

LUBETA CXL

Synthetic Refrigeration Lubricants / For Mobile A/C Compressor

New poly-alkylene glycol (PAG) based air-conditioning (A/C) / refrigeration lubricants with enhanced, wide-temperature compatibility with hydrofluorocarbons (HFCs) refrigerants.

Introduction

HFCs are chlorine-free gases, now replacing chlorofluorocarbon (CFC) gases worldwide as more environmentally acceptable refrigerants. HFC-134a, a HFCs which has no ozone depletion potential (ODP), 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 PAG 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 CXL PAGs 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 CXLs with a wide range of HFCs ensures their suitability for use with a range of refrigerants, including 1,1,1,2-tetrafluoroethane (R134a), difluoromethane (R32), pentafluoroethane (R125), 1,1,1-trifluoroethane (R143a) and blending refrigerants (R-404A, R-407C, R-410A, R-507) 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. PAGs for automotive A/C units are well known, however they can suffer from two key problems. Firstly, one of phase separation with the HFC 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, PAGs 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.

Lubeta CXL lubricants, based on a new “capping” technology, provide efficient lubrication for compression type refrigeration units, with good refrigerant solubility over the full temperature range, and a substantially reduced tendency to absorb water, Improved lubricating properties as a result of the capping technology improves suitability for use in all applications.

Property

Excellent Solubility : in the principle HFC refrigerant R-134a over the compressor's temperature range of operation, resulting in an absence of lubricant pool forming and hence maintained compressor efficiency

Reduced Hygroscopicity : The water affinity of Lubeta CXL grades is significantly reduced compared to the tendency towards water absorption demonstrated by standard PAGs. Hence use of Lubeta CXL grades ensures problems such as freezing of water resulting in blocked capillaries are reduced and any reductions in compressor efficiency are minimized.

Chemical and Thermal Stability : Exposure to high temperatures and high levels of moisture results in minimized product degradation, which in common competitor products such as polyol esters can release corrosive acids and cause a loss of performance and possible failure.

Improved Electrical Resistivity for hermetic compressor applications.

Additional performance advantages characterising the Lubeta CXL range are as follows:
 Excellent viscosity index – Typically >200, The higher viscosity index of the CXL 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 polyol esters, the wear protection offered by Lubeta CXL PAGs is exceptional, resulting in improved system efficiency. Lower maintenance costs result from reduced compressor wear.

Formulating Expertise – Fully formulated Lubeta CXL 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	CXL 46	CXL 100	CXL 150
Viscosity cSt @40°C	ASTM-D445	47.8	99.3	151.6
Viscosity cSt @100°C	ASTM-D445	11.7	19.9	26.8
Viscosity Index	-	220	226	222
Density g/cm @20°C	ASTM-D1298	1.02	1.03	1.03
Pourpoint °C	ASTM-D97	-42	-42	-38
Flashpoint COC °C	ASTM-D92	>200	>200	>200
Water Content % mass	ASTM-E284	<0.08	<0.08	<0.08
TAN mg KOH/g	ASTM-D974	<0.10	<0.10	<0.10
4-Ball Wear Test 40kg/1 hour(mm)	ASTM-D4172	0.43	0.43	0.43

Materials Compatibility

Common seal and gasket materials are unaffected by PAGs, and Lubeta CXL grades are compatible with elastomers commonly found in R-134a systems. Lubeta CXL 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.

Hydrolytic Stability

Uncapped PAGs are very hygroscopic and may absorb several thousand ppm of water when exposed to humid conditions. In the absence of adequate inhibitors, such water absorption could potentially lead to corrosion of bearings. Freezing of absorbed water, potentially leading to ice formation in the expansion valve or capillaries within the units is another problem associated with high moisture content. However, PAGs will bind with water and prevent both corrosion and ice formation problems, even at minimal temperatures. Alternative lubricant technologies available for refrigeration systems such as POEs are also hygroscopic may bind with water, although the presence of moisture may result also in the hydrolysis of the ester to form acidic species, potentially leading to accelerated metallic corrosion problems, device blockage and reduced compressor efficiency. Rapid acid number increase in POEs may be catalysed by metal contamination such as some types of brazing flux and also plated system components.

Despite their hygroscopicity, PAGs will not hydrolyse under normal conditions and demonstrate very high water tolerance.

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.

Specific Resistivity measurements (IEC 247) made for the Lubeta CXL grades indicate the resistivity to typically be $10^8 \Omega m$, with Breakdown Voltages (IEC 156) being recorded as 50-70 kV eff. Efficient operation in hermetic and semi-hermetic systems has indicated that the Lubeta CXL grades have suitable electrical properties for such systems.

Health and Safety

A Material Safety Data Sheet (MSDS) has been issued describing the health, safety and environmental characteristics of the Lubeta CXL 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 CXL grades do not have adverse effects on health when handled and used properly.

PAG's Material from UK and repacked in Taiwan

We offer the following packing and accept OEM/ODM for the MOQ buyers:

100ml, 1L, 5GL, 50GL (steel drum)

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