Krytox™

Krytox™ Product Brochure

❖ Contents

Chemours™

이엔지폴리머(주)

Krytox™ Performance Lubricants

Product Brochure

1. General-Purpose Oils and Greases

Oil Grades	100	101	102	103	104	105(H-1)	106	107
Standard Grease Grades	**200**	**201**	**202**	**203(H-1)**	**204**	**205(H-1)**	**206(H-1)**	**207**
Extreme Pressure Grease Grades	**210**	**211**	**212**	**-**	**214**	**215**	**216**	**217**
Anti-Corrosion Grease Grades	**220**	**221**	**222**	**223(H-1)**	**224**	**225(H-1)**	**226(H-1)**	**227**
ISO Grade of Oil	5	7	15	32	68	150	220	460
Estimated Useful Range								
°C	<–70~ 66	<–70~ 104	–63~ 132	–60~ 154	–51~ 179	–36~ 204	–36~ 260	–30~ 288
°F	<–94~ 150	<–94~ 220	–81~ 270	–76~ 310	–60~ 355	–33~ 400	–33~ 500	–22~ 550
Oil Viscosity, cSt								
20°C (68°F)	12.4	17.4	38	82	177	522	822	1535
40°C (104°F)	5.5	7.8	15	30	60	160	243	450
100°C (212°F)	-	2	3	5	8.4	18	25	42
204°C (400°F)	-	-	-	-	-	3.1	4.1	6
260°C (500°F)	-	-	-	-	-	-	2.4	3.3
Oil Viscosity Index	-	-	29	92	111	124	134	145
Oil Pour Point								
°C	<-70	<-70	<-63	-60	-51	-36	-36	-30
°F	<-94	<-94	<-81	-76	-60	-33	-33	-22
Oil Density, g/mL								
0°C (32°F)	1.87	1.89	1.92	1.92	1.93	1.94	1.95	1.95
100°C (212°F)	1.67	1.70	1.72	1.74	1.75	1.76	1.77	1.78
Max Oil Volatility, ASTM D2595 % in 22hr								
121°C (250°F)	90	75	35	7	3	1	<1	-
204°C (400°F)	-	-	-	-	-	7	<3	<1
Oil Separation form Grease, ASTM D6184 wt loss, % in 30hr								
99°C (210°F)	18	9	7	6	5	5	4	4
204°C (400°F)	-	-	-	-	-	-	12	12

2. Special Extreme Pressure and Anticorrosion Greases

➢ Typical Properties

Special Extreme Pressure and Anticorrosion Greases	GPL 294	GPL 295	GPL 296	GPL 297	XHT-EP298	XHT-EP299
ISO Grade of Oil	68	150	220	460	720	1000
Estimated Useful Range °C °F	 –51~ 179 –60~ 355	 –36~ 204 –33~ 400	 –36~ 260 –33~ 500	 –30~ 288 –22~ 550	 –15~ 294 –5~ 560	 –5~ 300 –23~ 572
Oil Viscosity, cSt 20°C (68°F) 40°C (104°F) 100°C (212°F)	 180 60 9	 550 160 18	 810 240 25	 1600 440 42	 2560 738 65	 3500 1005 85
Oil Viscosity Index	124	125	134	155	158	166
Oil Pour Point °C °F	 -51 -60	 -36 -33	 -36 -33	 -30 -22	 -15 -5	 -5 23

➢ Typical Performance

	Pin and Vee Block Test	Block on Ring Wear Test	ASTM D3336 Bearing Life Test
GPL 225	4,500 lb load = 37 in-lb torque	0.70 mm wear scar	Greater than 3,200 hr at 177°C (350°F) and 10,000 rpm
GPL 295	4,500 lb load = 30 in-lb torque	0.55 mm wear scar	Greater than 2,500 hr at 177°C (350°F) and 10,000 rpm

Timken EP tests were run on the following KRYTOX™ greases by ASTM D2509:

	OK Load	Score Load	Scar Width at OK Load
GPL 215	30 lb	40 lb	1.507 mm
GPL 225	50 lb	60 lb	1.109 mm
GPL 295	60 lb	70 lb	1.125 mm

3. XHT (Extra High Temperature) Products

➢ User Guide for Krytox XHT Greases

Standard Grades
XHT-S and XHT-SX
250~320°C (482~608°F)
Small or large bearings with relatively high speeds. Higher viscosity, lower evaporation of oil extends life.

Anticorrosion Grades
XHT-AC and ACX
250~320°C (482~608°F)
For machines that run for shorter duration with frequent starts and stops Frequently cooled machines require anticorrosion additives.

Extra Bonding Grades
XHT-BD, BDX, and BDZ
300~400°C (572~752°F)
For use when machine movement is not purely rotational. This grease is non-melting for high-temperature use and offers better adhesion to substrate.

➢ Typical Properties

Grade	Thickener		Viscosity (cSt)			Volatility (ASTM D97)	Anticorrosion Additive
	Type	Properties	at 40°C	at 100°C	at 200°C	at 204°C (%)	
XHT-S	PTFE	Low friction max. temp. 300°C	500	47	6.9	<1	NA
XHT-SX	PTFE	Low friction max. temp. 300°C	738	60	8.8	<0.4	NA
XHT-AC	PTFE	Low friction max. temp. 300°C	500	47	6.9	<1	Sodium nitrite
XHT-ACX	PTFE	Low friction max. temp. 300°C	738	60	8.8	<0.4	Sodium nitrite
XHT-BD	Non-melting	Extra strong bonding to substrate	500	47	6.9	<1	NA
XHT-BDX	Non-melting	Extra strong bonding to substrate	738	60	8.8	<0.4	NA
XHT-BDZ	Non-melting	Extra strong bonding to substrate	1005	85	10.9	<0.3	NA

4. AUT (Automotive Lubricants) Series

➢ Formulations for Automotive Applications

AUT 2045	Additive free
AUT 2245	Traditional sodium nitrite anti-corrosion additive
AUT 2A45	Corrosion inhibited with proven soluble additive technology
AUT 2E45	Sodium nitrite-free anti-corrosion additive

➢ Typical Properties of the Krytox AUT Series

Appearance	White, Creamy Consistency
Estimated Useful Temperature Range	-44°C to 200°C (-47°F to 392°F)
Base Oil Viscosity, cSt	
20°C (68°F)	310
40°C (104°F)	100
100°C (212°F)	12.5
200°C (392°F)	2.5
Oil Separation, wt% after 30hr	
99°C (210°F)	4
Max. Oil Volatility, % in 22hr, ASTM D2595	
66°C (150°F)	0.1
121°C (250°F)	0.5
204°C (400°F)	2
Dropping Point	NA
Standard NLGI Grade	2
Specific Gravity at 0°C (32°F), g/cm	2.0

5. Corrugator Krytox (High-Temperature Anticorrosion Greases)

➢ Typical Properties

Corrugator Krytox	226 FG	227 FG
ISO Grade of Base Oil	220	460
Estimated Useful Range °C °F	 –36~ 260 –33~ 500	 –30~ 288 –22~ 550
Oil Viscosity, cSt 40°C (104°F) 100°C (212°F)	 240 25	 440 42
Specific Gravity	1.95	1.95
Oil Separation, %, 30hr at 99°C (210°F)	3	3
Appearance	White, creamy texture	White, creamy texture
Anticorrosion Additive	Sodium Nitrite	Sodium Nitrite
Antirust Rating, ASTM D1743	Pass	Pass
Four Ball Wear Scar, ASTM D 2266 at 1 hr, 1200 rpm, 107°C(225°F), 20kg	0.4mm	0.4mm
Coefficient of Friction, ASTM D 2266	0.11	0.11
Oil Volatility, %, 22 hr at 204°C(400°F) ASTM D 972 (Modified)	3 max.	1 max.

6. Aerospace Grade Oils and Greases

➢ Typical Properties (Oils)

				Aerospace Oil Grade				
Property	**ASTM Test Method**	**Test Conditions**	**Units**	**143AZ**	**143AA**	**143AB**	**143AC**	**143AD**
Average Molecular Weight	NMR			2060	2210	3800	5940	7480
Viscosity	ASTM D445	-32°C (-25°F) 0°C (32°F) 20°C (68°F) 38°C (100°F) 40°C (104°F) 99°C (210°F) 100°C (212°F) 204°C (400°F) 260°C (500°F)	cSt	7480 228 60 24.7 22.8 4.2 4.1 1.1 -	12,340 350 88 35 32 5.4 5.3 1.3 -	44,620 1070 240 86 78 10.5 10.2 2.1 -	- 3940 800 270 243 26 25.4 4.1 2.4	- 7500 1540 502 450 44 42.4 6.0 3.4
Viscosity Index	ASTM D2270			60	96	113	134	146
Pour Point	ASTM D97		°C °F	-55 -70	-50 -60	-40 -40	-35 -30	-30 -20
Distillation Range	ASTM D1160	53 Pa (0.4 torr)	°C °F	140 / 210 285 / 410	170 / 245 340 / 475	215 / 290 420 / 555	260 / 370 500 / 700	300 / 400+ 570 / 750+
Oil Density		0°C (32°F) 100°C (212°F)	g/mL	1.91 1.72	1.92 1.74	1.93 1.75	1.95 1.77	1.95 1.78
Vapor Pressure	Knudsen	38°C (100°F) 260°C (500°F) 38°C (100°F) 260°C (500°F)	torr torr Kpa Kpa	4×10^{-4} 1.5 5×10^{-5} 0.2	1×10^{-4} 0.8 1×10^{-5} 0.1	5×10^{-6} 3×10^{-2} 7×10^{-7} 4×10^{-3}	8×10^{-8} 2×10^{-3} 1×10^{-8} 3×10^{-4}	6×10^{-9} 3 x 10 8×10^{-10} 4×10^{-5}
Volatility	ASTM D2595	149°C (300°F) 204°C (400°F) 260°C (500°F)	wt% loss In 22 hr	18 - -	15 - -	1.9 17.3 76.2	- <1 4	- - 2
Estimated Useful Range			°C °F	–57~149 –70~300	–51~177 –60~350	–40~232 –40~450	–34~288 –30~550	–29~316 –20~600

6. Aerospace Grade Oils and Greases

➢ Typical Properties (Greases)

Property	ASTM Test Method	Test Conditions	Units	Aerospace Grade				
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**	**-**
				283AZ	**283AA**	**283AB**	**283AC**	**283AD**
Viscosity of Base Oil	ASTM D445	20°C (68°F) 38°C (100°F) 99°C (210°F) 204°C (400°F)	cSt	60 24.7 4.2 1.08	88 35 5.4 1.3	240 86 10.5 2.1	800 270 26 4.1	1540 502 44 6.0
Vapor Pressure of Base Oil	Knudsen	38°C (100°F) 260°C (500°F)	torr torr	4×10^{-4} 1.5	1×10^{-4} 0.8	5×10^{-6} 3×10^{-2}	8×10^{-8} 2×10^{-3}	6×10^{-9} 3×10^{-4}
Volatility of Base Oil	ASTM D2595	149°C (300°F) 204°C (400°F) 260°C (500°F)	wt% loss In 22 hr	18 - -	15 - -	1.9 17.3 76.2	- <1 4	- - 2
Pour Point of Base Oil	ASTM D97		°C °F	-55 -70	-50 -60	-40 -40	-35 -30	-30 -20
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) 204 °C(400 °F)	wt% loss In 30 hr	6 -	5 20	4 12	3 11	3 10
Estimated Useful Range			°C °F	–57~149 –70~300	–51~177 –60~350	–40~232 –40~450	–34~288 –30~550	–29~316 –20~550+

7. H-1 Food Grade Lubricants

➢ Typical Properties (Greases)

General Greases	FG 20	FG 22	FG 24	-	FG 26
Anticorrosion Greases	**FG 30**	**FG 32**	**FG 34**	**FG 35**	**FG 36**
NLGI Grade	2	2	2	2	2
Base Oil Viscosity, cSt at 40°C (104°F)	30	160	240	500	738
Viscosity Index	121	125	134	149	158
Operating Range, °C(°F)	–60 to 154 (–76 to 310)	–36 to 204 (–33 to 400)	–30 to 260 (–22 to 500)	–20 to 300 (–4 to 572)	–10 to 300 (14 to 572)

➢ Typical Properties (Oils)

Oils	FG 40	FG 45	FG 50	FG 53
Antirust	No	No	Yes	Yes
Oil Viscosity, cSt 40°C (104°F) 100°C (212°F)	160 18	500 42	160 18	215 23
Volatility at 22 hr	204°C(399°F) = 3%	260°C(500°F) = 2%	204°C(399°F) = 3%	Not tested
Viscosity Index	125	133	125	131
Pour Point, °C(°F)	-35 (-31)	-25 (-13)	-35 (-31)	-30 (-22)
Upper Use Limit, °C(°F)	200 (392)	275 (527)	180 (356)	295 (563)
Vapor Pressure	7 x 10^{-7} torr	1 x 10^{-9} torr	7 x 10^{-7} torr	NA
Density, g/cc at 20°C(68°F)	1.92	1.93	1.92	1.92

8. NRT Series for Reactive Gas Service

➢ Typical Properties

Product Properties	NRT 8900	NRT 8904	NRT 8906	NRT 8906A	NRT 8908	NRT 8950	NRT 8990	NRT PLSS	NRT 8805
Description	White, creamy grease	White, creamy grease	White, creamy grease	White, creamy grease	Light gray, creamy paste	White, creamy grease	White, creamy grease	White, creamy grease	Clear, colorless oil
NLGI Grade	2	2	2	2	2	1.5	1	2	-
Thickener	PTFE	PTFE	PTFE	PTFE	inorganic	Non-melting	PTFE	PTFE	-
Estimated Useful Temperature Range, °C	-51 ~ 121	-51 ~ 179	-36 ~ 260	-36 ~ 200	-40 ~ 180	-15 ~ 325	-75 ~ 150	-36 ~ 260	-40 ~ 160
Oil Viscosity, Kinematic cSt ASTM D445, °C 40 100 204	1.8.7	60 9	240 25 4	240 25 4	49 7.2	500 47	15 3.7	240 25 3.9	81 11
Oil Density, g/mL	1.9	1.93	1.95	1.95	2.0	1.95	1.9	1.95	1.9
Max Oil Volatility, % in 22 hr ASTM D972, °C 66 121 204 260	9 35	1 3	1 <5	1 <6	2	<1 2.1	8	1 <5	1

8. Vacuum Pump Fluids

➢ Typical Properties (Oils)

Property	Test Method	Conditions	Units	Krytox 1506 / 1506XP	Krytox 1514 / 1514XP	Krytox 1525 / 1525XP	Krytox 1531 / 1531XP	Krytox 16256	Krytox 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				NAF H-1 / No	NAF H-1 / No	NAF H-1 / No	None	None	None

8. Vacuum Pump Fluids

➢ Typical Properties (LVP_Low Vapor Pressure)

			Krytox (Grease)
Property	**Conditions**	**Units**	**LVP**
Penetration	worked, 25°C (77°F)	mm/10	280
NLGI Consistency			2
Vapor Pressure	20°C (68°F) 200°C (392°F) 20°C (68°F) 200°C (392°F)	torr torr kPa kPa	$< 1.0 \times 10^{-13}$ $< 1.0 \times 10^{-5}$ $< 1.3 \times 10^{-14}$ $< 1.3 \times 10^{-6}$
Oil Separation	30 hr, 204°C (399°F)	wt%	13.8
Evaporation Loss	22 hr, 204°C (399°F)	wt%	0.3
Density	25°C (77°F)	g/cc	1.94

➢ Typical Vapor Pressure- Temperature Characteristics