



Compressor Oil Changeover Procedure

How to transition from one compressor oil to another.

Making the change to the lubricant best suited for your compressor can help maximize profitability and improve reliability of your operation. Some of these benefits can include:

- Long Machinery Life
- Maximum Compressor Efficiency
- Long Drain Intervals
- Reduced Maintenance and Unscheduled Downtime

Unlike changing engine oils, where typically a simple drain and fill is sufficient, changing a compressor oil has some complexity involving compatibility of different brands, base oils and additives. Incompatibility of two oils may cause additives to gel and drop out of the oil, which could result in degradation of lubrication performance. Consequently, it is extremely important to plan and execute a successful compressor oil change-out process, based on these complexities and OEM requirements. Always follow the recommendations of the OEM.

Typically base oils used in compressor lubricants are either mineral Group I (naphthenic/paraffinic), mineral Group II, synthetic Group III, PAO, ester (diester and polyolester), silicone, or PAG. Usually PAGs are not compatible with other base fluids besides themselves. Usually mineral oils and PAOs are compatible, however, PAOs and ester base oils could have varying degrees of compatibility with other products. Some diesters may be incompatible with some types of paint and elastomers. Even if two different products are made with the same type of base oil, there exists possibility that there could be incompatibility from the additives. Additionally, there exists possibility that a new replacement compressor oil could be incompatible with the existing, in-service oil, due to levels of contamination, including water. Again, there are many complexities to consider.

It is imperative to be cautious even when changing from one base oil type compressor fluid to a Chevron compressor fluid of the same base oil, because variations of incompatibility could come into play. The compatibility table of base oils used in compressor oil formulation are shown below and reiterates the need for caution and appropriate decision regarding compatibility, flushing, etc.

Base Oil	Compatible?
PAG + PAG	Possible
PAG + PAO	Never
PAG + Ester (Diester and Polyolester)	Never
PAG + Mineral	Never
PAG + Silicone	Never
PAO + PAO	Possible
PAO + Ester (Diester and Polyolester)	Possible
PAO + Mineral	Possible
PAO + Silicone	Never
Mineral + Mineral	Possible
Mineral + Ester (Diester and Polyolester)	Possible
Mineral + Silicone	Never

Again, there is no absolute answer to compatibility, including issues caused by the variability of additives, and contamination of the in-service oil. When changing oils, our primary recommendation for compressors is to drain and flush the system no matter what the base oil of the current and replacement product, because of all these variables of potential incompatibility. This will provide the full performance benefit of the new oil in the compressors. This conservative recommendation is additionally substantiated in the risk vs reward model, when speaking of the size of a reservoir in question, they are usually small. So, because of the small volume of current product involved in a reservoir, it is best to drain and flush knowing the risk and complexity of compatibility.

There are levels of risk that may be appropriately taken, for example, replacing a certain base oil compressor fluid, with the same type base oil compressor fluid, i.e. drain, flush and changing filters, demonstrates lesser risk. To benefit from the full potential of the new compressor oil, it is better to replace the old oil completely instead of topping up.

Individual circumstance might warrant a verification with Local Technical Support. Complicate that same scenario with a potential need to remove carbon and lacquer deposits, escalates the level of caution. This level of caution may include flushing, potential for solvent flushing, seal replacement, etc.

Chevron can test for compatibility using ASTM D7155 testing or visual test methods. This testing can be requested using the Technical Service Request process. The compatibility testing is not a certification of performance when products are mixed, but can lead to contribution to the decision process of what level of compatibility/incompatibility exists, and consequently, what degree of flushing is warranted.

Four step-by-step specific changeover procedures are provided below for use for different types of compressor fluids being considered. They should be used as a guide to supplement OEM recommendations.

Procedure A is recommended for changing from a mineral oil or PAO-based oil to synthetic Cetus® HiPerSYN® compressor oil. This procedure can also be used for changing between mineral oil-based compressor oils.

Procedure B is recommended for changing from a mineral oil-based oil to synthetic diester-based Cetus DE compressor fluid.

Procedure C is recommended for changing from a mineral oil or PAO-based oil to a polyalkylene glycol (PAG) fluid.

Procedure D is recommended for changing from a polyalkylene glycol (PAG) lubricant to a mineral oil-based oil, Cetus HiPerSYN oil, or Cetus PAO oil.

PROCEDURE A: CHANGE-OVER PROCEDURE FROM A HYDROCARBON MINERAL OIL OR PAO-BASED COMPRESSOR OIL TO SYNTHETIC CETUS HIPERSYN COMPRESSOR OIL IN ROTARY COMPRESSORS

(This procedure can also be used when switching to Chevron Cetus PAO).

To achieve the best results from the Chevron Cetus HiPerSYN Oil, the unit should be as clean as possible (including all components that come into contact with the lubricant) before changing over. This includes draining and thoroughly removing the previously used lubricant from the compressor. In all cases, the manufacturer's change-out and flushing recommendations, including all relevant safety precautions should be closely followed during the conversion. Inspect the seals to determine their condition, and follow the compressor manufacturer's recommendation on seal replacement. If the previous compressor oil is of significantly different chemistry (ie., PAG polyalkylene glycol or diesters), the seals will need to be replaced. Please refer to the manufacturer's service manual to select the right viscosity ISO grade for the compressor oil. Please also refer to the Product Data Sheet for the Chevron Cetus HiPerSYN oil that will be used in the change-out.

The following procedure is recommended for fluid changeover to Cetus HiPerSYN in a compressor that has been operated with other types of mineral oil-based or PAO-based lubricants. The following steps are suggested to facilitate the change out of the previously used lubricant.

- 1) Allow the compressor system to run to normal operating temperature for 1 hour.
- 2) Shut down the compressor system.
- 3) Drain all the previously used lubricant from the main reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets. Clean strainers and replace air-oil separator and oil filters.
- 4) Refill the compressor system to half capacity (or the minimum required by the manufacturer) with Chevron Cetus DE oil, a diester-based lubricant.
- 5) Start machine and bring to normal operating temperature, and run the compressor system for 8 to 24 hours, carefully monitoring temperatures, pressures, and filter condition.
- 6) Cetus DE oil has excellent solvency and should the compressor contain deposits, the use of this product will clean and loosen these deposits. These deposits will be picked up by the fluid and carried to the filters, and therefore the pressure increases across the oil filters and should be closely monitored.
- 7) Shut down the machine.

- 8) Drain thoroughly all the Cetus DE oil from the main reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets. Dismantle and inspect all internal compressor components that come in contact with the lubricant such that all deposits are removed. The components should be as clean as practical before changing over. Follow the manufacturer's recommended procedures for the thorough cleaning of all valves, air passages, coolers, separators, and procedure for seal replacements.
- 9) Refill the machine to half capacity (or the minimum required by the manufacturer) with Cetus HiPerSYN oil.
- 10) Start the compressor system and bring to normal operating temperature for at least 1 hour.
- 11) Shut down the machine and drain the main reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets. Clean strainers and replace air-oil separators and oil filters.
- 12) Repeat Steps 9-11.
- 13) Refill machine with Cetus HiPerSYN oil to the normal level.
- 14) Restart machine and monitor the oil level.
- 15) Run the compressor for two weeks, carefully monitoring make-up fluid, temperature, and pressure as well as filter conditions during this period. (If needed, evaluate the fluid condition to take any corrective action needed).
- 16) Sample the fluid at monthly intervals for the next six months continuing to carefully monitor make-up fluid, temperature and pressure, as well as filter conditions.

PROCEDURE B: CHANGE-OVER PROCEDURE FROM MINERAL OIL-BASED COMPRESSOR OIL TO SYNTHETIC DIESTER-BASED CETUS DE COMPRESSOR OIL IN ROTARY COMPRESSORS

Chevron Cetus DE compressor oils are synthetic lubricants formulated with diester-based oils and exhibit a high degree of inherent detergency aimed at keeping compressor parts clean in service. The change-over procedure requires some additional precautions.

To achieve the best results from the Chevron Cetus DE compressor oils, the unit should be as clean as possible (including all components that come into contact with the lubricant) before changing over. This includes draining as much of the previously used lubricant as is practical. In all cases, the manufacturer's change-out and flushing recommendations, including all relevant safety precautions should be closely followed during the conversion. Inspect the seals to determine their condition, and follow the compressor manufacturer's recommendation on seal replacement. Please refer to the manufacturer's service manual to select the right viscosity ISO grade for the compressor oil. Please also refer to the Product Data Sheet for the Chevron Cetus DE lubricant that will be used in the change-out.

The high solvency and cleaning action of Cetus DE compressor oil may remove heavy deposits from the internal surfaces when converting from petroleum oils. There may be a transition period needed to purge the built-up sludge and heavy deposits from the internal surfaces of the system. The length of time for this transition will depend on the age and condition of the compressor. One can expect to find evidence of additive deposits downstream of the compressors, such as in the cooler parts. Therefore, the machines need to be properly surveyed. Depending on the deposit level in the system, it may take as long as ~500 hours before all residual deposits are removed.

Please refer to the Product Data Sheet for compatibility of this product with seals, paints and plastics. The following procedure is recommended when changing over a compressor fluid where the compressor has been operated with mineral oil based lubricants. The following steps are suggested to facilitate the change out of the previously used lubricant.

- 1) Allow the compressor system to run to normal operating temperature for 1 hour.
- 2) Shut down the compressor system.
- 3) Drain all the previously used lubricant from the main reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets. Clean strainers and replace air-oil separator and oil filters.
- 4) Refill the compressor system to half capacity (or the minimum required by the manufacturer) with Cetus DE oil.
- 5) Start machine and bring to normal operating temperature, and run the compressor system for 8 to 24 hours, carefully monitoring temperatures, pressures, and filter condition.
- 6) Cetus DE oil has excellent solvency and should the compressor contain deposits, the use of this product will clean and loosen these deposits. These deposits will be picked up by the fluid and carried to the filters, and therefore the pressure increases across the oil filters and should be closely monitored.
- 7) Shut down the machine.
- 8) Drain thoroughly all the Cetus DE oil from the main reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets. Dismantle and inspect all internal compressor components that come in contact with the lubricant such that all deposits are removed. The components should be as clean as practical before changing over. Follow the manufacturer's recommended procedures for the thorough cleaning of all valves, air passages, coolers, separators, and procedure for seal replacements.
- 9) Refill the machine to half capacity (or the minimum required by the manufacturer) with Cetus DE oil.
- 10) Start the compressor system and bring to normal operating temperature for at least 1 hour.
- 11) Shut down the machine and drain the main reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets. Clean strainers and replace air-oil separators and oil filters. (Repeat steps 9-11 if necessary).

- 12) Refill machine with Cetus DE oil to the normal level.
- 13) Restart machine and monitor the oil level.
- 14) Run the compressor for two weeks, carefully monitoring make-up fluid, temperature, and pressure as well as filter conditions during this period. The Cetus DE synthetic lubricant will continue to remove deposits from inaccessible oil lines and passages and may reduce filter efficiency and require an earlier change. (If needed, evaluate the fluid condition to take any corrective action needed).
- 15) Sample the fluid at monthly intervals for the next six months continuing to carefully monitor make-up fluid, temperature and pressure, as well as filter conditions.

PROCEDURE C: CHANGE-OVER PROCEDURE FROM A HYDROCARBON MINERAL OIL OR PAO-BASED COMPRESSOR OIL TO A POLYALKYLENE GLYCOL (PAG) LUBRICANT IN ROTARY COMPRESSORS

PAG polyalkylene glycol lubricants are typically not compatible with hydrocarbon lubricants or synthetic PAO fluids. Generally, the preference is not to mix PAG and petroleum or PAO-based lubricants together. In order to achieve the best performance results from PAG fluids, the previously used lubricant should be thoroughly removed from the compressor. Care should be used when changing to PAG fluids. A complete drain and flush will provide the full performance benefit.

Because PAG compressor fluids have significantly different chemistries, all seals in the compressor need to be replaced, otherwise oil leakage can occur due to seal shrinkage of swollen seals. Follow the compressor manufacturer's recommendations on seal replacements, and guidance on compatibility of paint types and flexible sealants.

To achieve the best results from the PAG fluids, the unit should be as clean as possible (including all components). This includes draining and flushing all the previously used lubricant. In all cases, the manufacturer's change-out and flushing recommendations, including all relevant safety precautions should be closely followed during the conversion. Please refer to the manufacturer's service manual to select the right viscosity ISO grade for the compressor fluid. Please also refer to the Product Data Sheet for the PAG lubricant that will be used in the change-out.

The following procedure is recommended when changing over a compressor fluid where the compressor has been operated with other types of lubricants. The following steps are suggested to facilitate the change out of the previously used lubricant.

- 1) Allow the compressor system to run to normal operating temperature for 1 hour.
- 2) Shut down the compressor system.
- 3) Drain completely all the previously used lubricant from the reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets where oil may be trapped. Clean strainers and replace air-oil separator and oil filters.
- 4) Refill the compressor system to half capacity (or the minimum required by the manufacturer) with the PAG fluid.
- 5) Start machine and bring to normal operating temperature, and run the compressor system under no load for 8 to 24 hours, carefully monitoring temperatures, pressures, and filter condition.
- 6) Shut down the machine.
- 7) Drain the PAG completely from the main reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets. Dismantle and inspect all internal compressor components that come in contact with the lubricant such that all deposits are removed. The components should be as clean as practical before changing over. Follow the manufacturer's recommended procedures for the thorough cleaning of all valves, air passages, coolers, separators, and procedure for seal replacements.
- 8) Refill the machine to half capacity (or the minimum required by the manufacturer) with PAG fluid.
- 9) Start the compressor system and bring to normal operating temperature for at least 1 hour.
- 10) Shut down the machine and fully drain the main reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets. Clean strainers and replace air-oil separators and oil filters. (Repeat steps 8-10 if necessary).
- 11) Refill machine with the PAG fluid to the normal level.
- 12) Restart machine and monitor the fluid level.
- 13) Run the compressor for two weeks, carefully monitoring make-up fluid, temperature, and pressure as well as filter conditions. (If needed, evaluate the fluid condition to take any corrective action needed).
- 14) Sample the fluid at monthly intervals for the next six months continuing to carefully monitor make-up fluid, temperature and pressure, as well as filter conditions.

PROCEDURE D: CHANGE-OVER PROCEDURE FROM A POLYALKYLENE GLYCOL (PAG) LUBRICANT TO A MINERAL OIL-BASED OIL, CETUS HIPERSYN OIL OR CETUS PAO COMPRESSOR OIL IN ROTARY COMPRESSORS

PAG polyalkylene glycol lubricants are typically not compatible with hydrocarbon lubricants or synthetic PAO fluids. Generally, the preference is not to mix PAG and petroleum based lubricants together. In order to achieve the best performance results from Chevron mineral oil or PAO compressor oils, the previously used lubricant should be thoroughly removed from the compressor. Care should be used when changing from PAG fluids. They are highly polar and any residual PAG fluid can dissolve any additives from the fresh mineral hydrocarbon lubricant or synthetic PAO fluid and form a gel. Therefore, residual PAG fluid must be removed.

Because PAG compressor fluids have significantly different chemistries, all seals in the compressor need to be replaced, otherwise oil leakage can occur due to seal shrinkage of swollen seals. Follow the compressor manufacturer's recommendations on seal replacements.

To achieve the best results from the Chevron mineral oil or PAO compressor oils, the unit should be as clean as possible (including all components). This includes draining as much of the previously used lubricant as is practical. In all cases, the manufacturer's change-out and flushing recommendations, including all relevant safety precautions should be closely followed during the conversion. Please refer to the manufacturer's service manual to select the right viscosity ISO grade for the compressor oil. Please also refer to the Product Data Sheet for the Chevron lubricant that will be used in the change-out.

The following procedure is recommended when changing over a compressor fluid where the compressor has been operated with PAG types of lubricants. The following steps are suggested to facilitate the change out of the previously used lubricant to a Chevron compressor oil, such as Cetus HiPerSYN Oil.

- 1) Allow the compressor system to run to normal operating temperature for 1 hour.
- 2) Shut down the compressor system.
- 3) Drain all the previously used PAG lubricant from the main reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets. Clean strainers and replace air-oil separator and oil filters.
- 4) Refill the compressor system to half capacity (or the minimum required by the manufacturer) with Chevron Cetus HiPerSYN Oil.

- 5) Start machine and bring to normal operating temperature, and run the compressor system for 8 to 24 hours, carefully monitoring temperatures, pressures, and filter condition.
- 6) Shut down the machine.
- 7) Drain the lubricant from the main reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets. Dismantle and inspect all internal compressor components that come in contact with the lubricant such that all deposits are removed. The components should be as clean as practical before changing over. Follow the manufacturer's recommended procedures for the thorough cleaning of all valves, air passages, coolers, separators, and procedure for seal replacements.
- 8) Refill the machine to half capacity (or the minimum required by the manufacturer) with Cetus HiPerSYN Oil.
- 9) Start the compressor system and bring to normal operating temperature for at least 1 hour.
- 10) Shut down the machine and drain the main reservoir, oil cooler, and filters. Disconnect lines at the low points to drain residual oil pockets. Clean strainers and replace air-oil separators and oil filters. (Repeat steps 8-10 if necessary).
- 11) Refill machine with Cetus HiPerSYN Oil to the normal level.
- 12) Restart machine and monitor the oil level.
- 13) Run the compressor for two weeks, carefully monitoring make-up fluid, temperature, and pressure as well as filter conditions. (If needed, evaluate the fluid condition to take any corrective action needed).
- 14) Sample the fluid at monthly intervals for the next six months continuing to carefully monitor make-up fluid, temperature and pressure, as well as filter conditions.

Chevron Lubrication Engineers at 1-800-LUBETEK, are available for consultation.

Always 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 guide is meant to supplement the OEM recommendations and should not replace such recommendations.

Follow all OEM Safety procedures related to the application of these procedures.

Follow all OEM recommendations pertaining to seal change-out requirements.

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