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Cold W.A.R.

Whether it's **A**ir Conditioning or **R**efrigeration
SERVICING KNOW-HOW



Information about
refrigeration oils
that you might want
to know

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PHASE II
41

Information about refrigeration oils that you might want to know

Here is some information concerning refrigeration oils that you may find useful.

OIL TYPES



Mineral – a by-product in the distillation of crude oil to produce gasoline. Mineral oil can be classified into the following groups: naphthenic, paraffinic, and aromatic. Naphthene based mineral oils are suitable for refrigeration systems using CFC or HCFC refrigerants.



Alkylbenzene (AB) – a synthetic oil suitable for refrigeration systems using CFC or HCFC refrigerants. It is compatible with mineral oil, and compared to mineral oil, it has improved refrigerant miscibility with R-22 at low temperature conditions.



Polyolester (POE) – the primarily synthetic oil for refrigeration systems using HFC refrigerants. It is also suitable for refrigeration systems using CFC, HCFC refrigerants and being evaluated in CO₂ systems.

Polyalkylene Glycol (PAG) – a synthetic oil primarily used in R-134a automotive air conditioning systems. It is more hygroscopic than either POE or PVE oils, but it does not undergo hydrolysis in the presence of water.

Polyvinyl Ether (PVE) – a synthetic oil that is being used as an alternative to POE oil. It is more hygroscopic than POE oil, but less than PAG oil. Like PAG oil, PVE oil does not undergo hydrolysis in the presence of water.

OIL PROPERTIES

Dielectric Strength – a measure of the oil's resistance to an electric current. A low dielectric strength is indicative of moisture and/or contamination in the oil.

Fire Point – the lowest temperature at which the oil maintains combustion.

Flash Point – the lowest temperature at which oil vapor momentarily ignites.

Floc Point – the temperature at which wax will separate from the oil. Above this temperature, wax will remain in solution.

Pour Point – the temperature at which the oil begins to pour.

Specific Gravity – density with respect to water.



Viscosity – a measure of the oil's resistance to flow. Two units of measure are typically used with refrigeration oil. The older measure is Saybolt Universal Seconds (SUS); the newer is ISO viscosity grade number (ISO VG), a measure using centistokes. For comparison, an oil having a 150 SUS has an ISO viscosity grade of 32.

Information about refrigeration oils that you might want to know

ADDITIONAL TERMS USED WITH REFRIGERATION OIL

Esterification – the reverse of hydrolysis. It is the process in which an organic acid and alcohol are combined to form POE oil and water.

Hydrolysis – decomposition of a compound by reaction with water. In the case of POE oil, it decomposes into partial esters, organic acid and alcohol in the presence of water. The degree of hydrolysis is driven by the amount of water present. The speed at which hydrolysis occurs is dependent on temperature and the acid content (acids can act as a catalyst).

Hygroscopicity – ability of the oil to absorb moisture. The most hygroscopic refrigerant oils in descending order are: PAGs, PVEs, POEs, ABs, and mineral oils

Miscibility – ability of the oil to mix with the refrigerant. Some degree of miscibility is necessary between the oil and refrigerant so that the oil can return to the compressor during system operation.

Polar – a molecular structure with an uneven distribution of electron density. PAG, PVE, and POE oils have polar structures which allow them attract water molecules.

Solubility – the ability of one compound to dissolve into another. Water is soluble in various degrees with the refrigerants and refrigeration oils.

WHICH OIL IS THE CORRECT ONE TO USE?

One may consult oil approval listings such as the one published in Sporlan's Catalog G-1. But one should confirm with the compressor manufacturer which oils are qualified for the particular compressor model, refrigerant, and application.

PROPER PROCEDURES FOR MAINTAINING LOW MOISTURE CONTENT IN POE OIL

1. Avoid exposing POE oil to air for any unnecessary length of time. Keep containers of POE oils tightly closed when it is not being dispensed.
2. Keep the refrigeration system closed except when work is actually being performed on the equipment.
3. Keep POE oil in their original containers.
4. Use a properly sized Catch-All® filter-drier when installing or servicing refrigeration equipment.