Krytox™ Performance Lubricants

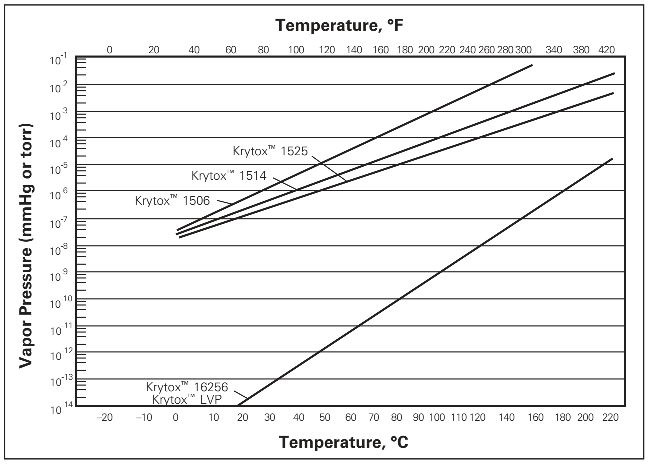
Vacuum Pump Fluids

Product Information

Krytox™ vacuum pump fluids (VPF) are used in applications where conventional vacuum pump oils cause safety, waste disposal, and maintenance problems. They are nonflammable and eliminate the chance of fire in pumps. They are non-reactive and safe to use in oxygen systems. They can replace competitive PFPE fluids as well as any other type of vacuum fluid. Krytox™ fluids do not contain acetal groups, which are susceptible to attack by Lewis acids (see Figure 2 and Table 3). This gives Krytox™ superior stability as a vacuum pump fluid. Krytox™ vacuum fluids are precisely distilled to provide low vapor pressures and superior performance (see Figure 1). In addition, Krytox™ fluids are recyclable.

Krytox™ XP VPF oils contain a soluble additive to prevent rust. This patented additive enhances the performance of Krytox™ VPF fluids, giving them improved performance properties. The long-term anti-rust properties repel moisture, providing extra protection from corrosion of metal parts and bearing surfaces.

Figure 1. Typical Vapor Pressure—Temperature Characteristics



While Krytox™ VPF fluids are inert and non-reactive to all elastomers, plastics, and metals, the soluble additives in Krytox™ XP products have not been tested with all materials. Initial testing has shown no problems with Teflon™ fluoroplastic resin, Kalrez® perfluoroelastomer parts, Viton™ fluoroelastomer, nitrile, and silicone rubbers. The performance of the soluble additives could degrade at temperatures more than 182 °C (360 °F) over a long period of time.

High-Vacuum Grease

Krytox™ LVP is a high vacuum grease formulated with a special low vapor pressure Krytox™ oil for high-vacuum applications. It is also useful for sealing laboratory glassware connections and as a thread lubricant/sealant.

For more information on Krytox™ LVP, see Table 2.

Figure 2. Relative Weight Loss of PFPE Fluids in Presence of a Lewis Acid (90 min at 120 °C [248 °F] by ISOTGA)

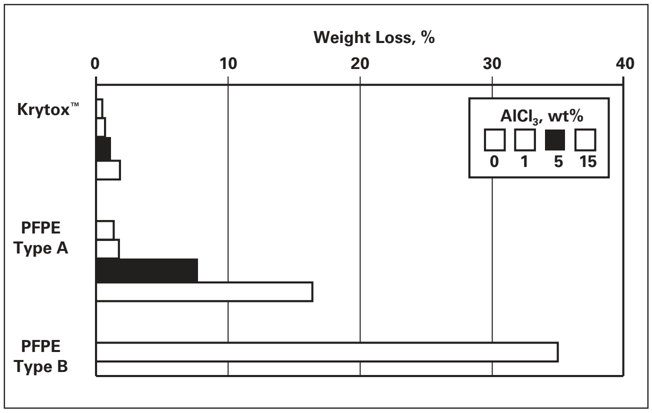


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Table 1. Krytox™ Vacuum Pump Fluids Properties*

Property	Test Method	Conditions	Units	Krytox™ 1506/ 1506XP	1514/ 1514XP	1525/ 1525XP	1531/ 1531XP	16256	1645
Average Molecular Weight	NMR			2160	2840	3470	3940	9400	NA
Vapor Pressure**	Knudsen	20 °C (68 °F) 50 °C (122 °F) 100 °C (212 °F) 200 °C (392 °F)	torr	4×10^{-7} 1×10^{-5} 1×10^{-3} 5×10^{-1}	2×10^{-7} 3×10^{-6} 1×10^{-4} 1×10^{-2}	1×10^{-7} 1×10^{-6} 3×10^{-5} 2×10^{-3}	1×10^{-7} 1×10^{-6} 3×10^{-5} 2×10^{-3}	3×10^{-14} 2×10^{-12} 1×10^{-9} 2×10^{-6}	5×10^{-12} NA NA NA
Kinematic Viscosity	ASTM D445	20 °C (68 °F) 50 °C (122 °F) 100 °C (212 °F)	mm^2/s (cSt)	60 15.5 4.1	140 32 7.2	250 52 10.6	310 63 12.5	2560 437 64.6	450 NA NA
Density		20 °C (68 °F) 50 °C (122 °F) 100 °C (212 °F) 200 °C (392 °F)	g/cc	1.88 1.82 1.73 1.54	1.89 1.83 1.74 1.55	1.90 1.84 1.75 1.56	1.90 1.84 1.75 1.56	1.92 1.87 1.78 1.61	NA NA NA NA
Pour Point	ASTM D97		°C (°F)	−60 (−76)	−54 (−65)	−48 (−54)	−41 (−42)	−15 (5)	−35 (−31)
Distillation	ASTM D1160	10%	°C (°F)	160 (320)	200 (392)	200 (392)	200 (392)	NA	NA
Range at 0.4 torr		90%		220 (428)	280 (536)	300 (572)	300 (572)	NA	NA
Heat of Vaporization	Knudsen	150–250 °C (302–482 °F)	cal/g	9	7	6	6	NA	NA
Volatility at 22 hr	ASTM D2595	121 °C (250 °F)	%	6.5	1.3	0.6	0.4	0.2	NA
Surface Tension		25 °C (77 °F)	dyn/cm	17	18	19	19	19	NA
Food Contact Approval				NSF H-1/No	NSF H-1/No	NSF H-1/No	None	None	None

*This table gives typical properties based on historical production performance. Chemours does not make any express or implied warranty that these products will continue to have these typical properties.
**Actual values are equal to or less than those indicated.

Table 2. Krytox™ LVP High-Vacuum Grease*

Penetration (worked, 25 °C [77 °F]), mm/10	280
NLGI Consistency Grade	2
Vapor Pressure, torr at 20 °C (68 °F) torr at 200 °C (392 °F) kPa at 20 °C (68 °F) kPa at 200 °C (392 °F)	$<1.0 \times 10^{-13}$ $<1.0 \times 10^{-5}$ $<1.3 \times 10^{-14}$ $<1.3 \times 10^{-6}$
Oil Separation (30 hr, 204 °C [400 °F]), wt%	13.8
Evaporation Loss (22 hr, 204 °C [400 °F]), wt%	0.3
Density (25 °C [77 °F]), g/cc	1.94

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Table 3. Initial Temperature for Depolymerization*

Fluid Type	°C (°F)
Perfluoroalky Ether Krytox™ (no -O-CF_2-O- links)	142 (287)
Type A (some -O-CF_2-O- links)	102 (216)
Type B (many -O-CF_2-O- links and no shielding)	72 (162)
Hydrocarbon	79 (174)
Silicone	58 (136)
Fluorosilicone	82 (180)

*This is the threshold temperature for the initial reaction in the presence of the Lewis Acid Aluminum Chloride as measured in a differential scanning calorimeter.

For product information, industry applications, technical assistance, or global distributor contacts, visit krytox.com or within the U.S. and Canada, call 1-844-773-CHEM/2436 or outside of the U.S., call 1-302-773-1000.

Replaces: H-58530-8 C-10291 (9/15)