Guidelines for Indoor and Outdoor Lubricant Storage

Lubricants are delivered in numerous package styles. The four main types of containers used to store lubricants are pails, drums, totes, and bulk tanks.

Following recommended best practices for proper lubricant storage can result in:

- Increased critical equipment life
- Reduced downtime
- Lowered maintenance costs
- Reduced fluid consumption and lower expenditures for new oil
- Environmental responsibility
- Reducing costs

Proper lubricant storage is critical to maintain the product integrity of a lubricant and to ensure that it will perform as expected in the equipment application. Poor storage conditions can introduce particulate and moisture contamination, cause the lubricant to deteriorate and lose performance properties, and become unusable. Disposal arrangements and the handling of waste oils can create unwanted expense. Undesirable use of storage space may be necessary to store these oils pending their removal and disposal. These are all reasons to consider for proper lubricant storage and handling.

Lubricant storage fundamentals include the following:

- Lubricants, pumps, and tools associated with lubricant transfer should be stored indoors in a clean environment.
  - All equipment associated with lubricant transfer should be kept isolated and used only for the product it is intended for to avoid any mixing and altering the original properties or formulation of the oil.
  - Product labels on all storage containers, nozzles and product transfer equipment should be clearly displayed and attached to each item.
- Lubricants exposed to temperature extremes can lose additive effectiveness, and it is recommended to store where temperature cycling is limited.
- Lubricants are hygroscopic (they absorb water). Protect from sources of water contamination.
- Varying temperatures can cause air displacement (breathing) in sealed containers, resulting in potential water and particulate contamination.

Conditions that can affect the life of a lubricant during storage include: atmospheric oxidation, hot and cold temperatures, light, water, and particulate contamination. Extreme high or low storage temperatures can cause lubricant degradation and have a negative impact on product performance. Extremely cold temperatures during storage can cause some types of performance additives in the lubricant to precipitate and drop out. Fluctuating storage temperatures should be corrected and avoided. It is recommended that lubricants be stored indoors whenever possible to reduce degradation from environmental contamination and temperature fluctuations. A clean, dry, and cool storage area is highly desirable and recommended.

Indoor Lubricant Storage

Packaged lubricants should be stored preferably indoors in a dry and clean environment. Steps need to be taken to keep the container tops free of any dust, dirt, and water. Containers should always be kept away from open flames, sparks, and extreme heat.

The storage room needs to have good temperature and climate control to prevent extreme high or low temperatures. Indoor storage temperatures should remain moderate, as excessive heat can cause the product to heat up internally. Excessive heat from steam pipes, air vents, and furnaces should be avoided to prevent degradation of the lubricant.

Adequate ventilation is important to remove undesirable fumes and odors from building up. The storage space should be clean and dry to avoid contaminating the lubricants with ingress of moisture.

Indoor storage of drums should allow their storage upright or on their sides with the bungs positioned at the 3 and 9 o'clock positions to ensure air tight seals. Outdoor storage is typically not recommended for drums because of potential water accumulation on the top of the drums. This can lead to corrosion of the drums.

It is stressed again that temperature fluctuations should be corrected and avoided. This can cause air to move from the atmosphere into the headspace of the drum or container, and the air in the headspace to move out of the drum. When water is present on top of the bungs, it can be pulled and drawn into the container by suction. Dirt and any other forms of contamination that may be present will also be pulled in. This process can occur even with drums that have never been opened. When water enters, it can mix with the lubricant and settle to the bottom of the drum. So, good temperature control is essential to prevent the high risk for water ingression into the new oil if the drums are not stored properly and to protect them from water and dirt.

It is also recommended to have a suitable secondary containment tray that can act as a spill dike underneath the drum and bulk containers to catch spills and prevent leaks from spreading.

Outdoor Lubricant Storage

Lubricants must be stored carefully and properly to avoid contamination and degradation that can lead to poor lubricant performance. Outdoor storage of drums, totes, and bulk containers is not recommended due to risk of weather extremes of frost and heat from sunlight. When storage space becomes limited indoors and becomes a space constraint, it may become necessary to store the lubricants outdoors. Guidance discussed above for indoor lubricant storage can also apply here.

Investing in lightweight, outdoor weather shelter and roof protection can help shelter and minimize these problems. Extremes of temperature can affect the integrity of the storage containers. Extreme hot and cold temperatures can weaken the seams of a drum and can cause moisture condensation. Moist air can also be sucked into the drum headspace even when the drum is sealed. Damage of containers can be caused by rain water and wind, ultra-violet sunlight can degrade non-metal packages, and excessive heat can cause the containers to heat up internally. Fluctuating temperature extremes can affect the integrity and have a negative impact on the lubricant and especially greases. During hot weather months the drums can heat up by direct sunlight and can change from ambient temperature to 125 – 150 degrees F. The lightweight, outdoor roof can be used to minimize the risk of these disadvantages. The use of roof protection can help prevent the buildup of rain water which can cause contamination by drips, spills and leaks that can allow the water to enter the drums and containers. Drum covers can be employed, and they need to be checked to ensure they will fit tightly on all drums that are stored in an upright position so that water and dirt will not accumulate around the drum openings. Other times, drums can also be stored horizontally and covered with the bungs positioned at the 3 and 9 o'clock positions to ensure air tight seals.

The containers themselves can also be at risk with water. Damp conditions need to be avoided to prevent corrosion of the containers. Direct exposure to ultra-violet sunlight can cause degradation of non-metal packages. Therefore, investing in roofing structures should always be considered. They should be designed to protect water from settling on the tops of the containers, and protect from direct sunlight radiation.

Sensitive lubricant products (especially to cold temperatures) should not be stored outdoors.

Bulk Lubricant Storage

The use of bulk lubricant storage is determined by the consumption rate. Bulk lubricant is not recommended to be stored outdoors due to changes between high and low temperatures. There is also risk of water contamination from the vents and breather openings.

Bulk lubricant should ideally be stored indoors. Temperature extremes and temperature differences throughout the day can cause moisture condensation on the walls of the tank, and affect the condition of the lubricants inside these containers. If outdoor storage is the only option, all openings on the bulk tanks need to be secured tightly with secure fill caps, and filter breathers used to exclude contamination ingestion. Equipping with desiccant breathers helps to avoid contamination by dust and moisture and water from entering. The breathers must be sized properly with the correct capture efficiency. Investing in a lightweight, outdoor roof protection can help minimize these problems with water ingression. It is best practice to have permanently installed piping with suitable handling and pump-equipped dispensing systems to filter the oil during transfer between the bulk storage systems to small containers. Vents from the tanks should be independently piped to a centralized venting system and vented with desiccant filter breathers to avoid dust and moisture from entering. Bulk tanks also need to have regularly scheduled cleaning.

Below is a checklist that can be reviewed for proper storage. It is taken from our publication Chevron ISOCLEAN® program titled "Execute Proper Product Storage and Handling Standards."

- Products are stored indoors or in oil sheds
- Larger volume products are stored in bulk
- Clearly visible product labels are on each bulk tank
- Each bulk tank includes a visible oil level gauge
- Each bulk tank includes a desiccant breather
- Each bulk tank includes a hatch cover that closes and seals properly
- Drums stored outdoors are stored on their sides with bungs at the three and nine o'clock positions
- Drums are rotated on a first-in first-out basis
- Drums include an adaptor for dispensing and have a desiccant breather
- Grease drums/kegs include pump, follower plate and dispenser with lid that seals and closes
- Product labels are clearly visible on drums, including fill dates
- Oil shed/area is clean and free of absorbent, oil and other contaminants
- Products are stored in a systematic manner and labeled as such (hydraulic oil, engine oil, etc.)
- The number of products are optimized based upon applications.

Additional points to be considered:

With most stored containers, re-emphasizing the first-in and first-out method should be followed as much as possible so that the oldest inventory can be used first.

Any lubricant containers prone to mechanical damage should be subjected to adequate inspection and corrective maintenance performed. Operational and monitoring inspections should identify any leaking packages and corrective actions performed as soon as possible.

Machine down time created by the use of contaminated lubricants caused by improper storage have caused many users and marketers to place more importance on the handling and storage of their lubricants. Even though most of these precautions and recommendations appear to be standard practice, the failure to observe these precautions can cause poor reliability in the equipment and lubricant applications.

It is the responsibility of the user to 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.

For further information, please contact Chevron Lubrication Engineers at **LubeTek (1-800-LUBETEK).**

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