

# LUBE

# TECHNI-GRAM



**FROM :**

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May 2004

## REFRIGERATION COMPRESSOR LUBRICATION REQUIREMENTS

Of all compressor applications, the most often misunderstood applications involve refrigeration compressors. Despite differences in design, principles, and methods of operation, the function of all gas compressors is the same: to raise the pressure of a gas by compressing it to a smaller volume. Designed to move and compress gases, compressors find use in those processes involved with air, various gases and refrigerant vapors. All compressors may be considered as belonging to one of two categories, mechanical (positive displacement) or centrifugal.

Generally, the most confusing factors regarding refrigeration compressors concerns are: 1.) the low temperature flow capabilities or pour point/floc point and 2.) the compatibility of the compressor lubricant with the refrigerant being used.

The importance of pour point or floc point is often overemphasized. Many problems associated with refrigeration systems exist within the lines and the equipment beyond the compressor. With the exception of ultra-low temperature systems developed in recent years for use in liquefied petroleum gas (LPG) and liquefied natural gas (LNG) applications, pour points of compressor lubricant should be in the same range with **evaporator** temperatures.

Oil separators located between compressor discharge and the expansion valve prevent most of the oil from entering the evaporator when immiscible refrigerants are involved. Where efficient oil separation is carried out through the use of separators, oil stills, and periodic blow-off, very little oil reaches the expansion valve. That which does is carried through the low-pressure side by the refrigerant, providing sufficient velocity is maintained. Where the velocity of the refrigerant is not high enough to carry it back to the compressor, oil drops out in the lines and drains into the lower parts of the system. Accumulation of oil in any line will develop excessive refrigerant flow resistance. It is most undesirable for the oil to collect in the evaporator coils and thus insulate them. Therefore, if the refrigerant is not miscible with the lubricant the pour point of the oil must be below the evaporator temperature.

### Compatibility

The confusion with compatibility of the oil with the refrigerant being used has increased due to the increased use of chlorine-free hydrofluorocarbon refrigerants such as HFC-134a (R-134a). HFC's are more commonly recognized as freons. SWEPCO's 702 Rotary Compressor Oil and SWEPCO 707 Reciprocating Compressor Oil are recommended for refrigeration compressor systems utilizing ammonia, CFC (chlorofluorocarbons) and HCFC (hydro chlorofluorocarbon) refrigerants such as R-717, R-11, R-12, R-13, R-113, R-114, R-115,



*... to keep it running*

R-22, R-141b, R-500, R-501 and R-502. They are not recommended for use with HFC (hydrofluorocarbon) refrigerants such as HFC-134a.

### **SWEPCO 707 Reciprocating Compressor Oil**

**SWEPCO 707 Reciprocating Compressor Oil** is SWEPCO's #1 selling compressor oil for refrigeration applications. It is a highly refined naphthenic oil which is essentially wax-free as shown by its superior low pour points and floc points. This assures trouble-free service life under low temperature conditions typically encountered in most systems. Equipment lines, evaporator, expansion valve and refrigerant control devices stay clean allowing for maximum system efficiency.

#### **In Summary**

Refrigeration compressors require special consideration based on the refrigerant handled and the evaporator temperatures involved. Because of the chemical effect of some refrigerants, particularly ammonia, and the physical effect of low temperature on discreet additives and certain ingredients of mineral oils, selectiveness is important in choosing a lubricant. Since there are immiscible refrigerant systems and those systems employing miscible refrigerants, it is always best to follow the manufacturers recommendation for proper viscosity, pour point, etc. requirements.

In consideration of the above factors, lubricating oils selected for refrigeration compressors must possess the following qualifications:

- 1) **Chemical stability** - to resist oxidation at discharge temperatures. Free of unsaturated hydrocarbons to prevent precipitation at expansion valves.
- 2) **Low pour point** - having its wax content reduced sufficiently to meet the low-temperature conditions of the system so the lubricant will not freeze on the low temperature side of the system.
- 3) **Low floc point** - free of wax and/or other material that will separate at low temperatures to plug valves and capillary tubes. Also indicates low moisture content.
- 4) **High dielectric strength** - especially for hermetically sealed units where moisture cannot be removed otherwise.
- 5) **Proper viscosity** - to meet the mechanical conditions of the compressor after considering the immiscibility or miscibility of the refrigerant used.
- 6) **Low volatility** - to reduce oil vaporization at discharge temperatures and pressures.
- 7) **Anti-foaming** - capable of releasing dissolved refrigerant easily without foaming excessively.