

LUBETA EST

Synthetic Refrigeration Lubricants / For Mobile A/C Compressor

New polyol ester based air-conditioning / refrigeration lubricants with enhanced, wide-temperature compatibility with Hydrofluorocarbons.

Introduction

Hydrofluorocarbons (HFCs) are chlorine-free gases, now replacing chlorofluorocarbon (CFC) Gases worldwide as more environmentally acceptable refrigerants. HFC-134a, a hydrofluorocarbon which has no ozone depletion potential, is the principle refrigerant in use. Poor compatibility of HFCs With mineral oil based lubricant systems has led to the introduction of synthetic lubricants for refrigerant applications. Synthetic polyol ester (POE) lubricants are well established in the automotive industry as a synthetic fluid suitable for use in air conditioning systems, with the novel structural difference of LUBETA EST polyol esters also ensuring the lubricants meet the performance requirements for use in the assembly of a wide range of industrial and domestic refrigerant and air conditioning systems. Miscibility of the LUBETA ESTs with a wide range of HFCs ensures their suitability for use with a range of refrigerants, including 1,1,1,2- tetrafluoroethane (R134a), pentafluoroethane(R125), difluoromethane (R32), 1,1,1-trifluoroethane (R143a) and refrigerants based on blends of these.

Generally, a compression type refrigeration unit, such as found in automotive air-conditioning units, consists of a compressor, a condenser, expansion bulbs and an evaporator. In such a refrigeration unit, usually the temperature can rise to 40°C, often 65°C or more, while in the cooler the temperature may be as low as -40°C. Polyol esters for automotive air-conditioning units are well known, however they can suffer from two key problems. Firstly, one of phase separation with the hydrofluorocarbon at temperatures close to room temperature and above. The resulting HFC-rich phase can result in poor lubrication and reduced compressor life, with separation of lubricant in critical temperature regions in reduced compressor efficiency. For efficient lubrication of the compressor avoidance of phase separation is therefore crucial. Secondly, polyol esters are hygroscopic and the absorption of water above acceptable levels can cause freezing out of water in the expansion bulbs, resulting in reduced efficiency and lubrication.

Property

Miscibility with Refrigerant Gases provide excellent miscibility with HFC-134a over a wide temperature range. The products have been tested with many refrigerant gases and found to be miscible with most CFC, HCFC and HFC refrigerant gases.

Thermal Stability assess the thermal stability of refrigerant gas. The refrigeration industry has adopted the test in a modified form to assess the stability of lubricants with the new HFC refrigerants.

Hydrolytic Stability of any ester based lubricant is essential for the long term durability of the refrigeration system, particularly as relatively high water levels can be present within working unit.

Hygroscopicity The LUBETA EST lubricants are considerably less hygroscopic than polyalkylene glycol lubricants which saturate in excess of 1% water.

Anti-wear Performance Characteristics giving negligible steel wear in bench tests. This has been successfully translated into excellent compressor results of low wear in rapid life tests and in the field.

Compatible and Miscible with Mineral Oils

Additional performance advantages characterizing the LUBETA EST range are as follows:
Excellent viscosity index – Typically >200 , The higher viscosity index of the EST grades ensures that at higher temperatures there is the potential of further enhanced compressor life due to a greater lubricating film thickness in hydrodynamic conditions. Improved viscosity index also allows a compressor manufacturer to select a lower viscosity fluid than typically used, which offers power usage savings.

Superior high temperature stability, resulting in reduced downtime and lower maintenance costs.

Superior lubricity – Compared to competitor products such as polyalkylene glycols, the wear protection offered by LUBETA EST POEs is exceptional, resulting in improved system efficiency. Lower maintenance costs result from reduced compressor wear.

Formulating Expertise – Fully formulated LUBETA EST grades contain a complete additive system to protect the compressor from any problems relating to corrosion of white or yellow metals, to minimize the effects of wear and extreme pressure conditions, and to ensure long life for the fluids in use.

Typical Properties

	Test Method	EST 68	EST 100	EST 150
Viscosity cSt @40°C	ASTM-D445	65	92	137
Viscosity cSt @100°C	ASTM-D445	9.4	10.6	15.1
Viscosity Index	-	192	220	218
Density g/cm @20°C	ASTM-D1298	0.99	0.97	0.98
Pour point °C	ASTM-D97	-39	-36	-37
Flashpoint COC °C	ASTM-D92	>250	>250	>250
Water Content % mass	ASTM-E284	<0.03	<0.03	<0.03
TAN mg KOH/g	ASTM-D974	<0.10	<0.10	<0.10
4-Ball Wear Test 40kg/1 hour (mm)	ASTM-D4172	0.52	0.58	0.58
Copper Corrosion 3hrs@100°C	ASTM-D130	1a	1a	1a
Steam Turbine Corrosion	ASTM-D665(a) ASHRAE 86	Pass	Pass	Pass
Miscibility: Two-phase Separation Temps(°C)				
Upper: 1% EST in 134a		80	55	55
Upper: 5% EST in 134a		35	35	35
Lower: All EST concs		<-40	<-40	<-40

Materials Compatibility

Common seal and gasket materials are unaffected by polyol esters, and LUBETA EST grades are compatible with elastomers commonly found in R-134a systems. LUBETA EST grades are incompatible with alkyd paints which soften in the presence of these products, internal system surfaces should ideally be unpainted or coated with a resistant material, such as epoxy resin based paints which are fully compatible.

Electric Properties

For lubricant application in hermetic and semi-hermetic systems, Where the lubricant is in direct contact with the motor windings, the electric properties such as dielectric strength and motor winding / insulation compatibility are of importance, Good electrical insulation may be retained by minimizing moisture levels, with the dielectric breakdown voltage routinely used to detect free water in refrigeration oils.

Health and Safety

A Material Safety Data Sheet (MSDS) has been issued describing the health, safety and environmental characteristics of the LUBETA EST range, together with advice on handling precautions and emergency procedures. This must be consulted and fully understood before storage, handling and use. Based on current information, the LUBETA EST grades do not have adverse effects on health when handled and used properly.

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