DuPont™ Krytox® Aerospace Grade Oils and Greases

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Typical Properties* of DuPont™ Krytox® Aerospace Grade Fluorinated Oils

Property	ASTM Test Method	Test Conditions	Units	Aerospace Oil Grade 143AZ	143AA	143AB	143AC	143AD
Average Molecular Weight	NMR			2060	2210	3800	5940	7480
Viscosity	ASTM D445	–32 °C (–25 °F)	cSt	7480	12340	44620	—	—
		0 °C (32 °F)		228	350	1070	3940	7500
		20 °C (68 °F)		60	88	240	800	1540
		38 °C (100 °F)		24.7	35	86	270	502
		40 °C (104 °F)		22.8	32	78	243	450
		99 °C (210 °F)		4.2	5.4	10.5	26	44
		100 °C (212 °F)		4.1	5.3	10.2	25.4	42.4
		204 °C (400 °F)		1.1	1.3	2.1	4.1	6.0
		260 °C (500 °F)		—	—	—	2.4	3.4
Viscosity Index	ASTM D2270			60	96	113	134	146
Pour Point	ASTM D97		°C	–55	–50	–40	–35	–30
			°F	–70	–60	–40	–30	–20
Distillation Range	ASTM D1160	53 Pa (0.4 torr)	°C	140/210	170/245	215/290	260/370	300/400+
			°F	285/410	340/475	420/555	500/700	570/750+
Oil Density			g/mL					
		0 °C (32 °F)		1.91	1.92	1.93	1.95	1.95
		100 °C (212 °F)		1.72	1.74	1.75	1.77	1.78
Vapor Pressure	Knudsen	38 °C (100 °F)	torr	4×10^{-4}	1×10^{-4}	5×10^{-6}	8×10^{-8}	6×10^{-9}
		260 °C (500 °F)	torr	1.5	0.8	3×10^{-2}	2×10^{-3}	3×10
		38 °C (100 °F)	kPa	5×10^{-5}	1×10^{-5}	7×10^{-7}	1×10^{-8}	8×10^{-10}
		260 °C (500 °F)	kPa	0.2	0.1	4×10^{-3}	3×10^{-4}	4×10^{-5}
Volatility	ASTM D2595	149 °C (300 °F)	wt% loss	18	15	1.9	—	—
		204 °C (400 °F)	in 22 hr	—	—	17.3	<1	—
		260 °C (500 °F)		—	—	76.2	4	2
Estimated Useful Range			°C	–57–149	–51–177	–40–232	–34–288	–29–316
			°F	–70–300	–60–350	–40–450	–30–550	–20–600

*This table gives typical properties (not specifications) based on historical production performance. Viscosity may vary within +10%. DuPont does not make any express or implied warranty that these products will continue to have these typical properties.

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Figure 1. Viscosity vs. Temperature of DuPont™ Krytox® Aerospace Grade Fluorinated Oils

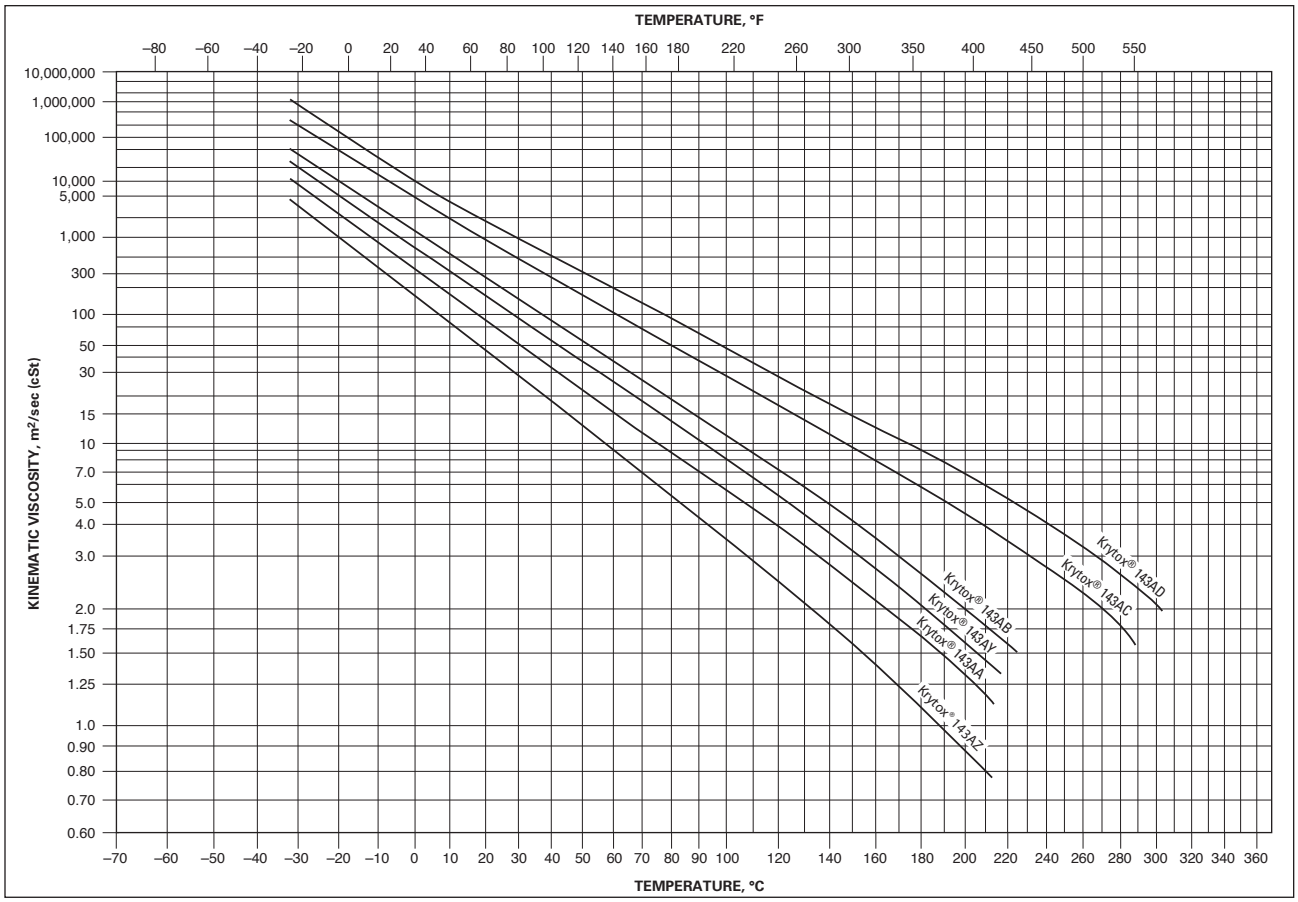
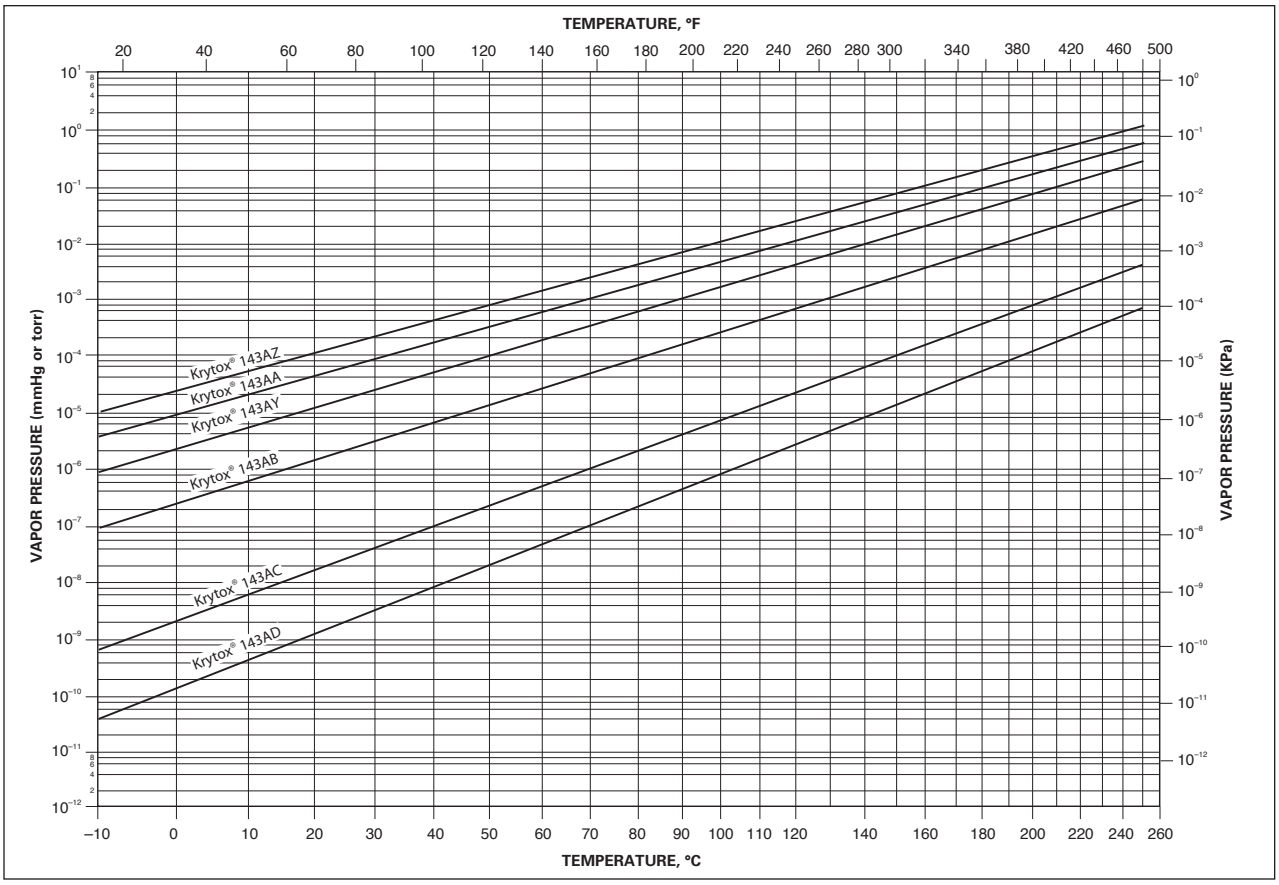


Figure 2. Vapor Pressure vs. Temperature of DuPont™ Krytox® Aerospace Grade Fluorinated Oils



Typical Properties* of DuPont™ Krytox® Aerospace Grade Fluorinated Greases

Property	ASTM Test Method	Test Conditions	Units	Aerospace Grades				
Aerospace Grease Grade				**240AZ (H-1)**	**240AA**	**240AB (H-1)**	**240AC (H-1)**	**240AD**
Extreme Pressure Grade				**250AZ**	—	—	**250AC**	**250AD**
Rust Inhibited Grade				—	—	**280AB**	**280AC**	—
Rust Inhibited Grade				**283AZ**	**283AA**	**283AB**	**283AC**	**283AD**
Viscosity of Base Oil	ASTM D445		cSt					
20 °C (68 °F)				60	88	240	800	1540
38 °C (100 °F)				24.7	35	86	270	502
99 °C (210 °F)				4.2	5.4	10.5	26	44
204 °C (400 °F)				1.08	1.3	2.1	4.1	6.0
Vapor Pressure of Base Oil	Knudsen							
38 °C (100 °F)			torr	4×10^{-4}	1×10^{-4}	5×10^{-6}	8×10^{-8}	6×10^{-9}
260 °C (500 °F)			torr	1.5	0.8	3×10^{-2}	2×10^{-3}	3×10^{-4}
Volatility of Base Oil	ASTM D2595		wt% loss in 22 hr					
149 °C (300 °F)				18	15	1.9	—	—
204 °C (400 °F)				—	—	17.3	<1	—
260 °C (500 °F)				—	—	76.2	4	2
Pour Point of Base Oil	ASTM D97							
		°C		–55	–50	–40	–35	–30
		°F		–70	–60	–40	–30	–20
Texture				Buttery				
Penetration	ASTM D217	60 Strokes		265–295				
Mechanical Stability	ASTM D217	10,000 and 100,000 Strokes		No change from original grade				
Oxidation Stability	ASTM D942	99 °C (210 °F)		0 psig O_2 pressure drop after 600 hr				
Liquid Oxygen Impact	ASTM D2512, NASA MSFC 106B			Pass				
Grease Density		25 °C (77 °F)	g/mL	1.89	1.91	1.92	1.93	1.93
Oil Separation	ASTM D6184	99 °C (210 °F)	wt% loss	6	5	4	3	3
		204 °C (400 °F)	in 30 hr	—	20	12	11	10
Estimated Useful Range		°C		–57–149	–51–177	–40–232	–34–288	–29–316
		°F		–70–300	–60–350	–40–450	–30–550	–20–550+

* This table gives typical properties (not specifications) based on historical production performance. Viscosity may vary within +10%. DuPont does not make any express or implied warranty that these products will continue to have these typical properties.

DuPont ™ Krytox ® 143 series oils are clear, colorless, fluorinated synthetic oils that are nonreactive, nonflammable, safe in chemical and oxygen service, and are long-lasting. Krytox® is a perfluoropolyether (PFPE)—also called perfluoroalkylether (PFAE) or perfluoropolyalkylether (PFPAE)—with the following chemical structure:

$$F\text{-}(CF(CF_3)\text{-}CF_2\text{-}O)_n\text{-}CF_2CF_3 \qquad \text{where } n = 10\text{–}60$$

The polymer chain is completely saturated and contains only carbon, oxygen, and fluorine. On a weight basis, a typical Krytox® oil contains 21.6% carbon, 9.4% oxygen, and 69.0% fluorine.

All standard grades of grease are thickened with high efficiency PTFE, whose formula is $(CF_2\text{-}CF_2)_n$. This special high efficiency thickener has a melting point of 325°C (617°F) and has low molecular weight and submicron (0.2 µ) particle size for higher performance in bearings.

Krytox® 240 series greases are white buttery greases with all of the same properties as our 143 series oils that they are made from, but they are in grease form.

Krytox® 250 series EP greases are black greases that contain molybdenum disulfide added as an extreme pressure additive for highly loaded gears and bearings.

Krytox® 283 series anticorrosion greases are white greases that contain sodium nitrite. These grades provide rust protection at ambient temperatures, corrosion protection at high temperatures, and antiwear protection.

DuPont ™ Krytox ® 240 AC, 240 AB and 240 AZ gr-1 greases now have NSF approval for incidental food contact (H-1) in and around food processing areas.

DuPont Performance Lubricants

Extreme Conditions. Extreme Performance.

For more information or technical assistance, contact:

DUPONT Authorized Distributor

TMC

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