoid deposit-related performance deterioration, and will help cars avoid deposit-related increase in emissions.

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APPLICATIONS

Chevron Plus Unleaded Gasoline provides a higher octane than regular unleaded for those drivers who need a moderately higher octane fuel than regular unleaded, and is designed for use in spark-ignition engines where the manufacturer specifies the use of an unleaded fuel. Unleaded gasoline must be used in vehicles equipped with catalytic converters because lead poisons the catalyst and destroys its ability to reduce exhaust pollutants.

It also is recommended for leaded fuel vehicles where the engine octane requirement and operating conditions permit the use of an unleaded gasoline.

Chevron Plus Unleaded Gasoline is satisfactory for use in two-stroke cycle gasoline-powered engines where gasoline-oil mix is used, such as outboard motors, chain saws, scooters, etc., unless the manufacturer specifies leaded gasoline only.

CAUTION — FOR MOTOR FUEL USE ONLY. Do not use as a Pressure Appliance Fuel. This is especially critical in appliances that employ a "generator" system.

WARNING

PORTABLE CONTAINER FIRE HAZARD

Improper filling of portable gasoline containers creates danger of fire.

To fill a container:

- Place approved container on the ground away from vehicle or trailer. DO NOT fill any container that is inside a vehicle or on a truck/trailer bed.
- Keep nozzle in contact with the container while filling.
- Do not use a nozzle lock-open device.

It is unlawful and dangerous to dispense gasoline into unapproved or improperly labeled containers.

CHEVRON SUPREME UNLEADED GASOLINE

CUSTOMER BENEFITS

Chevron Supreme Unleaded Gasoline delivers value through:

- **"Knock-free" performance** for most properly adjusted high octane requirement engines or improved performance for most engines equipped with knock limiters that are activating using lower octane gasoline.
- **Area blending** provides top performance for seasonal and location changes.
- **Extra value** — Chevron Supreme Unleaded Gasoline, with deposit control additive Techron®, provides intake and fuel injection system deposit control which helps keep exhaust emissions low and helps maximize engine performance.

FEATURES

Chevron Supreme Unleaded Gasoline is a clear, light-yellow colored, premium-grade, unleaded gasoline.

It is composed of selected premium blending components to yield a premium-grade antiknock level for those engines not satisfied by Chevron Regular Unleaded Gasoline or Chevron Plus Unleaded Gasoline. It contains Chevron's Techron deposit control additive for cleanup of deposits left by lower quality gasolines.

Chevron Supreme Unleaded Gasoline meets all state and federal specifications for an unleaded gasoline.

FUNCTIONS

Chevron Supreme Unleaded Gasoline meets the requirements of ASTM D4814, *Standard Specification for Automotive Spark-Ignition Engine Fuel*. It provides high antiknock performance without the addition of organometallic or other antiknock additives. It may contain up to 10 volume percent ethanol depending on geographic location and time of year. The (R+M)/2 octane rating ranges from 93 minimum in eastern markets to 91 minimum in some western markets (may be slightly lower in some high elevation markets).

It provides the proper volatility for each geographical area, and time of year, for good cold starting and warmup characteristics, vapor-lock protection, and fuel economy.

It meets or exceeds industry specifications for oxidation stability and gum formation in storage.

Chevron Supreme Unleaded Gasoline contains the deposit control additive Techron for cleanup of deposits left by lower quality gasolines. The Chevron Techron additive is Chevron's proprietary gasoline additive that helps keep an engine's entire intake system clean, plus avoids contributing to excessive combustion chamber deposits like some other oil companies' additives. Chevron's gasolines with the Techron additive give unsurpassed performance in avoiding deposit-related problems.

Fuel injector and intake valve deposits can cause hesitation and stumbling, loss of power on acceleration, higher emissions and loss of mileage.

Use of Chevron gasolines with the Techron additive over the years will help cars avoid deposit-related performance deterioration, and will help cars avoid deposit-related increase in emissions.

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APPLICATIONS

Chevron Supreme Unleaded Gasoline is designed for use in all spark-ignition engines where the manufacturer specifies the use of an unleaded fuel and where higher antiknock quality is needed than is available in other grades of unleaded gasolines. Unleaded gasoline must be used in vehicles equipped with catalytic converters because lead poisons the catalyst and destroys its ability to reduce exhaust pollutants.

It is also recommended for leaded fuel vehicles where the engine octane requirements and operating conditions permit the use of an unleaded gasoline.

Chevron Supreme Unleaded Gasoline is satisfactory for use in two-stroke cycle gasoline-powered engines where gasoline oil-mix is used, such as outboard motors, chain saws, scooters, etc., unless the manufacturer specifies leaded gasoline only.

CAUTION — FOR MOTOR FUEL USE ONLY. Do not use as a Pressure Appliance Fuel. This is especially critical in appliances that employ a "generator" system.

WARNING

PORTABLE CONTAINER FIRE HAZARD

Improper filling of portable gasoline containers creates danger of fire.

To fill a container:

- Place approved container on the ground away from vehicle or trailer. DO NOT fill any container that is inside a vehicle or on a truck/trailer bed.
- Keep nozzle in contact with the container while filling.
- Do not use a nozzle lock-open device.

It is unlawful and dangerous to dispense gasoline into unapproved or improperly labeled containers.

CHEVRON LS HEATING FUEL 2

CUSTOMER BENEFITS

Chevron LS Heating Fuel 2 delivers value through:

- **High BTU/gallon content** which minimizes cost.
- **Clean fuel** which means long burner life between services.
- **Long storage life** that permits buying large volumes to minimize transit costs

FEATURES

Chevron LS Heating Fuel 2 is a medium-bodied distillate fuel manufactured from selected crudes. It meets the requirements of ASTM D396, *Standard Specification for Fuel Oils*, for a No. 2 heating fuel with a sulfur content of 0.05 mass % maximum (500 ppm) - a "low sulfur" fuel.

Chevron LS Heating Fuel 2 has good storage life, high heat content, and is seasonally blended to avoid cold flow problems. Rigorous attention is also paid to fuel cleanliness.

FUNCTIONS

Chevron LS Heating Fuel 2 provides a clean-burning energy source, and allows proper atomization in pressure or gun burners for complete combustion.

APPLICATIONS

Chevron LS Heating Fuel 2 is applicable for domestic or commercial warm-air furnaces, water heaters, restaurant and galley ranges, commercial hot-air driers, and orchard heaters requiring a No. 2 heating fuel.

PRODUCT AND SDS NUMBERS

Product Number	*271006*
SDS Number	*6894*

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CHEVRON ULS DIESEL 2

CUSTOMER BENEFITS

Chevron ULS Diesel 2 delivers value through:

- **Reliable cold starting**
- **Quiet combustion**
- **Excellent available power and economy**
- **Long fuel filter life**
- **Reliable cold flow properties**
- **Long storage life**

In addition, there are special benefits of the low sulfur content:

- **Longer engine life** due to reduced levels of combustion acids which lead to corrosive wear of piston rings and cylinder walls. Piston ring area and piston skirt deposits are also minimized.
- **Extended oil life** — Reduced combustion acids decrease the rate of oil additive depletion.
- **Lower particulate (PM) emissions** are achieved compared to previous low sulfur (500 ppm) diesel formulations.

FEATURES

Chevron ULS Diesel 2 is a high quality low sulfur diesel fuel (15 ppm). It meets the requirements of ASTM D975, *Standard Specification for Diesel Fuel Oils*. This product complies with the U.S. Environmental Protection Agency and with California Air Resources Board regulations. It is appropriate for use in all diesel vehicles and engines including on-road and off-road vehicles, locomotives and marine applications.

Chevron ULS Diesel 2 meets the fuel requirements of major engine manufacturers, is area blended for cold weather use, and has high heat content.

FUNCTIONS

The high cetane number of Chevron ULS Diesel 2 provides quiet combustion and quick starting at low temperatures. The high heat content permits engines to achieve rated power output and optimum fuel economy. Area blending assures a minimum risk of wax plugging of fuel filters and an absence of cold pumping problems. Chevron ULS Diesel 2 has excellent storage and thermal stability.

APPLICATIONS

Chevron ULS Diesel 2 meets the requirements of all major manufacturers of high speed diesel engines.

PRODUCT AND SDS NUMBERS

Product Number	*270005*
SDS Number	*6894*

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BASE OILS

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CHEVRON NEUTRAL OIL
60R, 110RLV, 100R, 150R, 220R, 600R

PRODUCT DESCRIPTION

Chevron Neutral Oils are all-hydroprocessed, Group II/ II+ paraffinic base oils that can be used in blending in a variety of lubricant and process oils.

CUSTOMER BENEFITS

Chevron Neutral Oils deliver value through:

- **High viscosity index**
- **Good volatility**
- **Exceptional oxidation stability**
- **Compatibility with a wide array of additives for formulating flexibility**

FEATURES

Chevron Neutral Oils are all-hydroprocessed, highly refined API Group II/II+ paraffinic base stocks. Their extremely low sulfur, nitrogen, and aromatic content give them excellent thermal and oxidation stability. These base oils provide excellent cold flow performance because the ISODEWAXING® catalyst and technology convert almost all of the wax in the feed into very stable, branched isoparaffins.

Chevron Neutral Oils offer the following characteristics relative to typical Group I (solvent refined) base stocks:

- Lower volatility and cold cranking simulator (CCS) viscosity to meet modern engine oil specifications
- Better oxidation and thermal stability
- Lower aromatics, sulfur and nitrogen
- Improved response to pour point depressants
- Improved soot dispersancy in heavy duty motor oil formulations

Chevron Neutral Oils 100R, 150R, 220R, and 600R are API Group II base stocks with a typical viscosity index of 99-103.

Chevron Neutral Oil 110RLV is a 5 cSt Group II "plus" base stock with a typical viscosity index of 115-117. It was designed to meet the strict volatility requirements of modern engine oils while maintaining API Group II status to simplify qualification programs and to provide interchangeability of Chevron base stocks with other approved stocks. Chevron 110RLV enables blenders to minimize the amount of more expensive Group III oils needed for the most stringent 10W-XX and 5W-XX motor oil requirements.

Chevron Neutral Oil 60R is a light viscosity oil that is typically used in light industrial oil applications, electrical insulating oils, as well as other specialty lubricants and process oils.

Chevron Neutral Oils are non-toxic and meet **U.S. Food and Drug Administration (FDA)** requirement 21 CFR 178.3620(c) for components of nonfood articles.

APPLICATIONS

When combined with properly selected additives, Chevron Neutral Oils are ideal for blending a wide variety of finished products, including:

- Passenger car motor oils
- Heavy duty motor oils
- Industrial engine oils
- Tractor hydraulic fluids
- Transmission fluids
- Gear oils
- Greases
- Hydraulic oils
- Ammonia refrigeration oils
- Paper machine oils
- Turbine oils
- Process oils
- Lubricant additives

Always confirm that the Chevron product selected whether combined with other base oils/additives or used alone will meet the required usage specifications or original equipment manufacturers recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

9 July 2018
BO-10

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- Heat transfer fluids

TYPICAL TEST DATA

		60R	110RLV	100R
Product Number		*240664*	*255623*	*240667*
SDS Number		*30963*	*25003*	*6986*
API Base Stock Category	(API 1509 E.1.3)	Group II	Group II+	Group II
API Gravity	ASTM D1298	32.9	36.0	34.4
Specific Gravity at 60/60°F	ASTM D1298	 0.861	 0.845	 0.853
Density, lb/gal	ASTM D1298	7.167	7.034	7.102
Viscosity, Kinematic cSt at 40°C cSt at 100°C	ASTM D445	 10.5 2.6	 21.7 4.45	 20.0 4.08
Viscosity, Saybolt SUS at 100°F	ASTM D2161	 64	 113	 106
Viscosity Index	ASTM D2270	70	117	102
Cold-Cranking Simulator cP at -30°C cP at -25°C cP at -20°C cP at -10°C	ASTM D5293	 — — — —	 2450 1300 — —	 2650 1325 — —
Pour Point, °C	ASTM D97	-33	-15	-15
Evaporation Loss, NOACK, wt %	CEC-L-40-A-93	 —	 16	 25
Flash Point, COC, °C	ASTM D92	165	206	206
Color	ASTM D1500	L 0.5	L 0.5	L 0.5
Sulfur, ppm	Chevron	<6	<6	<6
Water, ppm	ASTM D1744	50	<50	<50
Saturates, HPLC, wt %	Chevron	>99	>99	>99
Aromatics, HPLC, wt %	Chevron	<1	<1	<1

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the Chevron product selected whether combined with other base oils/additives or used alone will meet the required usage specifications or original equipment manufacturers recommendation for the equipment operating conditions and customer's maintenance practices.

TYPICAL TEST DATA

		150R	220R	600R
Product Number		*581595*	*246748*	*246747*
SDS Number		*11858*	*6986*	*6986*
API Base Stock Category	(API 1509 E.1.3)	Group II	Group II	Group II
API Gravity	ASTM D1298	34.0	32.1	31.0
Specific Gravity at 60/60°F	ASTM D1298	 0.855	 0.865	 0.871
Density, lb/gal	ASTM D1298	7.119	7.202	7.251
Viscosity, Kinematic cSt at 40°C cSt at 100°C	ASTM D445	 29.4 5.24	 41.0 6.3	 106 12.0
Viscosity, Saybolt SUS at 100°F	ASTM D2161	 150	 212	 530
Viscosity Index	ASTM D2270	112	102	102
Cold-Cranking Simulator cP at -30°C cP at -25°C cP at -20°C cP at -10°C	ASTM D5293	 5070 2660 1400 —	 — 5600 3200 —	 — — — 4800
Pour Point, °C	ASTM D97	-15	-15	-15
Evaporation Loss, NOACK, wt %	CEC-L-40-A-93	 14	 11	 2
Flash Point, COC, °C	ASTM D92	220	230	265
Color	ASTM D1500	L 0.5	L 0.5	L 0.5
Sulfur, ppm	Chevron	<6	<6	<6
Water, ppm	ASTM D1744	<50	<50	<50
Saturates, HPLC, wt %	Chevron	>99	>99	>99
Aromatics, HPLC, wt %	Chevron	<1	<1	<1

Minor variations in product typical test data are to be expected in normal manufacturing.

Always confirm that the Chevron product selected whether combined with other base oils/additives or used alone will meet the required usage specifications or original equipment manufacturers recommendation for the equipment operating conditions and customer's maintenance practices.

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Emergency Information

SAFETY DATA SHEETS (SDS)

Safety Data Sheets have been prepared for all Chevron products to comply with the requirements of OSHA Hazard Communication 29 CFR 1910.1200 and many state and federal health and safety related laws and regulations.

Safety Data Sheets are available from:

- https://cglapps.chevron.com/msdspds
- lubemsds@chevron.com
- your Chevron Lubrication Marketer

If you are unable to contact your Chevron supplier, please contact:

Chevron
Chevron Business Center
9401 Williamsburg Plaza, Suite 201
Louisville, KY 40222

If you send a written request, be sure to include your full return address, telephone number, fax number, and e-mail address, if applicable.

EMERGENCY TELEPHONE NUMBERS

Health (24 hr)	
USA only	800-231-0623
Outside USA	001-510-231-0623, international collect calls accepted
Transportation (24 hr)	
CHEMTREC - USA only	1 800 424 9300
CHEMTREC - Outside USA	1 703 527 3887, international collect calls accepted
Mexico - SETIQ	01 800 00 214 00 and 55 59 15 88 (D.F.) Javier Ramirez, Emmanuel Remigio, Enrique Perea and Guillermo Vega

API Engine Oil Service Category Chart

GASOLINE ENGINES		
Category	**Status**	**Service**
SN	Current	Introduced in October 2010 for 2011 and older vehicles, designed to provide improved high temperature deposit protection for pistons, more stringent sludge control, and seal compatibility. API Service Category SN engine oils that also carry the designation SN Plus are formulated to provide API SN performance and additional protection against low-speed pre-ignition for turbocharged direct injection gasoline-powered vehicles. Oils that meet the requirements for API SN with SN Plus or API SN with SN Plus and Resource Conserving at the limit shown in Annex G, Table G-5, and are properly licensed, may display "SN Plus" or "Resource Conserving SN Plus" in the lower portion of the API Service Symbol in conjunction with API SN in the upper portion. Oils that satisfy SN Plus can also effectively lubricate engines calling for API SN, API SN with Resource Conserving, or ILSAC GF-5. API SN with SN Plus and API SN with SN Plus and Resource Conserving are also backward compatible to API Service Categories before API SN.
SM	Current	For 2010 and older automotive engines.
SL	Current	For 2004 and older automotive engines.
SJ	Current	For 2001 and older automotive engines.
SH	Obsolete	For 1996 and older engines.
SG	Obsolete	For 1993 and older engines.
SF	Obsolete	For 1988 and older engines.
SE	Obsolete	**CAUTION**: Not suitable for use in gasoline-powered automotive engines built after 1979.
SD	Obsolete	**CAUTION**: Not suitable for use in gasoline-powered automotive engines built after 1971. Use in more modern engines may cause unsatisfactory performance or equipment harm.
SC	Obsolete	**CAUTION**: Not suitable for use in gasoline-powered automotive engines built after 1967. Use in more modern engines may cause unsatisfactory performance or equipment harm.
SB	Obsolete	**CAUTION**: Not suitable for use in gasoline-powered automotive engines built after 1951. Use in more modern engines may cause unsatisfactory performance or equipment harm.
SA	Obsolete	**CAUTION**: Contains no additives. Not suitable for use in gasoline-powered automotive engines built after 1930. Use in more modern engines may cause unsatisfactory performance or equipment harm.

DIESEL ENGINES		
Category	**Status**	**Service**
CK-4	Current	API Service Category CK-4 describes oils for use in high-speed four-stroke cycle diesel engines designed to meet 2017 model year on-highway and Tier 4 non-road exhaust emission standards as well as for previous model year diesel engines. API CK-4 oils are designed to provide enhanced protection against oil oxidation, viscosity loss due to shear, and oil aeration as well as protection against catalyst poisoning, particulate filter blocking, engine wear, piston deposits, degradation of low- and high-temperature properties, and soot-related viscosity increase.Engine oils that meet the API Service Category CK-4 designation have been tested in accordance with the ACC Code of Practice and may use the API Base Oil Interchangeability Guidelines and the API Guidelines for SAE Viscosity-Grade Read Across. API CK-4 oils exceed the performance criteria of API CJ-4, CI-4 with CI-4 PLUS, CI-4, and CH-4 and can effectively lubricate engines calling for those API Service Categories. When using CK-4 oil with higher than 15 ppm sulfur fuel, consult the engine manufacturer for service interval recommendations.
FA-4	Current	API Service Category FA-4 describes certain XW-30 oils specifically formulated for use in select high-speed four-stroke cycle diesel engines designed to meet 2017 model year on-highway greenhouse gas (GHG) emission standards. API FA-4 oils are designed to provide enhanced protection against oil oxidation, viscosity loss due to shear, and oil aeration as well as protection against catalyst poisoning, particulate filter blocking, engine wear, piston deposits, degradation of low- and high temperature properties, and soot-related viscosity increase. Engine oils that meet the API Service Category FA-4 designation have been tested in accordance with the ACC Code of Practice and may use the API Base Oil Interchangeability Guidelines and the API Guidelines for SAE Viscosity-Grade Read Across. API FA-4 oils are not interchangeable or backward compatible with API CK-4, CJ-4, CI-4 with CI-4 PLUS, CI-4, and CH-4 oils. Refer to engine manufacturer recommendations to determine if API FA-4 oils are suitable for use.
CJ-4	Current	Introduced in 2006. For high-speed, four-stroke engines designed to meet 2007 model year on-highway exhaust emission standards. CJ-4 oils are compounded for use in all applications with diesel fuels ranging in sulfur content up to 500 ppm (0.05% by weight). However, use of these oils with greater than 15 ppm (0.0015% by weight) sulfur fuel may impact exhaust aftertreatment system durability and/or oil drain interval. CJ-4 oils are effective at sustaining emission control system durability where particulate filters and other advanced aftertreatment systems are used. Optimum protection is provided for control of catalyst poisoning, particulate filter blocking, engine wear, piston deposits, low- and high-temperature stability, soot handling properties, oxidative thickening, foaming, and viscosity loss due to shear. API CJ-4 oils exceed the performance criteria of API CI-4 with CI-4 PLUS, CI-4, CH-4, CG-4, and CF-4 and can effectively lubricate engines calling for those API Service Categories. When using CJ-4 oil with higher than 15 ppm sulfur fuel, consult the engine manufacturer for service interval.
CI-4	Current	Introduced in 2002. For high -speed, four-stroke engines designed to meet 2004 exhaust emission standards implemented in 2002. CI-4 oils are formulated to sustain engine durability where exhaust gas recirculation (EGR) is used and are intended for use with diesel fuels ranging in sulfur content up to 0.5% weight. Can be used in place of CD, CE, CF-4, CG-4 and CH-4 oils. Some CI-4 oils may also qualify for the CI-4 PLUS designation.

DIESEL ENGINES		
Category	**Status**	**Service**
CH-4	Current	Introduced in 1998. For high-speed, four-stroke engines designed to meet 1998 exhaust emission standards. CH-4 oils are specifically compounded for use with diesel fuels ranging in sulfur content up to 0.5% weight. Can be used in place of CD, CE, CF-4, and CG-4 oils.
CG-4	Obsolete	Introduced in 1995. For severe duty, high-speed, four-stroke engines using fuel with less than 0.5% weight sulfur. CG-4 oils are required for engines meeting 1994 emission standards. Can be used in place of CD, CE, and CF-4 oils.
CF-4	Obsolete	Introduced in 1990. For high-speed, four-stroke, naturally aspirated and turbo-charged engines. Can be used in place of CD and CE oils.
CF-2	Obsolete	Introduced in 1994. For severe duty, two-stroke-cycle engines. Can be used in place of CD-II oils.
CF	Obsolete	Introduced in 1994. For off-road, indirect-injected and other diesel engines including those using fuel with over 0.5% weight sulfur. Can be used in place of CD oils.
CE	Obsolete	Introduced in 1985. For high-speed, four-stroke, naturally aspirated and turbo-charged engines. Can be used in place of CC and CD oils.
CD-II	Obsolete	Introduced in 1985. For two-stroke-cycle engines.
CD	Obsolete	Introduced in 1955. For certain naturally aspirated and turbocharged engines.
CC	Obsolete	**CAUTION**: Not suitable for use in diesel-powered engines built after 1990.
CB	Obsolete	**CAUTION**: Not suitable for use in diesel-powered engines built after 1961.
CA	Obsolete	**CAUTION**: Not suitable for use in diesel-powered engines built after 1959.

Extracted from API 1509 17th Edition, 2012- Annex E - API Base Oil Interchangeability Guidelines For Passenger Car Motor Oils and Diesel Engine Oils. Reproduced courtesy of the American Petroleum Institute.

API Lubricant Service Designations for Automotive Manual Transmissions, Manual Transaxles, and Axles

API GL-1

Lubricants intended for manual transmissions operating under such mild conditions that straight petroleum or refined petroleum oil may be used satisfactorily. Oxidation and rust inhibitors, defoamers, and pour depressants may be added to improve the characteristics of these lubricants. Friction modifiers and extreme pressure additives shall not be used.

API GL-4

Lubricants intended for axles with spiral bevel gears operating under moderate to severe conditions of speed and load or axles with hypoid gears operating under moderate speeds and loads.

Although this service designation is still used commercially to describe lubricants, some test equipment used for performance verification is no longer available.

API GL-5

Lubricants intended for gears, particularly hypoid gears, in axles operating under various combinations of high-speed/shock load and low-speed/high-torque conditions. Lubricants qualified under SAE J 2360 (formerly known as U.S. Military Specification MIL-PRF-2105E) satisfy the requirements of the API GL-5 service designation, although the API designation does not require military approval.

API MT-1

Lubricants intended for nonsynchronized manual transmissions used in buses and heavy-duty trucks. Lubricants meeting the requirements of API MT-1 service provide protection against the combination of thermal degradation, component wear, and oil-seal deterioration, which is not provided by lubricants in current use meeting only the requirements of API GL-1, 4, or 5.

Extracted from API 1509 17th Edition, 2012- Annex E - API Base Oil Interchangeability Guidelines For Passenger Car Motor Oils and Diesel Engine Oils. Reproduced courtesy of the American Petroleum Institute.

API Base Oil Definitions

Group	Sulfur, Wt %		Saturates	V.I.
I	>0.03	and/or	<90	80-119
II	≤0.03	and	≥90	80-119
III	≤0.03	and	≥90	≥120
IV	All Polyalphaolefins (PAOs)			
V	All Stocks Not Included in Groups I-IV (Naphthenic Oils and Non-PAO Synthetics)			

Group I — These base oils are commonly called solvent refined base oils because nearly all of them are manufactured using solvent extraction and solvent dewaxing.

Group II — These base oils are hydroprocessed which give them significantly lower levels of impurities than Group I base oils.

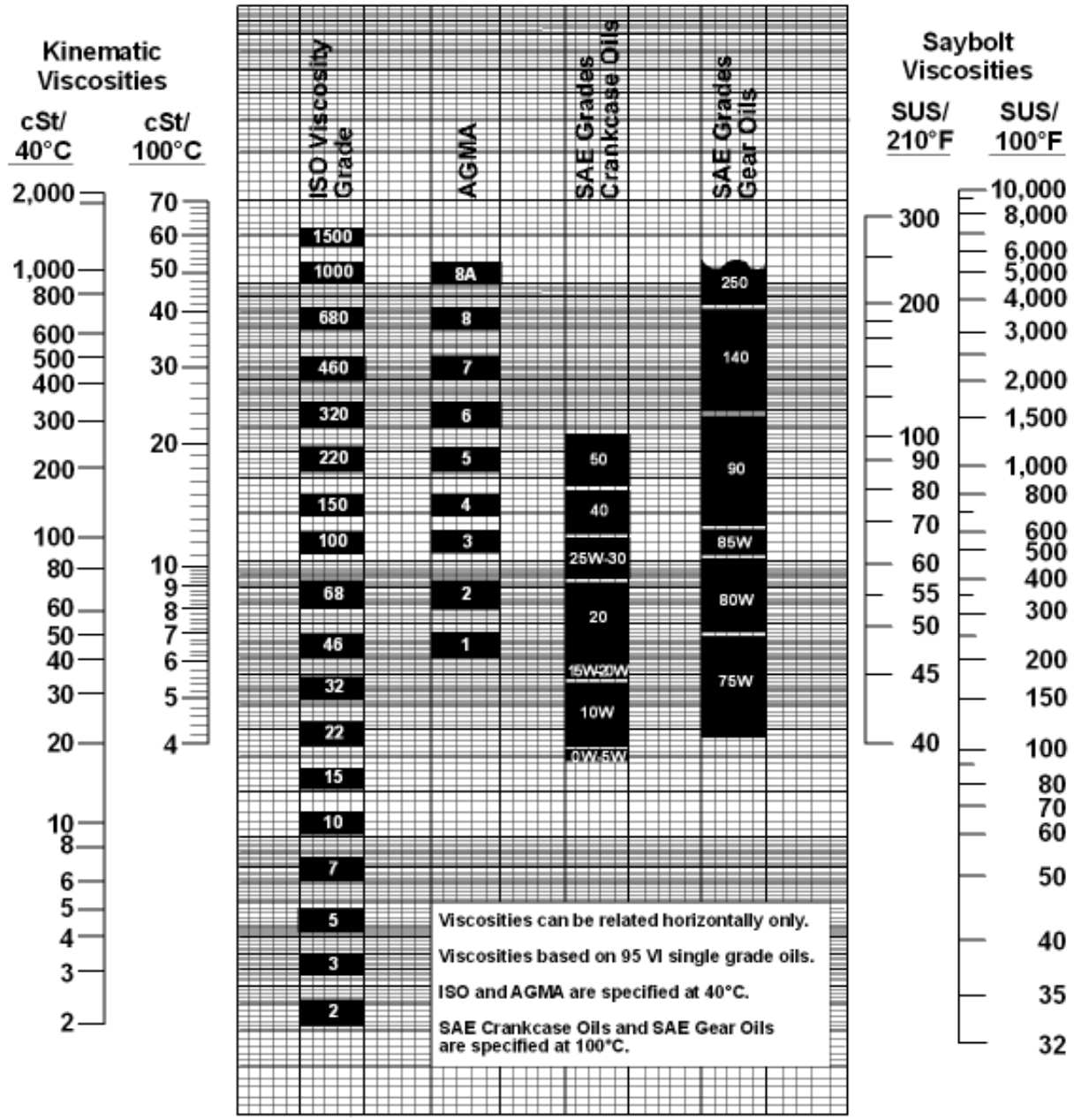
Group III — These base oils are also hydroprocessed but have significantly higher VI than Group II base oils. They are now generally regarded as "synthetic" in the USA.

Group IV — Polyalphaolefin (PAO) base oils are manufactured from olefins, a specific type of chemical feedstock. They predate Group III base oils and are sometimes referred to as traditional synthetics.

Group V — This category is a catch-all for all other base oils not included in categories I-IV. It includes low VI base oils like naphthenic base oils (also called pale oils) and high VI non-PAO synthetics like esters.

Extracted from API 1509 17th Edition, 2012- Annex E - API Base Oil Interchangeability Guidelines For Passenger Car Motor Oils and Diesel Engine Oils. Reproduced courtesy of the American Petroleum Institute.

Approximate Equivalents Kinematic Viscosity to Saybolt Universal Viscosity at 100°F Industrial Fluid Lubricants



To obtain approximate conversions, use the following conversion factors. Refer to ASTM D2161 for exact values:

Saybolt, SUS = Kinematic, cSt x 4.6 Kinematic, cSt = Saybolt, SUS / 4.6.

ASTM/ISO Viscosity System for Industrial Fluid Lubricants

ISO Viscosity Grade	Midpoint Viscosity, cSt at 40.0°C	Kinematic Viscosity Limits, cSt at 40.0°C		Approximate Equivalent SUS Units
		Min	Max	
2	2.2	1.98	2.42	32
3	3.2	2.88	3.52	36
5	4.6	4.14	5.06	40
7	6.8	6.12	7.48	50
10	10	9.00	11.0	60
15	15	13.5	16.5	75
22	22	19.8	24.2	105
32	32	28.8	35.2	150
46	46	41.4	50.6	215
68	68	61.2	74.8	315
100	100	90.0	110	465
150	150	135	165	700
220	220	198	242	1000
320	320	288	352	1500
460	460	414	506	2150
680	680	612	748	3150
1000	1000	900	1100	4650
1500	1500	1350	1650	7000
2200	2200	1980	2420	10300
3200	3200	2880	3520	15000

Reprinted, with permission, from ASTM D2422 Standard Classification of Industrial Fluid Lubricants by Viscosity System, copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standards may be obtained from ASTM, www.astm.org.

Viscosity Ranges for ANSI/AGMA 9005-E02[a] Lubricants

ISO Viscosity Grade[a]	Viscosity Range cSt (or mm^2/s) at 40°C		Former AGMA Grade Equivalents[b]
	min	max	
ISO VG 32	28.8	35.2	0
ISO VG 46	41.4	50.6	1
ISO VG 68	61.2	74.8	2
ISO VG 100	90	110	3
ISO VG 150	135	165	4
ISO VG 220	198	242	5
ISO VG 320	288	352	6
ISO VG 460	414	506	7
ISO VG 680	612	748	8
ISO VG 1000	900	1100	8A
ISO VG 1500	1350	1650	9
ISO VG 2200	1980[c]	2420[c]	10
ISO VG 3200	2880[d]	3520[d]	11

a Revision of ANSI/AGMA 9005-D94.
b With the change from AGMA viscosity grade equivalent to ISO viscosity grade classifications, the designations EP, R and COMP will no longer be used as part of the viscosity grade nomenclature.
c Viscosity limits have changed when compared with previous AGMA specifications (2880 to 3520 cSt at 40ºC).
d Viscosity limits have changed when compared with previous AGMA specifications (4140 to 5060 cSt at 40ºC).

AGMA 9005-E02 Lubricant Classifications & Minimum Performance Requirements	
RO (Formerly R&O)	Inhibited Oils
EP	Antiscuff/Antiwear Oils
CP (Formerly COMP)	Compounded Oils[a]

a Compounded gear oils are blended of petroleum base oils with 3% to 10% of natural or synthetic fatty oils. These lubricants are frequently used in wormgear drives.

Extracted from ANSI/AGMA 9005-E02, *Industrial Gear Lubrication*, with the permission of the publisher, the American Gear Manufacturers Association, 1001 North Fairfax Street, Suite 500, Alexandria, Virginia 22314.

UNDERSTANDING ISO CLEANLINESS CODES

The International Organization for Standardization (ISO) developed a cleanliness code to measure contamination levels per milliliter of fluid at three sizes: 4 microns, 6 microns and 14 microns. Each number represents a contaminant level code for the correlating particle size including all particles of the specified size and larger. It is written as XX/YY/ZZ where:

- XX = total number of particles ≥ 4 µm
- YY = total number of particles ≥ 6 µm
- ZZ = total number of particles ≥ 14 µm

In this example, the particles measured at the given micron levels are assigned a code based on where the value falls in the table. For this example, the ISO code would be 20/17/13.

	Particles/ml	ISO Code
≥4 µ	9,721	20
≥6 µ	1,254	17
≥10 µ	326	
≥14 µ	73	13
≥21 µ	12	
≥38 µ	5	
≥70 µ	0	
≥100 µ	0	

More than (p/ml)	Up to and including (p/ml)	ISO Code
80,000	160,000	24
40,000	80,000	23
20,000	40,000	22
10,000	20,000	21
5,000	10,000	20
2,500	5,000	19
1,300	2,500	18
640	1,300	17
320	640	16
160	320	15
80	160	14
40	80	13
20	40	12
10	20	11
5	10	10
2.5	5	9
1.3	2.5	8

Some programs or equipment guides may report under the old two-number system. In this case, simply drop the first number: */17/13.

READING POTENTIAL LIFE EXTENSION CHARTS

The following charts can be used to calculate the the potential useful life extension that can be achieved by moving from the current ISO cleanliness to a recommended ISO cleanliness level.

- Find the current ISO cleanliness rating on the Y axis
- Move horizontally to the new target ISO cleanliness rating on the X axis
- The corresponding box is the estimated life extension factor

For example, in the chart below, locate the current oil system ISO cleanliness code on the Y axis, 20/18/15. Move horizontally to the new target cleanliness level, 17/15/12. This gives a life extension factor for rolling element bearings a 1.7.

Maintaining the target cleanliness level of 17/15/12 means we can estimate the system components to last 1.7 times longer than at the current 20/18/15 ISO cleanliness level.

ROLLING ELEMENT BEARINGS

New Cleanliness Level

Current Machine Cleanliness	22/20/17	21/19/16	20/18/15	19/17/14	18/16/13	**17/15/12**	16/14/11	15/13/10	14/12/9	13/11/8	12/10
28/26/23	3	3.5	4	5	6	7.5	9	>10	>10	>10	>10
27/25/22	2.5	3	3.5	4	5	6	7	9	>10	>10	>10
26/24/21	2	2.5	3	4	5	6	7	8	10	>10	>10
25/23/20	1.5	2	2.5	3	3.5	4	5	6	8	9	>10
24/22/19	1.3	1.6	2	2.5	3	3.5	4	5	6	7	>10
23/21/18	1.2	1.5	1.7	2	2.5	3	3.5	4	5	7	10
22/20/17		1.2	1.5	1.7	2	2.5	3	4	5	7	9
21/19/16			1.2	1.5	1.7	2	2.5	3	4	6	8
20/18/15				1.2	1.5	**1.7**	2	2.5	3	4.5	6
19/17/14					1.2	1.5	1.7	2	2.5	3	5
18/16/13						1.2	1.5	1.7	2	3.5	4
17/15/12							1.2	1.5	1.7	2	2.5
16/14/11								1.3	1.6	1.8	2
15/13/10									1.2	1.5	1.8

Source: Noria Corporation, Fundamentals of Machinery Lubrication, Noria Skills Training

JOURNEY BEARINGS AND TURBO MACHINERY

New Cleanliness Level

Current Machine Cleanliness	22/20/17	21/19/16	20/18/15	19/17/14	18/16/13	17/15/12	16/14/11	15/13/10	14/12/9	13/11/8	12/10
28/26/23	4	4.5	6	6.5	7.5	8.5	10	>10	>10	>10	>10
27/25/22	3	3.5	4.5	5	6.5	8	9	10	>10	>10	>10
26/24/21	2.5	3	4	5	6.5	7.5	8.5	9.5	>10	>10	>10
25/23/20	1.7	2.3	3	3.7	5	6	7	8	9.5	>10	>10
24/22/19	1.4	1.8	2.3	3	3.5	4.5	5.5	7	8	10	>10
23/21/18	1.2	1.5	1.8	2.2	3	3.5	4.5	5	7	9	10
22/20/17		1.2	1.5	1.8	2.3	3	3.5	5	5	8	10
21/19/16			1.2	1.5	1.8	2.2	3	3.5	5	7	9
20/18/15				1.2	1.5	1.8	2.3	3	3.5	5.5	8
19/17/14					1.2	1.5	1.8	2.3	3	4	6
18/16/13						1.2	1.5	1.8	2.3	3.7	4.5
17/15/12							1.2	1.5	1.8	2.3	3
16/14/11								1.3	1.6	1.9	2.3
15/13/10									1.2	1.6	2

Source: Noria Corporation, Fundamentals of Machinery Lubrication, Noria Skills Training

GEAR BOXES AND OTHER SYSTEMS

Current Machine Cleanliness	New Cleanliness Level										
	22/20/17	21/19/16	20/18/15	19/17/14	18/16/13	17/15/12	16/14/11	15/13/10	14/12/9	13/11/8	12/10
28/26/23	2.5	3	3.5	4	5	6.5	7	9	10	>10	>10
27/25/22	2	2.5	3	3.5	4	5	6	7.5	9	>10	>10
26/24/21	1.5	2	2.5	3	4	5	6	7	8	10	>10
25/23/20	1.3	1.5	2	2.5	3	3.5	4	5	6.5	8.5	10
24/22/19	1.1	1.3	1.7	2	2.5	3	3.5	4	5	5.5	8.5
23/21/18	1.1	1.3	1.4	1.6	2	2.5	3	3.5	4	5.5	8
22/20/17		1.05	1.3	1.4	1.7	2	2.5	3	4	5.5	7
21/19/16			1.1	1.3	1.5	1.7	2	2.5	3.5	4.5	6
20/18/15*				1.1	1.3	1.5	1.7	2	2.5	3.7	5
19/17/14					1.1	1.3	1.5	1.7	2	2.5	3.5
18/16/13						1.1	1.3	1.5	1.8	3	3.5
17/15/12							1.1	1.4	1.5	1.8	2.2
16/14/11								1.2	1.4	1.5	1.8
15/13/10									1.1	1.3	1.6

Source: Noria Corporation, Fundamentals of Machinery Lubrication, Noria Skills Training

HYDRAULIC SYSTEMS AND DIESEL ENGINES

Current Machine Cleanliness	New Cleanliness Level										
	22/20/17	21/19/16	20/18/15	19/17/14	18/16/13	17/15/12	16/14/11	15/13/10	14/12/9	13/11/8	12/10
28/26/23	5	7	9	>10	>10	>10	>10	>10	>10	>10	>10
27/25/22	4	5	7	9	>10	>10	>10	>10	>10	>10	>10
26/24/21	3	4	6	7	9	>10	>10	>10	>10	>10	>10
25/23/20	2	3	4	5	7	9	>10	>10	>10	>10	>10
24/22/19	1.6	2	3	4	5	7	8	>10	>10	>10	>10
23/21/18	1.3	1.5	2	3	4	5	7	9	>10	>10	>10
22/20/17		1.3	1.6	2	3	4	5	7	9	>10	>10
21/19/16			1.3	1.6	2	3	4	5	7	9	>10
20/18/15				1.3	1.6	2	3	4	5	7	>10
19/17/14					1.3	1.6	2	3	4	6	8
18/16/13						1.3	1.6	2	3	4	6
17/15/12							1.3	1.6	2	3	4
16/14/11								1.3	1.6	2	3
15/13/10									1.4	1.8	2.5

Source: Noria Corporation, Fundamentals of Machinery Lubrication, Noria Skills Training

MOISTURE CONTENT

New Moisture Level (ppm)

Current Moisture Level (ppm)	10,000		5,000		2,500		1,000		500		250		100		50	
	Rolling Element	Journal	Rolling Element	Journal	Rolling Element	Journal	Rolling Element	Journal	Rolling Element	Journal	Rolling Element	Journal	Rolling Element	Journal	Rolling Element	Journal
50,000	2.3	1.6	3.3	1.9	4.6	2.3	7.8	2.9	11.2	3.5	16.2	4.3	26.2	5.5	37.8	6.7
25,000	1.6	1.3	2.3	1.6	3.3	1.9	5.4	2.4	7.8	2.9	11.2	3.5	18.2	4.6	26.2	5.5
10,000			1.4	1.2	2	1.5	3.3	1.9	4.8	2.3	6.9	2.8	11.2	3.5	16.2	4.3
5,000					1.4	1.2	2.3	1.6	3.3	1.9	4.8	2.3	7.8	2.9	11.2	3.5
2,500							1.6	1.3	2.3	1.6	3.3	1.9	5.4	2.4	7.8	2.9
1,000									1.4	1.2	2	1.5	3.3	1.9	4.8	2.3
500											1.4	1.2	2.3	1.6	3.3	1.9
250													1.5	1.3	2.3	1.6
100															1.4	1.2

Source: Noria Corporation, Fundamentals of Machinery Lubrication, Noria Skills Training

EXAMPLE:

- A circulating oil system contains oil with 1,000 ppm or 0.1 percent moisture content. Locate the box for 1,000 ppm in the current moisture level.
- Move horizontally to the new target moisture level, 250 ppm or 0.025 percent.
- The life extension factor for the new, target moisture level would be a factor of 2.0 for rolling element bearings and a life extension factor of 1.5 for journal bearings.

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NLGI Grease Consistency Numbers

The National Lubricating Grease Institute has established a grease consistency category based on ASTM D217 Worked Penetration characteristics. Worked Penetration is defined as the distance that an ASTM cone under a specified load, at 25°C (77°F), penetrates in 5 seconds the smooth surface of a grease sample that has been subjected to 60 strokes in a grease worker.

The greater the number defined in terms of the cone penetration, the softer the grease and the lower the NLGI number. Since the penetration scale is not continuous with the NLGI scale, i.e., there are lapses of 15 tenths of a millimeter between NLGI numbers, it is possible to design greases to fall between NLGI numbers. When this is done, unofficial half NLGI numbers are sometimes used.

NLGI Consistency Number	ASTM D217-10 Worked (60 Strokes) Penetration at 25°C(77°F), tenths of a millimeter
000	445 to 475
00	400 to 430
0	355 to 385
1	310 to 340
2	265 to 295
3	220 to 250
4	175 to 205
5	130 to 160
6	85 to 115

The results of two laboratories are considered different if they vary by more than 20 units.

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SAE Viscosity Grades for Engine Oils SAE J300 January 2015

Note: 1 mPa·s = 1 cP; 1 mm^2/s = 1 cSt

SAE Viscosity Grade	Low Temperature (°C) Cranking Viscosity[a], mPa·s	Low Temperature (°C) Pumping Viscosity[b], mPa·s	Low Shear Rate Kinematic Viscosity[c], mm^2/s at 100°C		High Shear Rate Viscosity[d], mPa·s at 150°C
	Max	Max with No Yield Stress	Min	Max	Min
0W	6200 at -35	60,000 at -40	3.8	—	—
5W	6600 at -30	60,000 at -35	3.8	—	—
10W	7000 at -25	60,000 at -30	4.1	—	—
15W	7000 at -20	60,000 at -25	5.6	—	—
20W	9500 at -15	60,000 at -20	5.6	—	—
25W	13000 at -10	60,000 at -15	9.3	—	—
8	—	—	4.0	< 6.1	1.7
12	—	—	5.0	< 7.1	2.0
16	—	—	6.1	< 8.2	2.3
20	—	—	6.9	< 9.3	2.6
30	—	—	9.3	< 12.5	2.9
40	—	—	12.5	< 16.3	3.5 (0W-40, 5W-40 and 10W-40 grades)
40	—	—	12.5	< 16.3	3.7 (15W-40, 20W-40, 25W-40 and 40 grades)
50	—	—	16.3	< 21.9	3.7
60	—	—	21.9	< 26.1	3.7

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a ASTM D5293: Cranking viscosity - The non-critical specification protocol in ASTM D3244 shall be applied with a P value of 0.95.
b ASTM D4684. Note that the presence of any yield stress detectable by this method constitutes a failure regardless of viscosity.
c ASTM D445.
d ASTM D4683, CEC L-36-A-90 (ASTM D4741), or ASTM D5481.
All values, with the exception of the low-temperature cranking viscosity, are critical specifications as defined by ASTM D3244.

Kinematic viscosity ranges for SAE 8 to 20 viscosity grades partially overlap. In labeling a single-grade or multigrade oil meeting the kinematic viscosity requirements of more than one grade, only the highest viscosity grade satisfied by the HTHS viscosity shall be referred to on the label.

Automotive Gear Lubricant Viscosity Classification SAE J306 revised June 2005

Note: 1 cP = 1 mPa″s; 1 cSt = 1 mm^2/s

SAE Viscosity Grade	Maximum Temperature for Viscosity of 150,000 cP, °C[a,b]	Kinematic Viscosity at 100°C, cSt[c]	
		Minimum[d]	Maximum
70W	-55[e]	4.1	—
75W	-40	4.1	—
80W	-26	7.0	—
85W	-12	11.0	—
80	—	7.0	<11.0
85	—	11.0	<13.5
90	—	13.5	<18.5
110	—	18.5	<24.0
140	—	24.0	<32.5
190	—	32.5	<41.0
250	—	41.0	—

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a Using ASTM D2983.
b Additional low temperature viscosity requirements may be appropriate for fluids intended for use in light duty synchronized manual transmissions. See SAE J306 text.
c Using ASTM D445.
d Limit must also be met after testing in CEC L-45-A-99, Method C (20 hours).
e The precision of ASTM Method D2983 has not been established for determinations made at temperatures below -40°C. This fact should be taken into consideration in any producer-consumer relationship.

This classification is based on the lubricant viscosity measured at both high and low temperatures. The high-temperature kinematic viscosity values are determined according to ASTM D445, with the results reported in centistokes (cSt). The low-temperature viscosity values are determined according to ASTM D2983 and these results are reported in centipoise (cP).

High temperature viscosity is related to the hydrodynamic lubrication characteristics of the fluid. Some gear lubricants may contain high molecular weight polymers, known as viscosity modifiers or viscosity index improvers, which function to increase the viscosity of the fluids. During use, these polymers may shear to a lower molecular weight, thereby resulting in a fluid with a lower viscosity than that of the new fluid. In order to ensure that the designated high temperature viscosity grade is retained during use, lubricants must meet the 100°C viscosity limits listed in Table 1 not only when new, but also following evaluation in CEC L-45-A-99, Viscosity Shear Stability of Transmission Lubricants, Method C (20 hours).

Low temperature viscosity requirements are related to the ability of the fluid to flow and provide adequate lubrication to critical parts under low ambient temperatures conditions. The 150,000 cP viscosity value used for the definition of low-temperature properties is based on a series of tests in a specific rear axle design. These tests have shown that pinion bearing failure has occurred at viscosities higher than 150,000 cP and the Brookfield method was shown to give adequate precision at this viscosity level. However, it should be pointed out that other axle designs may tolerate higher viscosities and fail at lower viscosities.

GLOSSARY

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This Glossary is offered as a concise source of basic information about petroleum products—their properties, the processes by which they are made, the test methods used to assess product characteristics and assure consistent quality, and the types of equipment and materials that rely on petroleum products for their operation or manufacture.

An italicized word or phrase within a definition indicates that the term is defined separately under its own heading.

A

absolute viscosity — the ratio of shear stress to shear rate. It is a fluid's internal resistance to flow. The common unit of absolute viscosity is the poise (see *viscosity*). Absolute viscosity divided by the fluid's density equals kinematic viscosity.

absorption — the taking up, assimilation, or incorporation of one material into another.

acid — a chemical substance that can react with metals to form salts and with bases or alkalies to form salts plus water. Acids contain hydrogen and they form hydrogen ions (H+) in water. They are considered strong or weak depending on the hydrogen ion concentration in the solution.

acid number — see *neutralization number*.

additive — a chemical added in small quantities to a petroleum product to impart or improve certain properties.

AGMA — American Gear Manufacturers Association, which as one of its activities establishes and promotes standards for gears and lubricants.

alkaline — the property of a substance, product, or mixture that gives it the chemical character of a base or alkali, as contrasted to an acid.

aniline point — lowest temperature at which a specified quantity of aniline (a benzene derivative) is soluble in a specified quantity of a petroleum product, as determined by test method ASTM D611 or D1012; hence, an empirical measure of the solvent power of a hydrocarbon.

antioxidant — see *oxidation inhibitor*.

antiwear agent — an additive that minimizes wear caused by metal-to-metal contact during conditions of mild boundary lubrication (e.g., stops and starts, oscillating motion). The additive reacts chemically with, and forms a film on metal surfaces under normal operating conditions.

API (American Petroleum Institute) — trade association of petroleum producers, refiners, marketers, and transporters, organized for the advancement of the petroleum industry by conducting research, gathering and disseminating information, and maintaining cooperation between government and the industry on all matters of mutual interest.

API Service Categories — gasoline and diesel engine oil quality levels established jointly by API, SAE, and ASTM, and sometimes called SAE or API/SAE categories.

API gravity — see *specific gravity*.

aromatic — unsaturated hydrocarbon identified by one or more benzene rings or by chemical behavior similar to benzene.

ash content — noncombustible residue of a lubricating oil or fuel, determined in accordance with ASTM D582 and D874 (sulfated ash).

ashless dispersant — cleanliness additive for crankcase oils. It is widely used in lubricants for aviation piston engines. Unlike conventional crankcase-oil detergents, ashless dispersants do not contain metallic compounds. See *dispersant*.

ASTM (American Society for Testing and Materials) — an organization devoted to "the promotion of knowledge of the materials of engineering, and the standardization of specifications and methods of testing." A preponderance of the data used to describe, identify, or specify petroleum products is determined in accordance with ASTM test methods.

autoignition temperature — minimum temperature at which a combustible fluid will burst into flame without an extraneous ignition source.

B

base — one of a broad class of compounds that react with acids to form salts plus water.

base number — see *neutralization number*.

base oils — base stocks and base stock blends used as an inert ingredient or diluent in the manufacture of automotive and industrial lubricants, and some industrial, agricultural, and consumer chemicals.

base stock — a primary refined petroleum fraction, usually a lube oil, into which additives and other oils are blended to produce finished products.

bright stock — high viscosity oils, highly refined and dewaxed to make clear products of good color, produced from residual stocks, or bottoms; used for blending with lower viscosity oils.

Brookfield viscosity — apparent viscosity of an oil, as determined under test method ASTM D2983.

bulk modulus — measure of a fluid's resistance to compressibility; the reciprocal of compressibility.

C

carbon residue — percent of coked material remaining after a sample of lubricating oil has been exposed to high temperatures under ASTM D189 (Conradson) or D524 (Ramsbottom). Results of these tests are reported as a percentage of the weight of the original sample.

catalyst — substance that contributes to a chemical reaction without, itself, undergoing any change.

centipoises — see *viscosity*.

centistokes — see *viscosity*.

centralized lubrication — system under which grease or oil is dispensed automatically from a reservoir directly to the lubricated parts of one or more machines. Flow is maintained by a pump or battery of pumps operating on a common rail, and the amount of lubricant supplied to each point can be regulated by metering devices at each point.

channel point — a measure of the lowest temperature at which a gear lubricant may be used safely.

Cleveland Open Cup (COC) — test (ASTM D92) for determining the flash point and fire point of all petroleum products except fuel oil and products with flash points below 70°C (175°F).

cloud point — temperature at which a cloud or haze of wax crystals appears at the bottom of a sample of lubricating oil in a test jar, when cooled under conditions prescribed by test method ASTM D2500.

Cold Cranking Simulator (CCS) — a high shear viscometer used to measure viscosity of crankcase oils at low temperature (0°F).

compatibility — the ability of petroleum products to form a homogeneous mixture that neither separates nor is altered by chemical interaction.

compounded oil — special blend of petroleum oil with small amounts of fatty or synthetic fatty oils added to them to impart special properties.

compressor — any of a wide variety of mechanisms designed to compress air or other gas to produce useful work.

corrosion — chemical attack on a metal or other solid by contaminants in a lubricant or coolant.

corrosion inhibitor — additive for protecting metal surfaces against chemical attack by water or other contaminants.

cutting fluid — fluid, usually of petroleum origin, for cooling and lubricating the tool and work in machining and grinding.

D

demulsibility — ability of an oil to separate from water, as determined by ASTM D1401 or D2711.

detergent — an additive in crankcase oils generally combined with (and confused with) dispersant additives. A detergent chemically neutralizes acidic contaminants in the oil before they become insoluble and fall out of the oil, forming sludge.

detergent-dispersant — engine oil additive that is a combination of a detergent and a dispersant; important in preventing the formation of sludge and other engine deposits.

dielectric strength (breakdown voltage) — minimum voltage required to produce an electric arc through an oil sample, as measured by test method ASTM D877; hence, an indication of the insulating (arc preventive) properties of a transformer oil. A low dielectric strength may indicate contamination, especially by water.

dispersant — engine oil additive that helps prevent sludge, varnish, and other engine deposits by breaking up insoluble contaminant particles already formed. Particles are kept finely divided so that they can remain "dispersed" or colloidally suspended in the oil.

dropping point — the temperature at which a grease passes from a semisolid to a liquid state under specified test conditions ASTM D556. It is an indication of whether a grease will flow from a bearing at operating temperature.

E

emulsibility — the ability of an oil to emulsify with water. The oil becomes suspended in the water in minute particles in a more or less stable form.

emulsion — intimate mixture of oil and water, generally of a milky or cloudy appearance.

engine deposits — hard or persistent accumulations of sludge, varnish, and carbonaceous residues due to blow-by of unburned and partially burned (partially oxidized) fuel, or from partial breakdown of the crankcase lubricant.

EP additive — lubricant additive that prevents sliding metal surfaces from seizing under conditions of extreme pressure (EP). At the high local temperatures associated with metal-to-metal contact, an EP additive combines chemically with the metal to form a surface film that prevents the welding of opposing asperities, and the consequent scoring that is destructive to sliding surfaces under high loads.

F

film strength — property of a lubricant which acts to prevent scuffing or scoring of bearing surfaces.

fire point — the minimum sample temperature at which vapor is produced at a sufficient rate to sustain combustion. Specifically, it is the lowest sample temperature at which the ignited vapor persists in burning for at least 5 seconds.

flash point — minimum temperature of a petroleum product or other combustible fluid at which vapor is produced at a rate sufficient to yield a combustible mixture. Specifically, it is the lowest sample temperature at which the air vapor mixture will "flash" in the presence of an ignition source (small flame).

floc point — temperature at which waxy materials in a lubricating oil separate from a mixture of oil and FREON R-12 refrigerant, giving a cloudy appearance to the mixture.

fluid friction — A liquid's internal resistance to flow. See *friction*.

foaming — occurrence of a frothy mixture of air and a petroleum product (e.g., lubricant, fuel oil) that can reduce the effectiveness of the product, and cause sluggish hydraulic operation, air binding of oil pumps, and over-flow of tanks or sumps.

foam inhibitor — an additive which causes foam to dissipate more rapidly. It promotes the combination of small bubbles into large bubbles which burst more easily.

freezing point — a specific temperature that can be defined in two ways, depending on the ASTM test used.

friction — resistance to the motion of one surface relative to another. The a mount of friction is dependent on the smoothness of the contacting surfaces, as well as the force with which they are pressed together.

G

grease — mixture of a fluid lubricant (usually a petroleum oil) and a thickener (usually a soap) dispersed in the oil. Because greases do not flow readily, they are used where extended lubrication is required and where oil would not be retained.

H

heat of combustion — measure of the available energy content of a fuel, under controlled conditions specified by test method ASTM D240 or D2382.

hydrocarbon — chemical compound of hydrogen and carbon; also called an organic compound. Hydrogen and carbon atoms can be combined in virtually countless ways to make a diversity of products.

hydrolytic stability — ability of additives and certain synthetic lubricants to resist chemical decomposition (hydrolysis) in the presence of water.

I

ILSAC (International Lubricant Standardization & Approval Committee) — composed of Japanese and U.S. automobile manufacturers, it initiates and promotes the development of passenger vehicle engine oil performance specifications.

inhibitor — additive that improves the performance of a petroleum product through the control of undesirable chemical reactions. See *corrosion inhibitor*, *oxidation inhibitor*, *rust inhibitor*.

inorganic compound — chemical compound, usually mineral, that does not include hydrocarbons and their derivatives.

insolubles — test for contaminants in used lubricating oils, under conditions prescribed by test method ASTM D893.

ISO — International Standards Organization.

ISO Cleanliness Code 4406:1999 — developed by the International Standards Organization to measure contamination levels per milliliter of fluid at three sizes: 4 microns, 6 microns and 14 microns. Each number represents a contaminant level code for the correlating particle size including all particles of the specified size and larger. It is written as XX/YY/ZZ. See *micron*.

ISO viscosity classification system — international system, approved by the International Standards Organization (ISO), for classifying industrial lubricants according to viscosity. Each ISO viscosity grade number designation corresponds to the mid-point of a viscosity range expressed in centistokes (cSt) at 40°C.

ISOSYN — ISOSYN® Technology is how Chevron formulates its top tier Delo® products. It's the combination of our premium base oils, high performance additives, with Chevron's formulation expertise that provides superb diesel engine parts protection. All at an outstanding value.

ISOSYN Advanced Technology — The combination of Chevron's outstanding formulating expertise, unique high performance additive chemistry and premium base oils that helps extend the durability of critical diesel engine parts.

K

kinematic viscosity — absolute viscosity of a fluid divided by its density at the same temperature of measurement. It is the measure of a fluid's resistance to flow under gravity, as determined by test method ASTM D445.

L

load wear index — measure of the relative ability of a lubricant to prevent wear under applied loads; it is calculated from data obtained from the Four Ball EP Method.

lubrication — Control of friction and wear by the introduction of a friction-reducing film between moving surfaces in contact. The lubricant used may be a fluid, solid, or plastic substance.

lubricity — Ability of an oil or grease to lubricate; also called film strength. Lubricity can be enhanced by additive treatment.

M

melting point — the temperature at which a solid substance melts or becomes liquid. Grease melting point is determined by placing a small amount of the grease on the bulb of a thermometer and heating in hot air until the grease begins to run off. Also see *dropping point*.

micron — a unit of length equal to one millionth of a meter.

mineral oil — Any petroleum oil, as contrasted to animal or vegetable oils. Also, a highly refined petroleum distillate, or white oil, used medicinally as a laxative.

miscible — capable of being mixed in any concentration without separation of phases.

moly, molysulfide — see *molybdenum disulfide*.

molybdenum disulfide — a black, lustrous powder (MoS2) that serves as a dry-film lubricant in certain high temperature and high vacuum applications.

multigrade oil — engine oil that meets the requirements of more than one SAE (Society of Automotive Engineers) viscosity grade classification (see *SAE viscosity grades*), and may therefore be suitable for use over a wider temperature range than a single grade oil.

N

naphthene — hydrocarbon characterized by saturated carbon atoms in a ring structure, and having the general formula CnH2n; also called cycloparaffin or cycloalkane. See *pale oil*.

naphthenic — see *naphthene*.

neutralization number — also called neut number, an indication of the acidity or alkalinity of an oil; the number is the weight in milligrams of the amount of acid (hydrochloric acid [HCI]) or base (potassium hydroxide [KOH]) required to neutralize one gram of the oil, in accordance with test method ASTM D664 (potentiometric method) or ASTM D974 (colorimetric method).

neutral oils — paraffinic base oils of low or medium viscosity obtained in petroleum distillation and prepared by various methods. They derive their name from the fact that they have not been treated with either an acid or an alkali.

Newtonian fluid — fluid, such as a straight mineral oil, whose viscosity does not change with rate of flow.

NLGI (National Lubricating Grease Institute) — trade association whose main interest is grease and grease technology.

NLGI consistency grades — simplified system established by the National Lubricating Grease Institute (NLGI) for rating the consistency of grease.

NMMA — National Marine Manufacturers Association.

O

octane number — expression of the antiknock properties of a gasoline, relative to that of a standard reference fuel. There are two distinct types of octane number measured in the laboratory: Research Octane Number (RON) and Motor Octane Number (MON), determined in accordance with ASTM D2699 and D2700, respectively.

oil — a greasy unctuous liquid of vegetable, animal, mineral, or synthetic origin.

oxidation — a form of chemical deterioration to which petroleum products, like most other organic materials, are subject. The resistance of many petroleum products to oxidation, however, is very high. Oxidation usually involves the addition of oxygen atoms, and the result is nearly always one of degradation.

oxidation inhibitor — substance added in small quantities to a petroleum product to increase its oxidation resistance, thereby lengthening its service or storage life; also called an antioxidant.

oxidation stability — resistance of a petroleum product to oxidation; hence a measure of its potential service or storage life. There are a number of ASTM tests to determine the oxidation stability of a lubricant or fuel, all of which are intended to simulate service conditions on an accelerated basis.

P

pale oil — straight naphthenic mineral oil, straw or pale yellow in color, used as a once-through lubricant and in the formulation of process oils. Naphthenic lubricating oils have low pour points owing to their very low wax content, and good solvency properties.

paraffin — hydrocarbon identified by saturated straight (normal) or branched (iso) carbon chains. Paraffins are relatively nonreactive and have excellent oxidation stability. In contrast to naphthenic (see *naphthene*) oils, paraffinic lube oils have relatively high wax content and pour point, and generally have a high viscosity index.

paraffinic — see *paraffin*.

particle count — a report of the number and size (in microns) in a volume of fluid. See *micron*.

penetration (grease) — measure of the consistency of a grease, utilizing a penetrometer. Penetration is reported as the tenths of a millimeter (penetration number) that a standard cone, acting under the influence of gravity, will penetrate the grease sample under test conditions prescribed by test method ASTM D217. Standard test temperature is 25°C (77°F). The higher the penetration number, the softer the grease.

poise — CGS unit of absolute viscosity; shear stress (in dynes per square centimeter) required to move one layer of fluid along another over a total layer thickness of one centimeter at a shear rate of one centimeter per second. Dimensions are dyne-sec/cm^2. The centipoise (cP) is 1/100 of a poise and is the unit of absolute viscosity most commonly used.

pour point — is a widely used low temperature flow indicator and is 5°F above the temperature to which a normally liquid petroleum product maintains fluidity.

pour point depressant — additive used to lower the pour point of a petroleum product.

ppm — parts per million.

process oil — oil that serves as a temporary or permanent component of a manufactured product.

R

R&O — rust and oxidation-inhibited term applied to highly refined industrial lubricating oils formulated for long service in circulating systems, compressors, hydraulic systems, bearing housing, gear cases, etc. The finest R&O oils are often referred to as turbine oils.

rheology — study of the deformation and flow of matter in terms of stress, strain, temperature, and time. The rheological properties of a grease are commonly measured by penetration and apparent viscosity.

rust inhibitor — a lubricant additive for protecting ferrous (iron and steel) components from rusting caused by water contamination or other harmful materials from oil degradation.

S

SAE (Society of Automotive Engineers) — organization responsible for the establishment of many U.S. automotive and aviation standards, including the viscosity classifications of engine oils and gear oils.

SAE viscosity grades — engine oil classification system as outlined in the Society of Automotive Engineers (SAE) standard J300, based on the measured viscosity of the oil at either -18°C (0°F), using test method ASTM D2602, or at 100°C (212°F), using ASTM D445. If the viscosity is measured at -18°C, the grade number of the oil includes the suffix "W" (e.g., SAE 20W), denoting suitability for winter use.

shear — deformation which occurs when parallel planes of a body are displaced relative to each other in a direction parallel to themselves.

shear rate — rate at which adjacent layers of a fluid move with respect to each other, usually expressed as reciprocal seconds.

shear stability — ability of a fluid to maintain a stable shear rate over a period of time.

shear stress — frictional force overcome in sliding one "layer" of fluid along another, as in any fluid flow. The shear stress of a petroleum oil or other Newtonian fluid at a given temperature varies directly with shear rate (velocity). The ratio between shear stress and shear rate is constant; this ratio is termed viscosity.

sludge — in gasoline engines, a soft, black, mayonnaise-like emulsion of water, other combustion by-products, and oil formed during low-temperature engine operation.

soap — the salt of an acid derived from animal or vegetable matter. Metallic soaps are used in the manufacture of grease.

specific gravity — for petroleum products, the ratio of the mass of a given volume of product and the mass of an equal volume of water, at the same temperature. The standard reference temperature is 15.6°C (60°F). Specific gravity is determined by test method ASTM D1298. The higher the specific gravity, the heavier the product.

STLE (Society of Tribology and Lubrication Engineers) — an organization intended to advance the knowledge and application of lubrication and related sciences.

straight mineral oil — petroleum oil containing no additives.

sulfated ash — the ash content of fresh, compounded lubricating oil as determined by ASTM D874. Indicates level of metallic additives in the oil.

synthetic lubricant — a lubricating fluid made with synthetic base stock featuring higher lubrication performance than a conventional lubricant. A synthetic base stock is composed of chemically altered molecules. A synthetic base stock could be a severely hydroprocessed Group III oil, or it could be a chemically synthesized oil like a polyalphaolefin.

T

tackiness agent — additive used to increase the adhesive properties of a lubricant, improve retention, and prevent dripping and splattering.

texture — that property of a lubricating grease which is observed when a small portion of it is compressed and the pressure slowly released.

thermal stability — ability to resist chemical degradation at high temperatures.

total acid number (TAN) — see *neutralization number*.

total base number (TBN) — see *neutralization number*.

tribology — science of the interactions between surfaces moving relative to each other. Such interactions usually involve the interplay of two primary factors: the load, or force, perpendicular to the surfaces, and the frictional force that impedes movement.

V

viscosity — measurement of a fluid's resistance to flow. The common metric unit of absolute viscosity is the poise, which is defined as the force in dynes required to move a surface one square centimeter in area past a parallel surface at a speed of one centimeter per second, with the surfaces separated by a fluid film one centimeter thick.

viscosity index — empirical, unitless number indicating the effect of temperature change on the kinematic viscosity of an oil. Liquids change viscosity with temperature, becoming less viscous when heated; the higher the viscosity index of an oil, the lower its tendency to change viscosity with temperature.

viscosity index improver — lubricant additive, usually a high molecular weight polymer, that reduces the tendency of an oil to change viscosity with temperature. Multigrade oils, which provide effective lubrication over a broad temperature range, usually contain viscosity index improvers.

Volatile Organic Compounds (VOC) — any organic compound that evaporates or vaporizes under operating conditions. There are many government regulations regarding the release of VOCs.

volatility — expression of evaporation tendency. The more volatile a petroleum liquid, the lower its boiling point and the greater its flammability.

W

wear — the attrition or rubbing away of the surface of a material as a result of mechanical action.

Z

ZDDP (zinc dialkyl dithiophosphate or zinc diaryl dithiophosphate) — widely used as an antiwear agent in motor oils to protect heavily loaded parts, particularly the valve train mechanisms (such as the camshaft and cam followers) from excessive wear. It is also used as an antiwear agent in hydraulic fluids and certain other products.