



marine lubricants information bulletin 8

# synthetic oils



Mineral base oil and synthetic lubricants are widely available, especially those used in industrial lubrication applications, and they have many applications onboard ships. It is important to select the right lubricant for your hydraulic system.

## Mineral base oils

These oils are mixtures of a wide range of hydrocarbons. They are derived from crude oils by distillation, solvent extraction, and hydro-finishing/cracking processes.

Mineral-oil based lubricants are blends of mineral base oils with additives to enhance or introduce specifically desired properties to the oil or suppress certain undesired characteristics.

Mineral-oil based lubricants, widely available at low to moderate prices throughout the world, provide satisfactory lubrication for most applications onboard ships. However, in specific conditions, such as some “filled-for-life” systems or under extremely demanding operating conditions, mineral-oil based lubricants can fail and synthetic-based lubricants should be considered.

## Synthetic base oils

Historically, special purpose demands triggered the development of synthetic lubricants. For example, conventional mineral-oil based lubricants could not meet extreme low- (Arctic) or high-temperature operations and fire resistance requirements. Synthetic base oils, a complex mixture of hydrocarbons, are the result of a carefully controlled chemical reaction process that produces a “pure” chemical of pre-selected composition. This reaction process produces an unlimited variety of products.

Many synthetic-based lubricants are formulated with additives similar to those in mineral-oil based lubricants. However, some synthetics require newly developed additives. This is true of the fully formulated lubricants for internal combustion engines and heavy-duty gear cases. Various types of synthetic-based oils used to formulate synthetic lubricants have certain advantages over conventional mineral-oil based products. These advantages are:

- Low pour point
- Low volatility
- Low toxicity
- High viscosity index
- High oxidation stability
- High flash and fire points

## Some pros and cons

Although synthetic lubricants are more expensive than mineral-oil based products, they offer operating or performance advantages that decrease operating costs. For example, synthetic lubricant is the preferred choice for lubricating cargo gas compressors that compress various gases. Mineral base oils can only be used with a limited number of these gases. However, synthetic oils, based on polyalkylene glycol, can be used with many of the gases shipped today.

Synthetic-based oils have a longer service life in addition to their extended overhaul periods. When used in air compressors, turbo chargers, and gear applications, synthetic-based oils may be more economical. For some systems, outside contamination (by water and/or dirt) and not lubricant breakdown may cause frequent oil changes. Using synthetic oils in these systems increases rather than decreases costs.

Synthetic lubricants are the best choice to use in extremely low- (Arctic) or high-operating temperatures. Some modern heavy fuel oil purifiers are located in special purifier rooms and work under extreme high-temperature conditions. Using synthetic gear oil for this application will extend the life of the equipment.

Not all synthetics and mineral oils are fully compatible; changing from synthetic base oil to mineral base oil can create potential problems. Systems must be drained and flushed when changing from one type of oil to another.

Seal compatibility issues can create another possible problem. Equipment seals selected for operation with mineral oils can show unexpected swelling or hardening with certain types of synthetic oils and visa versa. Your equipment manufacturer can help you avoid these problems.

Our conventional mineral-oil based lubricants, formulated with state-of-the-art additives, provide adequate lubrication for the majority of equipment installed onboard ships. However, for some specific applications, synthetic lubricants offer better performance that cannot be achieved by mineral oils.

Some synthetic lubricant products are already available in specific areas. These products are:

**LPG Compressor Oil:** A polyalkylene-glycol-based lubricant specifically developed for enclosed hydrocarbon and gas compressors, such as Sulzer-Burckhart “K” gas compressors.

**Cetus® PAO 46 and 68:** These polyalphaolefin compressor oils are used in rotary vane and screw-type air compressors and turbochargers.

**Cetus® DE 100:** A compressor oil, formulated with diesters, used in reciprocating (starting) air compressors.

**Pinnacle® Marine Gear:** A gear lubricant that is a mixture of polyalphaolefins and diesters. We recommend using this on enclosed gears operating at extreme temperatures or under severe conditions.

**Ulti-Plex® Synthetic Grease EP:** A high-temperature grease, composed of a lithium-complex thickener and synthetic-based oil, designed for the most extreme temperature environments and for applications that require extended re-lubrication intervals.

**Capella® HFC 32, 55 and 100:** Refrigerating compressor oils, formulated with polyolesters, intended for systems charged with chlorine-free refrigerants. ■

**Synthetic lubricants: Advantages compared to mineral oils**

Synthetic Base Type	Main Advantages	Applications
Alkylbenzenes	Low temperature performance	(Refrigeration) compressor oils mineral oil-like solvency
Polyalphaolefins	Wide temperature performance range, low volatility	Engine oils, gear oils, hydraulic oils, air compressor oils
Diesters	Wide temperature performance range, low volatility	Gas turbine oils, air compressor oils, hydraulic oils
Phosphate Esters	Fire resistance	Fire-resistant hydraulic fluids
Polyalkylene Glycols	Wide temperature performance range, hydrolytic stability, frictional properties	Gas compressor oil, gear oils
Polyolesters	Wide temperature performance range, low pour point	Jet engine oils, refrigeration compressor oils (chlorine-free refrigerants)