Using the Mobil Refrigeration Lubricant Selection Guide for Industrial Systems

To help determine the appropriate refrigeration lubricant required for your system, use our Mobil-branded Refrigeration Lubricant Selection Guide (available through your local representative or ExxonMobil Technical Help Desk) and follow the steps below:

**Step 1.** Obtain or confirm the following information on the application:
   a. Refrigerant fluid in use
   b. Evaporator is of dry type (oil carryover is < 15%) and evaporator temperature
   c. Compressor type and outlet temperature

If the evaporator is confirmed to be of the flooded type (oil carryover to the evaporator is >15%), please contact your local representative or Technical Help Desk for assistance. If oil carryover to the evaporator is <15%, please proceed to **Step 2.**

**Step 2.** Use the Mobil-branded Refrigeration Lubricant Selection Guide to identify potential Mobil-branded refrigeration lubricant(s) for the application information confirmed in **Step 1.** If the product selector tool indicates both mineral and synthetic lubricants are acceptable for the application, synthetic lubricants will generally offer a higher level of performance than mineral oils with respect to equipment protection, compressor efficiency, and oil life.

**Step 3.** If the equipment is under warranty, confirm that the Mobil-branded lubricant(s) indicated by the product selector are approved/accepted for use by the builder.

**Step 4.** As refrigeration oils are sensitive to water contamination, procure oil in a package size that avoids storage of half-used containers.

**Step 5.** In changing refrigeration oil technology or brands, ensure thorough flushing of the system to minimize product contamination.

For more information on all Mobil Industrial Lubricants and services, contact your local company representative or visit www.mobilindustrial.com.
Comparative high GWPs.

Selection of Refrigeration Lubricants

From a technical standpoint, the lubricant selected for a refrigeration system must

- be suitable for lubricating the type of compressor used in the refrigeration system
- have the appropriate miscibility and solubility characteristics with the refrigerant fluid

Refrigeration Compressor Lubrication

Three types of compressors are predominantly used in industrial refrigeration systems:

- Reciprocating compressors — the oil lubricates cylinders, connecting rods, and journal and thrust bearings; and maintains good sealing in compressing the refrigerant
- Screw compressors — the oil lubricates the screw(s) (except in dry screw units), and sliding and thrust bearings; maintains good sealing; and cools down compressed gas
- Centrifugal compressors — the oil lubricates sliding, antifriction, and thrust bearings as well as shaft packing and multiphase gears; provides proper sealing; and in many cases cools the compressor parts

Scroll or rotary vane compressors are also used in some refrigeration systems.

Compatibility of Lubricant with Refrigerant Fluid
- Miscibility (important at the evaporator portion of the refrigeration circuit):

Generally large refrigerant systems, particularly those using ammonia as a refrigerant, are equipped with oil separators. In these systems, it is desirable to use a lubricant that is immiscible or has low miscibility with the refrigerant fluid. With systems not equipped with oil-separation capability, the lubricant carried over from the compressor into the evaporator must be sufficiently miscible with the refrigerant at the evaporator temperature so that the refrigerant-fluid-lubricant blend remains in one phase after expansion in the evaporator and at a sufficiently low viscosity to travel through to the compressor. If the lubricant separates in the evaporator due to poor miscibility with the refrigerant fluid, or the blend viscosity is high, fluid is likely to get trapped in the evaporator and adversely affect the system’s cooling capacity and efficiency.

Miscibility curves are used to ensure that the lubricant selected matches miscibility requirements for the application. Miscibility charts are specific to lubricant-refrigerant combinations and are read based on the evaporator temperature and the percentage of oil carried over into the evaporator for the application in question. For typical industrial systems, oil carryover is 15% or less. At the evaporator temperature and expected oil carryover percentage for the application, the lubricant-refrigerant blend must remain in one phase. For example, as shown in Chart A, Mobil EAL Arctic 46 is suitable for use with refrigerant R-410a at evaporator temperatures between -40°C and +57°C at 15% expected oil carryover.

- Solubility (important at the compressor portion of the refrigeration circuit):

Another important consideration for proper lubricant selection is to ensure that the viscosity of the lubricant, after absorption of gaseous refrigerant at the high compressor temperature, is sufficient for effective lubrication of the compressor.

Mobil Industrial Lubricants Applications Expertise

Copies of miscibility and VPT curves for Mobil-branded refrigeration oils and various refrigerant fluids are available from our Technical Help Desk. A selection guide is also available to help you and your sales representative make the right choice of lubricants for your particular applications.

Conclusion

The selection of a high-quality refrigeration lubricant is driven by the type of compressor, application parameters, and, most important, the refrigerant fluid. We offer a wide range of synthetic and mineral oil-based refrigeration oils that are equipment-builder approved, and suitable for a broad range of industrial refrigeration applications.