High-Performance Multiuse (HPM) Grease Specification

Property	Test Conditions	Test method	Units	Min	Max
Cone Penetration of Lubricating Grease	Worked 60 Strokes	ASTM D217	dmm	220	340
Cone Penetration of Lubricating Grease	Prolonged worked penetration (Δ100k)	ASTM D217	dmm	- 30	+ 30
Elastomer compatibility of Lubricating Greases and Fluids [using SRE-NBR 28/P or SRE-NBR 28/PX elastomer per ISO 13226]	168 hours @ 125 °C	ASTM D4289	ΔHardness (Shore A points)	-15	+2
			Δ Volume percent	-5	+30
Oxidation Stability of Lubricating Greases by the Oxygen Pressure Vessel Method	Pressure drop after 100hrs @ 100 °C	ASTM D942	kPa (psi)		35 (5.1)
Determining the Water Washout Characteristics of Lubricating Greases	60 minutes @ 79 °C	ASTM D1264	wt%		10
Low Temperature Torque of Ball Bearing Grease	-20 °C	ASTM D1478			

HPM Spec						
	Starting torque			mNm (g·cm)		1000 (10,200)
	Running torque @ 60 minutes			mNm (g·cm)		100 (1,020)
	Oil Separation from Lubricating Grease During Storage	24 hours @ 25 °C	ASTM D1742	wt%		5.0
	Oil Separation from Lubricating Grease (Conical Sieve Method)	30 hours @ 100 °C	ASTM D6184	wt%		7.0
	Roll Stability of Lubricating Grease [using 1/2 scale penetration]	2 hours @ Room Temperature	ASTM D1831	dmm	-10%	+10%
	Wear Preventive Characteristics of Lubricating Grease (Four-Ball Method) Wear Scar Diameter	75 °C, 1200 rpm, 60 minutes	ASTM D2266	mm		0.60
	Measurement of Extreme-Pressure Properties of Lubricating Grease (Four-Ball Method), Weld point	1770 rpm @ 27 °C	ASTM D2596	kgf	250	
	Determining Corrosion Preventive Properties of Lubricating Greases	48 hours @ 52 °C	ASTM D1743	rating	Pass	
	Determination of Corrosion-Preventive Properties of Lubricating Greases Under Dynamic Wet Conditions (Emcor Test)	Distilled Water, 2 bearings	ASTM D6138	rating		0,1
	Detection of Copper Corrosion from Lubricating Grease	24 hours @ 100 °C	ASTM D4048	rating		1B

HPM + WR	Determining the Water Washout Characteristics of Lubricating Greases	60 minutes @ 79 °C	ASTMD1264	wt%		5.0
	Determining the Resistance of Lubricating Grease to Water Spray	5 minutes @ 38 °C	ASTM D4049	wt%		40
	Roll Stability of Lubricating Grease in Presence of Water (10% by wt distilled water) [using 1/2 scale penetration]	2 hours @ Room Temperature	ASTM D8022	dmm	-15%	+15%
HPM + CR	Corrosion-Preventive Properties of Lubricating Greases in Presence of Dilute Synthetic Sea Water Environments	10% Synthetic seawater (as in ASTM D665)	ASTM D5969	rating	Pass	
	Determination of Corrosion-Preventive Properties of Lubricating Greases Under Dynamic Wet Conditions (Emcor Test)	100% Synthetic seawater (as in ASTM D665)	ASTM D6138	rating		1 , 2
	Determination of Corrosion-Preventive Properties of Lubricating Greases Under Dynamic Wet Conditions (Emcor Test)	0.5 N solution (~ 3% NaCl solution)	ASTM D6138	rating		2 , 3

HPM + LT	Low Temperature Torque of Ball Bearing Grease	-30 °C	ASTM D1478			
	Starting torque			mNm (g·cm)		1000 (10,200)
	Running torque @ 60 minutes			mNm (g·cm)		100 (1,020)
	Grease Mobility	-20 °C	US Steel	g/min	10	
	Determination of flow pressure of lubricating greases according to Kesternich method	-30 °C	DIN 51805	mbar		1400

HPM + HL	**Wear Preventive Characteristics of Lubricating Grease (Four-Ball Method) Wear Scar Diameter**	**75 °C, 1200 rpm, 60 minutes**	**ASTM D2266**	**mm**		**0.50**
	Measurement of Extreme-Pressure Properties of Lubricating Grease (Four-Ball Method), Weld point	**1770 rpm @ 27 °C**	**ASTM D2596**	**kgf**	**400**	
	Determining Extreme Pressure Properties of Lubricating Greases Using a High-Frequency, Linear-Oscillation (SRV) Test Machine, Pass Load	**(Procedure B at 80 °C)**	**ASTM D5706**	**N**	**800**	
	Fretting Wear Protection by Lubricating Greases ***See Note***	**Average of 2 runs, 22 hours @ Room Temperature**	**ASTM D4170**	**mg**		**5.0**
	Determining Fretting Wear Resistance of Lubricating Greases Under High Hertzian Contact Pressures Using a High-Frequency, Linear-Oscillation (SRV) Test Machine	**50 °C, 100N, 0.300mm, 4 hours**	**ASTM D7594**	**mm**		**0.500**

*As of November 2020, submitting D4170 data is optional. After ASTM approves the D4170 revisions, submitting D4170 data will be required.