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Lubrication Accessory Series for LM Systems

THK provides a wide array of lubrication accessories such as grease, grease guns, grease nipples and plumbing fixtures available for various applications. (A24-7 to A24-37)

THK Original Grease

THK provides various types of THK original grease needed for the lubrication of LM systems. They are available for various conditions and environments.

[Table for Grease Selection]

Name of grease	AFA	AFB-LF	AFC	AFC-CA	AFF	AFG
Features	Low sliding friction	All-purpose type	For fretting and corrosion resistance	For clean environments	For clean environments	For preventing heat generation by ball screws
Base oil	High-grade synthetic oil	Refined mineral oil	High-grade synthetic oil	High-grade synthetic oil	High-grade synthetic oil	High-grade synthetic oil
Consistency enhancer	Urea-based	Lithium-based	Urea-based	Urea-based	Lithium-based	Urea-based
Features	Low sliding friction	○	—	—	—	○
	Micro-vibration	○	—	○	—	○
	High load	—	○	—	—	—
	Low dust generation (Clean environments)	—	—	—	◎	○
	Water resistance	○	○	—	—	—
	Machine stability	—	○	○	○	○
Bellows cartridge color	Clear	Light green	Clear	White	Dark blue	Light green
Cap color	White	Yellow	Orange	White	White	Orange
Reference page	A24-7	A24-9	A24-11	A24-13	A24-15	A24-18
Name of grease	AFJ	L100	L450	L500	L700	
Features	For a wide range of speeds	For clean environments/ High loads	For machine tools (Centralized lubrication)	For high-load ball screws	For medical, pharmaceutical, and food equipment	
Base oil	Refined mineral oil	High-grade synthetic oil	Refined mineral oil	Refined mineral oil	High-grade synthetic oil	
Consistency enhancer	Urea-based	Lithium complex-based	Urea-based	Lithium complex-based	Calcium sulfonate complex-based	
Features	Low sliding friction	○	—	—	—	
	Micro-vibration	○	—	○	—	
	High load	○	◎	◎	◎	
	Low dust generation (Clean environments)	—	○	—	—	
	Water resistance	—	—	◎	—	
	Machine stability	○	○	○	○	
Bellows cartridge color	Yellow	Blue	Dedicated cartridge	Purple	White	
Cap color	Blue	Yellow	Dedicated cartridge	Yellow	White	
Reference page	A24-21	A24-25	A24-27	A24-29	A24-31	

THK Original Grease AFA Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: urea-based



AFA Grease is a high-grade grease that possesses a long service life, excellent water resistance, and low sliding resistance through the use of high-grade synthetic oil as the base oil and a urea-based consistency enhancer.

[Features]

(1) Low sliding resistance

As the kinematic viscosity of the base oil is low, it is ideal for long-stroke, high-speed LM Guide operations.

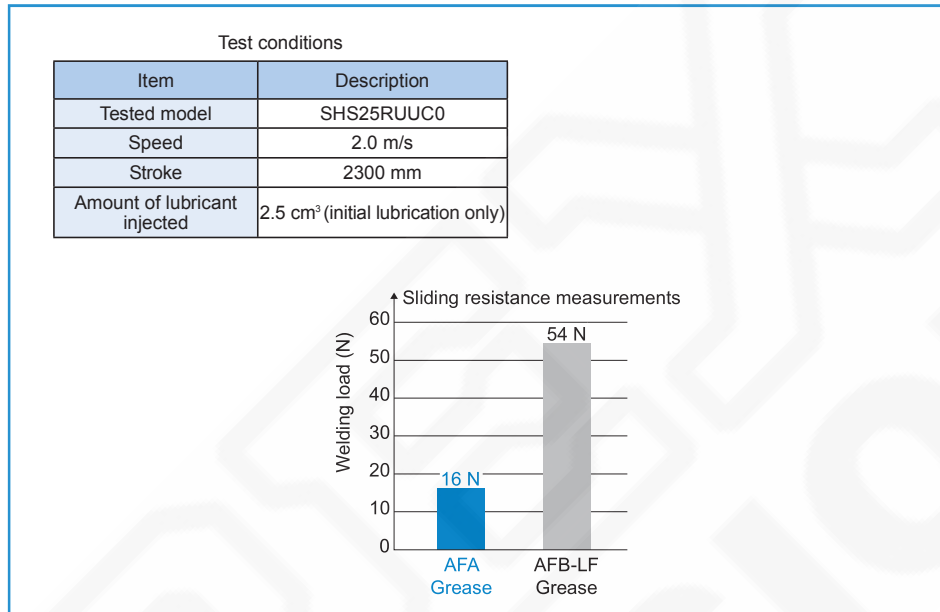
(2) Water resistance

It is less vulnerable to moisture penetration than other types of grease because of its high water resistance.

[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Urea-based	
Base oil	High-grade synthetic oil	
Base oil kinematic viscosity: mm ² /s (40°C)	25	JIS K 2220 23
Worked penetration (25°C, 60 W)	285	JIS K 2220 7
Mixing stability (100,000 W)	329	JIS K 2220 15
Dropping point: °C	261	JIS K 2220 8
Evaporation amount: mass% (99°C, 22 h)	0.2	JIS K 2220 10
Oil separation rate: mass% (100°C, 24 h)	0.5	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	JIS K 2220 9
Low-temperature torque: mN·m (-20°C)	Starting	JIS K 2220 18
	Rotational	
4-ball testing (welding load): N	3089	ASTM D2596
Service temperature range: °C	-45 to 160	
Color	Brown	

[Sliding Resistance Comparison]



[Rotational Torque Testing with Ball Screw Grease]

<Test method>

1 cm³ of grease was applied to the KR4620A + 640L LM Guide and 2 cm³ to the ball screw (initial injection only), and then the torque was measured at each motor rotation speed. The output values on the driver torque monitor were used for the torque measurements.

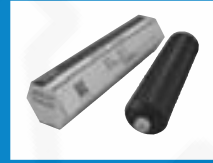
Rotational Torque Testing with Electric Actuators

Unit: N-cm

Grease used	Central value of dynamic viscosity mm ² /s (cSt) (40°C)	Dynamic viscosity range mm ² /s (cSt) (40°C)	Rotational speed			
			100 min ⁻¹	1000 min ⁻¹	2000 min ⁻¹	4000 min ⁻¹
AFA Grease	25	22.5 to 27.5	11.3	11.3	12.3	14.6
Lubricating oil VG32	32	28.8 to 35.2	11.2	10.8	13.4	14.7

THK Original Grease AFB-LF Grease

- Base oil: refined mineral oil
- Consistency enhancer: lithium-based



AFB-LF Grease is a general-purpose grease that provides excellent extreme pressure performance and mechanical stability properties through the use of a refined mineral oil base oil and a lithium-based consistency enhancer.

[Features]

(1) Extreme pressure resistance

The action of the special additives provides higher wear resistance and extreme pressure resistance than other lithium-based greases available on the market.

(2) Mechanical stability

AFB-LF Grease is not easily softened and demonstrates excellent mechanical stability even when used for a long period of time.

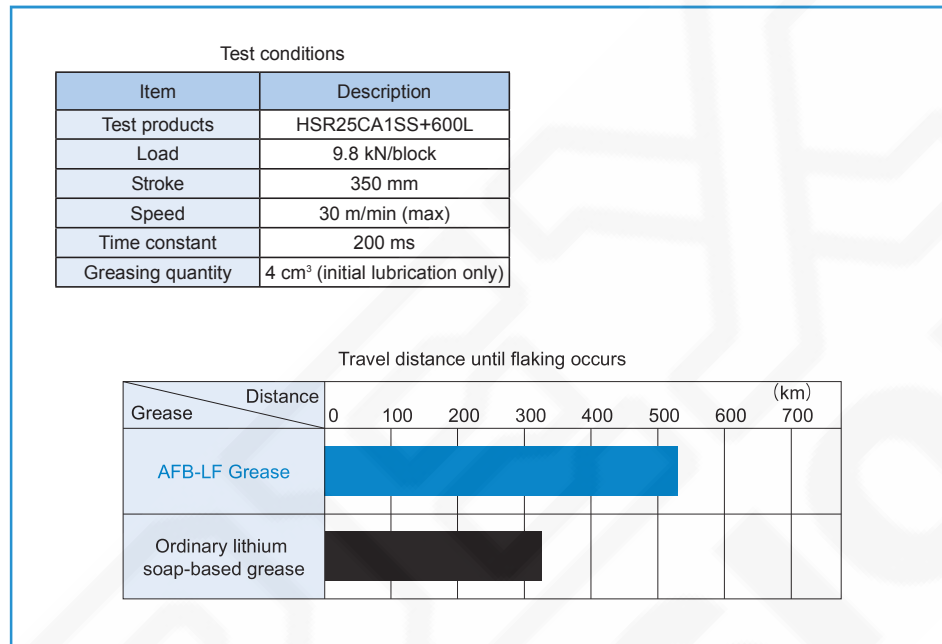
(3) Long service life

It provides many times the lubrication life of general lithium soap-based greases. As a result, it offers a lower maintenance workload and greater economy due to the longer intervals between greasing.

[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Lithium-based	
Base oil	Refined mineral oil	
Base oil kinematic viscosity: mm ² /s (40°C)	170	JIS K 2220 23
Worked penetration (25°C, 60 W)	275	JIS K 2220 7
Mixing stability (100,000 W)	345	JIS K 2220 15
Dropping point: °C	193	JIS K 2220 8
Evaporation amount: mass% (99°C, 22 h)	0.4	JIS K 2220 10
Oil separation rate: mass% (100°C, 24 h)	0.6	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	JIS K 2220 9
Low-temperature torque: mN·m (-20°C)	Starting	JIS K 2220 18
	Rotational	
4-ball testing (welding load): N	3089	ASTM D2596
Service temperature range: °C	-15 to 100	
Color	Brownish yellow	

[Comparison of Grease Service Life Data]



THK Original Grease AFC Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: urea-based



AFC grease uses high-grade synthetic oil as its base and a urea-based grease as its consistency enhancer, while also featuring special additives. This gives it excellent fretting resistance.

[Features]

(1) Fretting resistance

It is designed to be highly effective in preventing fretting corrosion.

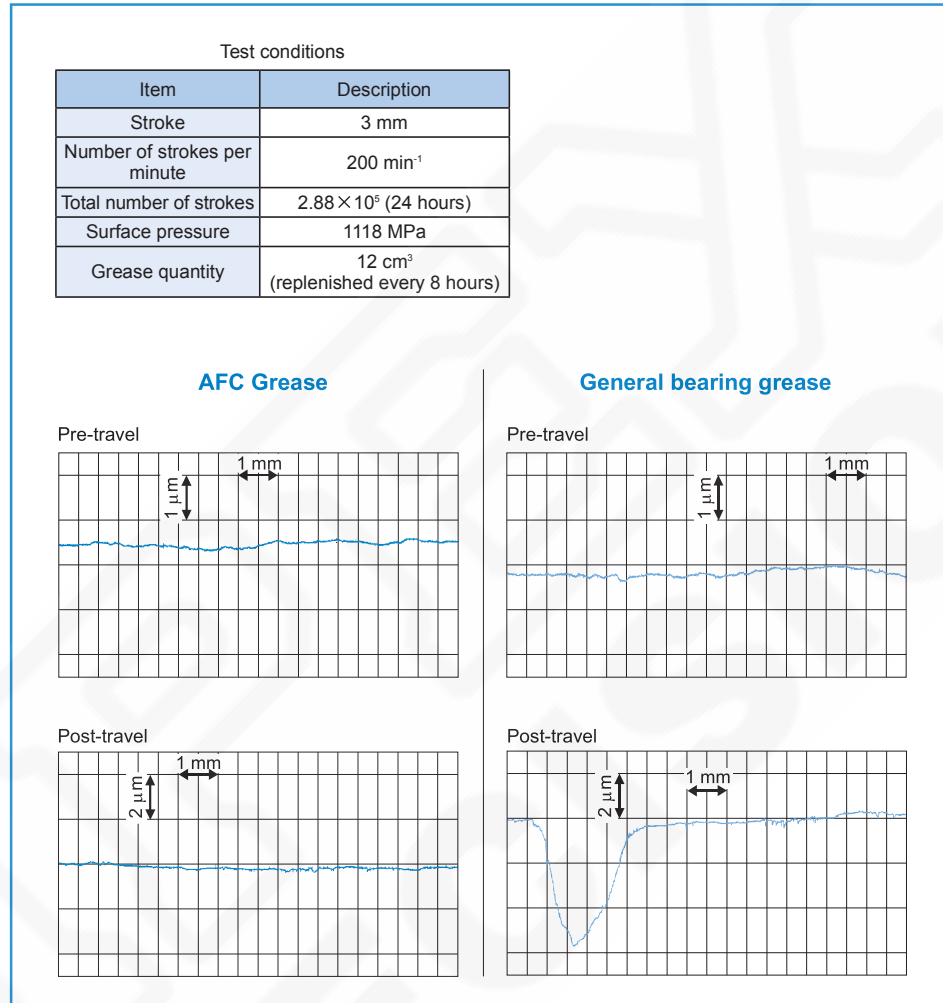
(2) Wide temperature range

Since a high-grade synthetic oil is used as the base oil, the lubricating performance remains high over a wide range of temperatures, from -54°C to 177°C .

[Representative Physical Properties]

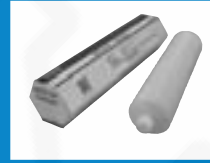
Item	Representative value	Test method
Consistency enhancer	Urea-based	
Base oil	High-grade synthetic oil	
Base oil kinematic viscosity: mm^2/s (40°C)	25	JIS K 2220 23
Worked penetration (25°C , 60 W)	288	JIS K 2220 7
Mixing stability (100,000 W)	341	JIS K 2220 15
Dropping point: $^{\circ}\text{C}$	269	JIS K 2220 8
Evaporation amount: mass% (99°C , 22 h)	0.2	JIS K 2220 10
Oil separation rate: mass% (100°C , 24 h)	0.6	JIS K 2220 11
Copper plate corrosion (B method, 100°C , 24 h)	Accepted	JIS K 2220 9
Low-temperature torque: $\text{mN}\cdot\text{m}$ (-20°C)	Starting	JIS K 2220 18
	Rotational	
4-ball testing (welding load): N	3089	ASTM D2596
Service temperature range: $^{\circ}\text{C}$	-54 to 177	
Color	Brown	

[Fretting Resistance Test Data (Comparison of Raceway Conditions)]



THK Original Grease AFE-CA Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: urea-based



AFE-CA grease uses high-grade synthetic oil as its base and a urea-based grease as its consistency enhancer. This ensures it produces very little dust, making it ideal for use in clean environments.

[Features]

(1) Low dust generation

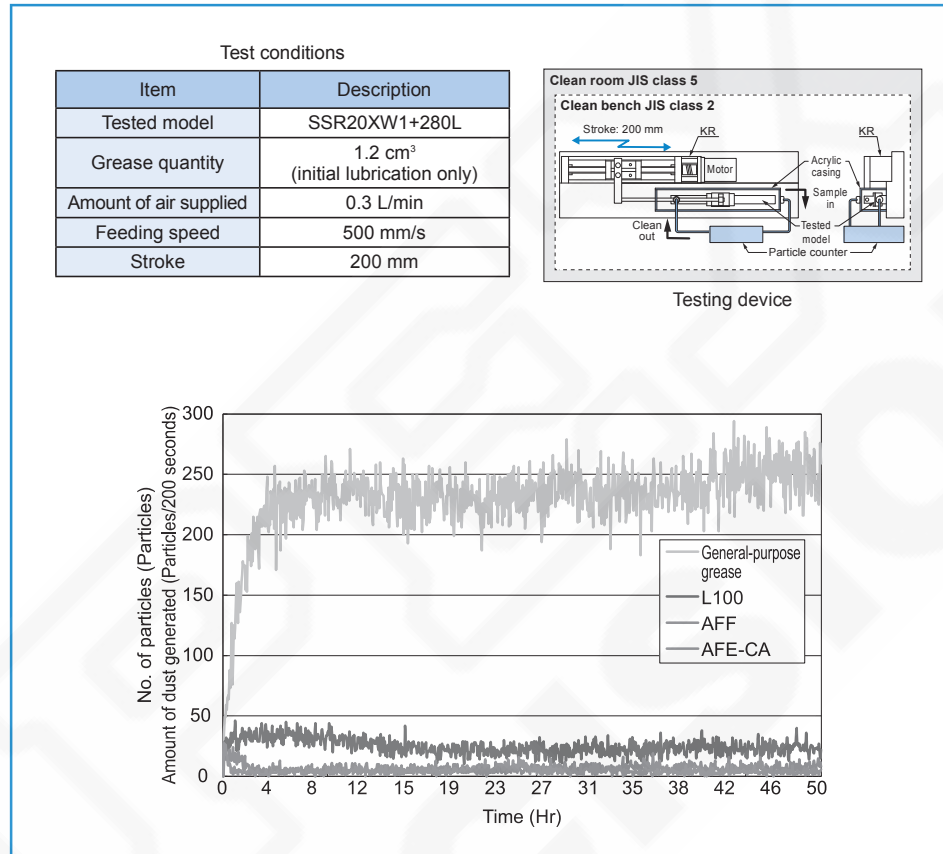
This grease generates the least amount of dust among all THK low dust-generating grease products. Contains zero metallic elements, making it ideal for use in semiconductor-related fields.

[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Urea-based	
Base oil	High-grade synthetic oil	
Base oil kinematic viscosity: mm ² /s (40°C)	99	JIS K 2220 23
Worked penetration (25°C, 60 W)	280	JIS K 2220 7
Mixing stability (100,000 W)	310	JIS K 2220 15
Dropping point: °C	260	JIS K 2220 8
Evaporation amount: mass% (99°C, 22 h)	0.1	JIS K 2220 10
Oil separation rate: mass% (100°C, 24 h)	0.1	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	JIS K 2220 9
Low-temperature torque: mN·m (-20°C)	Starting	JIS K 2220 18
	Rotational	
4-ball testing (welding load): N	1236	ASTM D2596
Service temperature range: °C	-40 to 180	
Color	Light yellowish brown	

[Low Dust-Generating Performance Test Data]

● AFE-CA Grease Test Data (Comparison of Dust Generation)



THK Original Grease AFF Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: lithium-based



AFF grease uses high-grade synthetic oil as its base and a lithium-based grease as its consistency enhancer, while also featuring special additives. This gives it excellent anti-fretting and low dust-generating performance. It also features a level of stable rolling resistance not found in other conventional vacuum and low dust-generating greases.

[Features]

(1) Stable rolling resistance

Since the viscous resistance is low, the rolling resistance fluctuation is also low. Thus, superb conformity is achieved at low speeds.

(2) Low dust generation

It generates very little dust, making it ideal for use under micro-stroke conditions.

(3) Fretting resistance

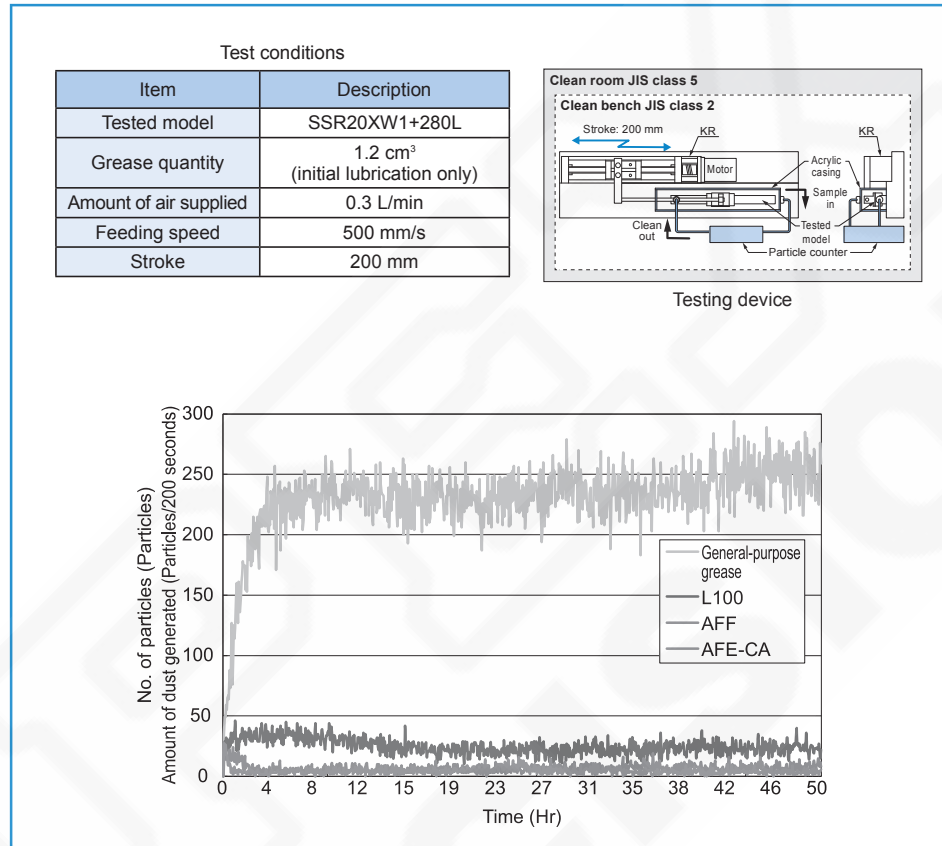
Since AFF grease is more resistant to wear from micro-vibrations than other low dust-generating greases, it allows the greasing interval to be extended.

[Representative Physical Properties]

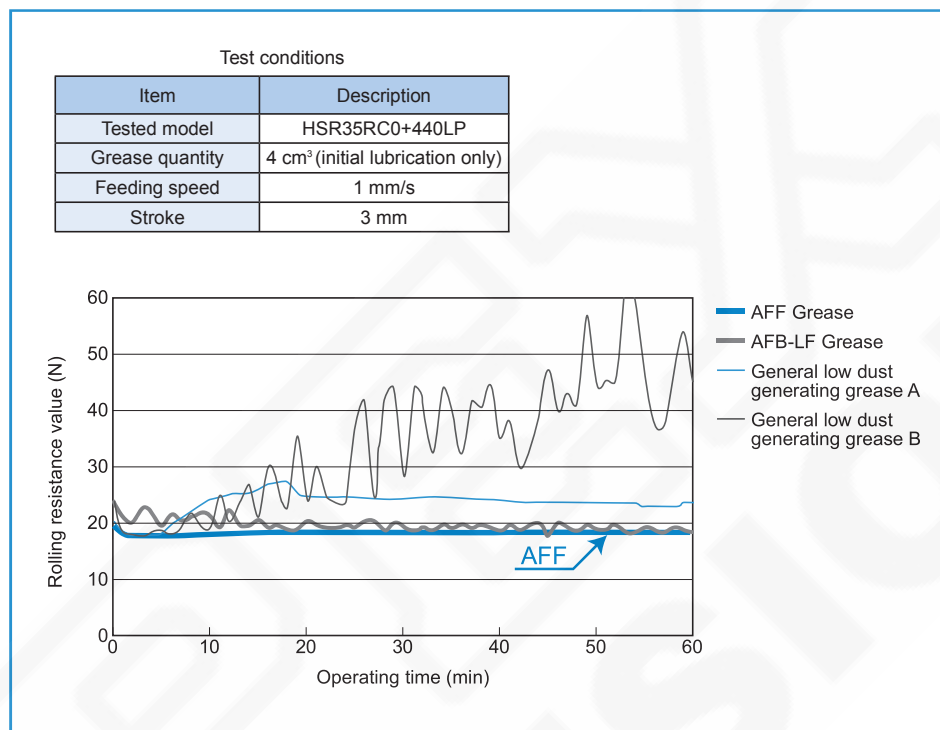
Item	Representative value	Test method
Consistency enhancer	Lithium-based	
Base oil	High-grade synthetic oil	
Base oil kinematic viscosity: mm ² /s (40°C)	100	JIS K 2220 23
Worked penetration (25°C, 60 W)	315	JIS K 2220 7
Mixing stability (100,000 W)	345	JIS K 2220 15
Dropping point: °C	220	JIS K 2220 8
Evaporation amount: mass% (99°C, 22 h)	0.7	JIS K 2220 10
Oil separation rate: mass% (100°C, 24 h)	2.6	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	JIS K 2220 9
Low-temperature torque: mN·m (-20°C)	Starting	JIS K 2220 18
	Rotational	
4-ball testing (welding load): N	1236	ASTM D2596
Service temperature range: °C	-40 to 120	
Color	Reddish brown	

[Low Dust-Generating Performance Test Data]

● AFF Grease Test Data (Comparison of Dust Generation)

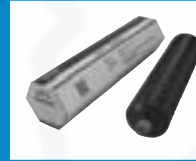


[Rolling Resistance Characteristics at Low Speed]



THK Original Grease AFG Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: urea-based



AFG Grease is a high-grade grease for ball screws that uses high-grade synthetic oil as its base and a urea-based grease as its consistency enhancer. This ensures that it has superior low heat-generating properties, allowing for use over a wide temperature range—from low to high temperatures.

[Features]

(1) Low heat generation

Since the viscous resistance is low, the grease generates only a minimal level of heat even during high-speed operation.

(2) Low torque properties

Features a low base oil kinematic viscosity, making it ideal for ball screws.

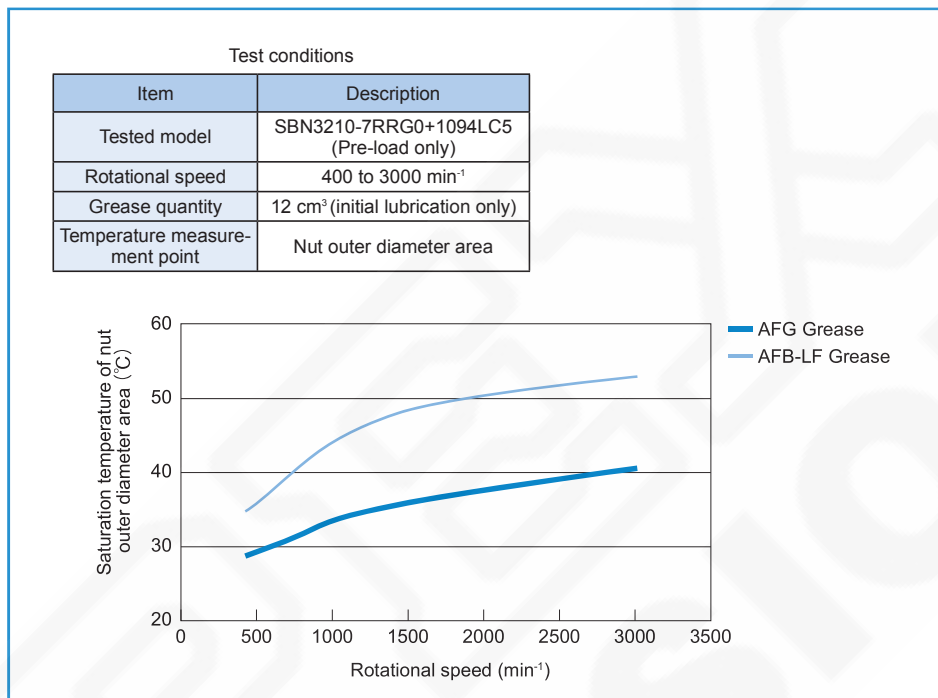
(3) Water resistance

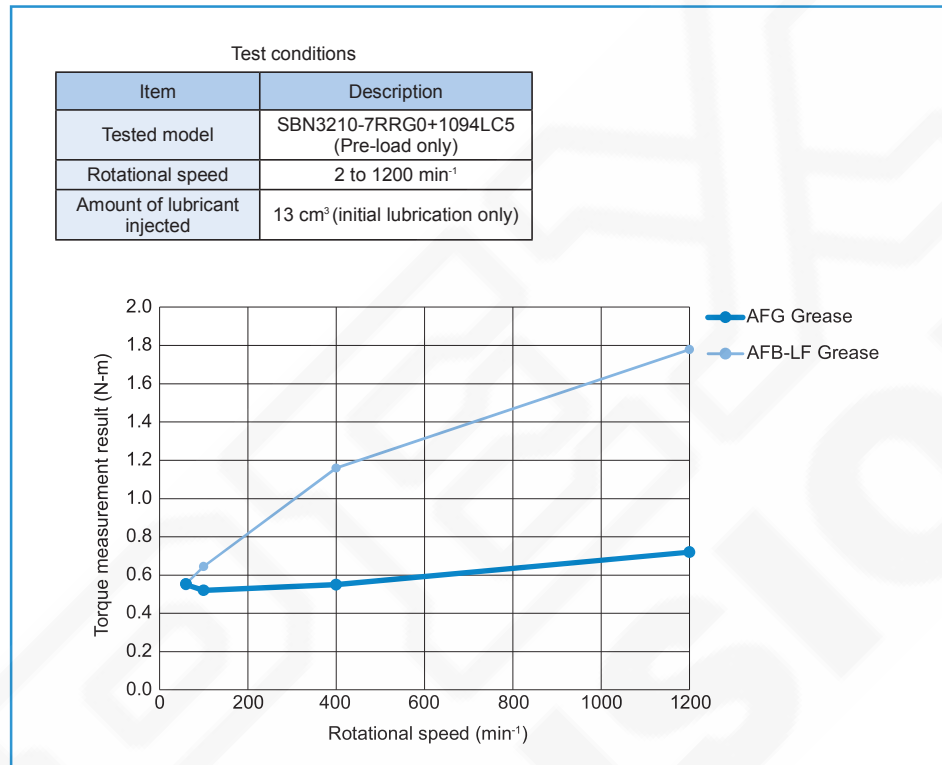
AFG Grease is a highly water-resistant grease that is less vulnerable to softening and reductions in extreme pressure resistance due to moisture penetration.

[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Urea-based	
Base oil	High-grade synthetic oil	
Base oil kinematic viscosity: mm ² /s (40°C)	25	JIS K 2220 23
Worked penetration (25°C, 60 W)	285	JIS K 2220 7
Mixing stability (100,000 W)	329	JIS K 2220 15
Dropping point: °C	261	JIS K 2220 8
Evaporation amount: mass% (99°C, 22 h)	0.2	JIS K 2220 10
Oil separation rate: mass% (100°C, 24 h)	0.5	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	JIS K 2220 9
Low-temperature torque: mN·m (-20°C)	Starting	JIS K 2220 18
	Rotational	
4-ball testing (welding load): N	3089	ASTM D2596
Service temperature range: °C	-45 to 160	
Color	Brown	

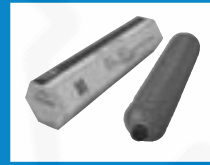
[Low Heat Generation Test Data]



[Ball Screw Torque Data]

THK Original Grease AFJ Grease

- Base oil: refined mineral oil
- Consistency enhancer: urea-based



AFJ grease uses refined mineral oil as its base and a urea-based grease as its consistency enhancer, while also featuring other special additives. This gives it excellent lubrication properties at a wide range of speeds—from low to high.

[Features]

- (1) Wide range of speeds
It provides consistent and even lubrication at a wide range of speeds, from low to high.
- (2) Wear resistance
Even at low speeds, it has excellent oil film formation to reduce wear.
- (3) Vibration resistance
It reduces wear caused by machine vibration during high-speed operation.

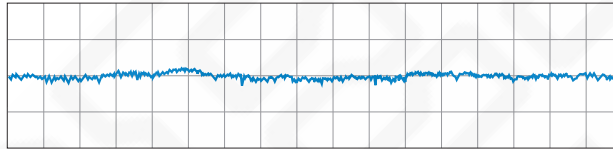
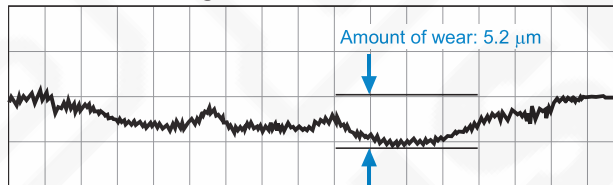
[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Urea-based	
Base oil	Refined mineral oil	
Base oil kinematic viscosity: mm ² /s (40°C)	20	JIS K 2220 23
Worked penetration (25°C, 60 W)	325	JIS K 2220 7
Mixing stability (100,000 W)	360	JIS K 2220 15
Dropping point: °C	185	JIS K 2220 8
Evaporation amount: mass% (99°C, 22 h)	0.6	JIS K 2220 10
Oil separation rate: mass% (100°C, 24 h)	7.0	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	JIS K 2220 9
Low-temperature torque: mN·m (−20°C)	Starting	JIS K 2220 18
	Rotational	
4-ball testing (welding load): N	3089	ASTM D2596
Service temperature range: °C	−20 to 120	
Color	Yellowish brown	

[Wear Resistance Test Data (LM Guide Block)]

Test conditions

Item	Description
Tested model	NRS55B2SS+780LP
Applied load	5.9 kN
Feeding speed	0.1 m/min
Stroke	200 mm
Grease quantity	12 cm ³ (initial lubrication only)
Test duration	480 hours

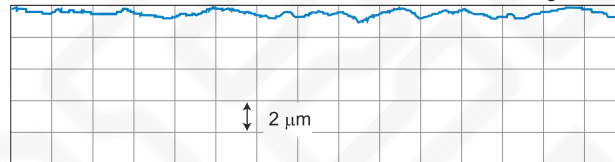
AFJ Grease**Other urea-based grease**

[Vibration Resistance Test Data (LM Guide Rail)]

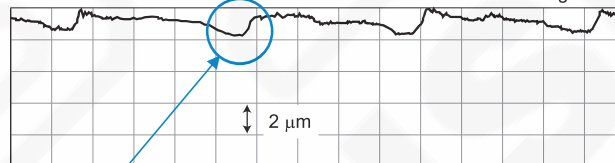
Test conditions

Item	Description
Tested model	SHS25R1UU+580LP
Applied load	11.05 kN (0.35C)
Feeding speed	60 m/min
Acceleration/ deceleration	9.8 m/s ²
Stroke	350 mm
Grease quantity	2 cm ³ (initial lubrication only)

AFJ Grease After traveling 434 km



Other urea-based grease After traveling 86 km



“Wear
mechanism”

High-speed
movement and
rapid acceleration/
deceleration

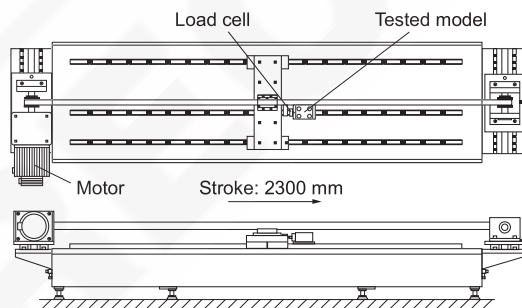
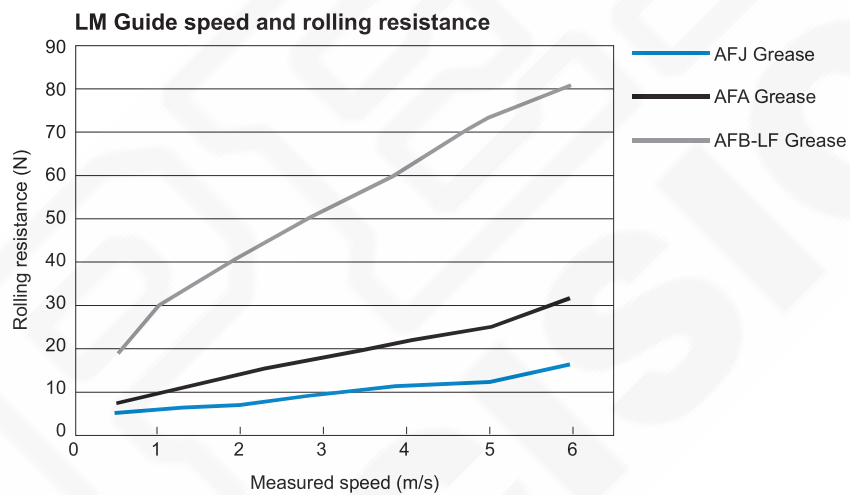
Mechanical
vibrations
occur

Raceways
wear down

[LM Guide Rolling Resistance Measurement Data]

Test conditions

Item	Description
Tested model	SHS25R1UU+3000L
Applied load	No load
Acceleration	29.4 m/s ² (3G)
Stroke	2300 mm
Test temperature	21°C
Grease quantity	2 cm ³ (initial lubrication only)
Measurement speed	0.5, 1, 2, 3, 4, 5, 6 m/s



Lubrication

L100 Grease

THK Original Grease L100 Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: lithium complex-based



L100 grease uses high-grade synthetic oil as its base and lithium complex-based grease as its consistency enhancer, while also featuring special additives. It also produces little dust and boasts excellent extreme pressure resistance to a degree not found in standard low dust-generating greases. This makes it ideal for use in clean rooms.

*The packaging is scheduled to change (see photograph).

[Features]

(1) Low dust generation

It demonstrates the same low dust-generating performance as our previous low dust-generating grease, making it ideal for use in clean rooms.

(2) Extreme pressure resistance

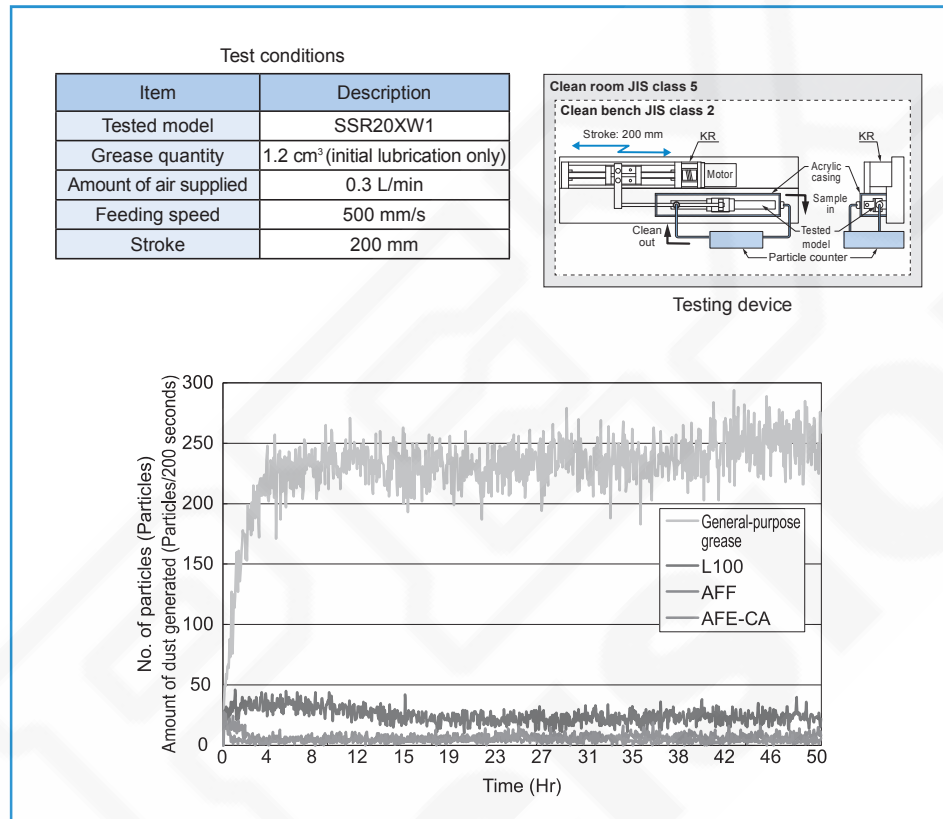
The action of the additives and base oil (which is suitable for withstanding loads) gives it extreme pressure resistance three times greater than our previous low dust-generating grease.

[Representative Physical Properties]

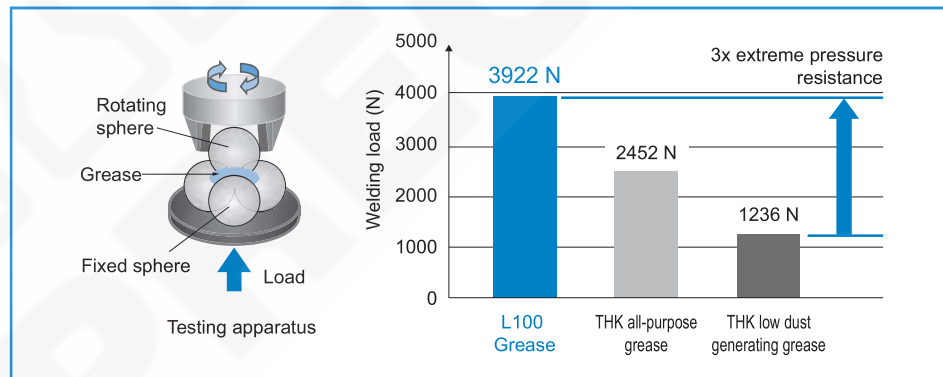
Item	Representative value	Test method
Consistency enhancer	Lithium complex-based	
Base oil	High-grade synthetic oil	
Base oil kinematic viscosity: mm ² /s (40°C)	198	JIS K 2220 23
Worked penetration (25°C, 60 W)	294	JIS K 2220 7
Mixing stability (100,000 W)	312	JIS K 2220 15
Dropping point: °C	260	JIS K 2220 8
Evaporation amount: mass% (99°C, 22 h)	0.1	JIS K 2220 10
Oil separation rate: mass% (100°C, 24 h)	0.8	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	JIS K 2220 9
Low-temperature torque: mN·m (-20°C)	Starting	JIS K 2220 18
	Rotational	
4-ball testing (welding load): N	3922	ASTM D2596
Service temperature range: °C	-40 to 150	
Color	Yellow	

[Low Dust-Generating Performance Test Data]

● Comparison with other THK greases



[Extreme Pressure Resistance]



Lubrication

L450 Grease

THK Original Grease

L450 Grease

- Base oil: refined mineral oil
- Consistency enhancer: urea-based



L450 Grease is a 00-grade grease product for centralized lubrication* that provides excellent water resistance, oil film retention, and pumpability by using refined mineral oil as the base oil, a urea-based consistency enhancer, and special additives.

* L450 Grease can be used with SKF Japan Ltd.'s ECP Pump.

[Features]

(1) Water resistance

It is less vulnerable to moisture penetration than other types of grease because of its high water resistance.

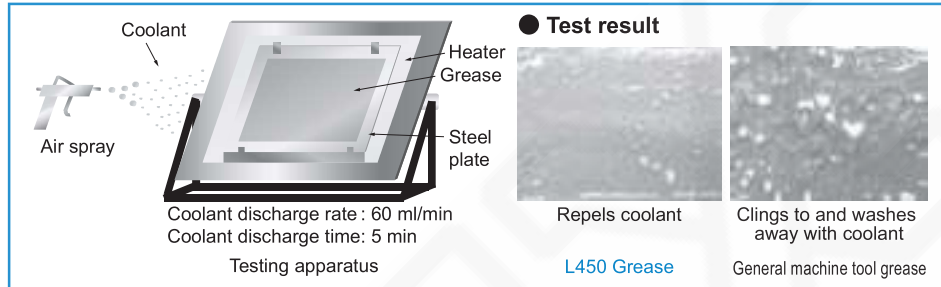
(2) Extreme pressure resistance

The action of its special additives gives it 1.5 times the extreme pressure resistance of general machine tool grease.

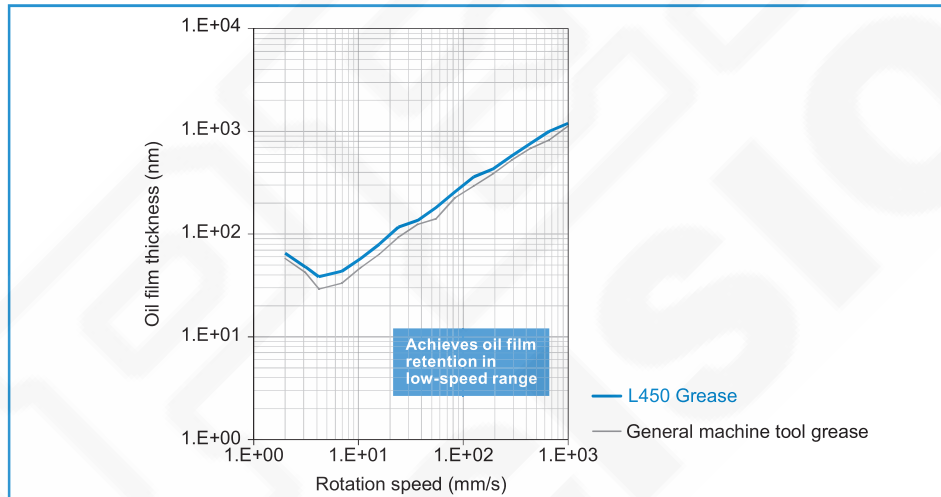
[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Urea-based	
Base oil	Refined mineral oil	
Base oil kinematic viscosity: mm ² /s (40°C)	136	JIS K 2220 23
Worked penetration (25°C, 60 W)	411	JIS K 2220 7
Mixing stability (100,000 W)	—	JIS K 2220 15
Dropping point: °C	247	JIS K 2220 8
Evaporation amount: mass% (99°C, 22 h)	0.3	JIS K 2220 10
Oil separation rate: mass% (100°C, 24 h)	10.7	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	JIS K 2220 9
Low-temperature torque: mN·m (-20°C)	Starting	JIS K 2220 18
	Rotational	
4-ball testing (welding load): N	2452	ASTM D2596
Service temperature range: °C	-40 to 150	
Color	Tan	

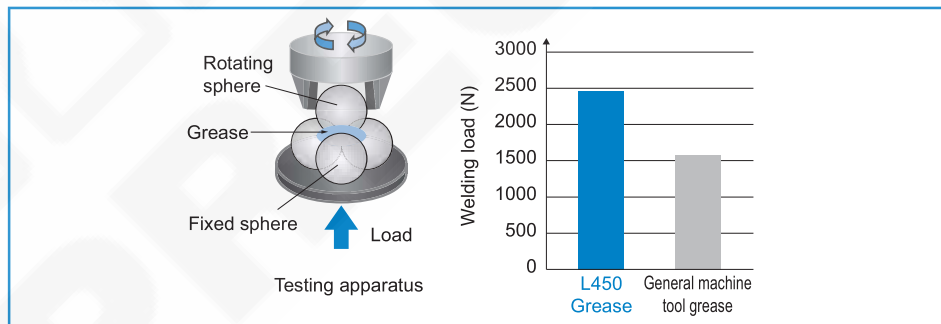
[Water Resistance (Washability Test Using Coolant)]



[Oil Film Retention (Oil Film Thickness Evaluation Test)]



[Extreme Pressure Resistance (High-Speed, 4-Ball Welding Load Test)]



Lubrication

L500 Grease

THK Original Grease

L500 Grease

- Base oil: refined mineral oil
- Consistency enhancer: lithium complex-based



L500 grease uses refined mineral oil as its base and lithium complex-based grease as its consistency enhancer, while also featuring special additives. It features excellent extreme pressure resistance and pumpability as well as a long service life.

*The packaging is scheduled to change (see photograph).

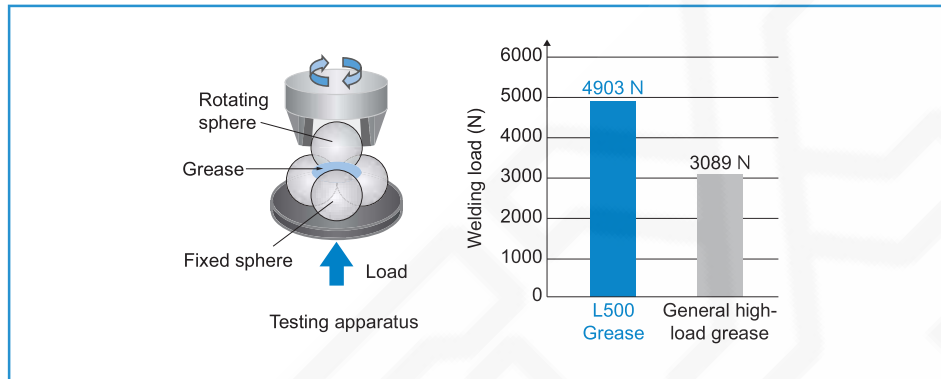
[Features]

- (1) Extreme pressure resistance
The action of the special additives gives it excellent extreme pressure resistance.
- (2) Long service life
It provides longer lasting lubrication than general high-load grease, helping reduce the amount of time spent on maintenance.
- (3) Pumpability
It boasts excellent pumpability, allowing it to be used with automatic lubricating systems.

[Representative Physical Properties]

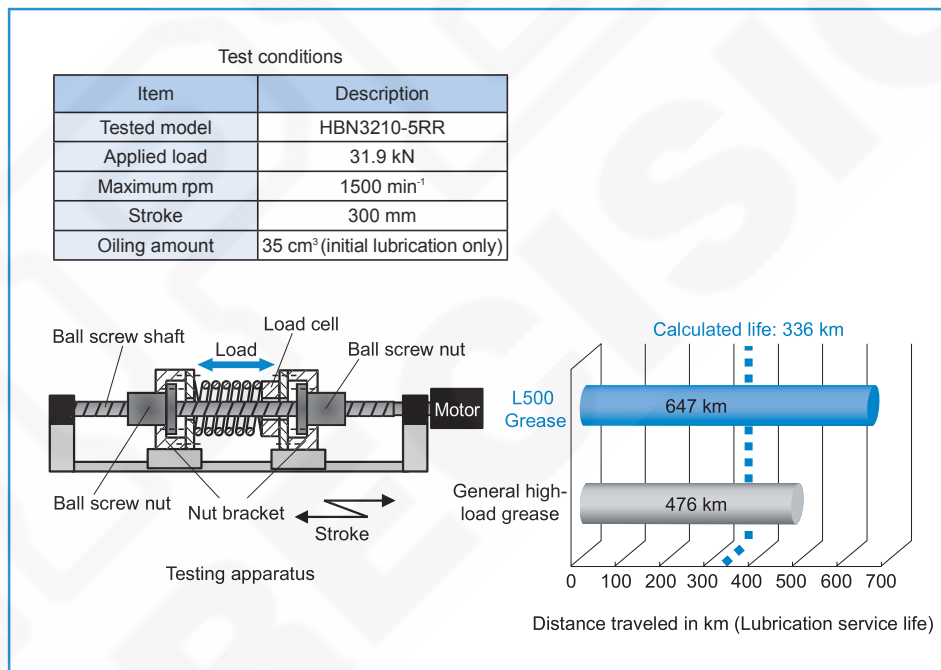
Item	Representative value	Test method
Consistency enhancer	Lithium complex-based	
Base oil	Refined mineral oil	
Base oil kinematic viscosity: mm ² /s (40°C)	120	JIS K 2220 23
Worked penetration (25°C, 60 W)	327	JIS K 2220 7
Mixing stability (100,000 W)	365	JIS K 2220 15
Dropping point: °C	250	JIS K 2220 8
Evaporation amount: mass% (99°C, 22 h)	0.4	JIS K 2220 10
Oil separation rate: mass% (100°C, 24 h)	2.5	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	JIS K 2220 9
Low-temperature torque: mN·m (-20°C)	Starting	JIS K 2220 18
	Rotational	
4-ball testing (welding load): N	4903	ASTM D2596
Service temperature range: °C	-20 to 175	
Color	Yellow	

[Extreme Pressure Resistance]



[Long Service Life]

- Lubrication service life measured via ball screw



THK Original Grease

L700 Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: calcium sulfonate complex-based



L700 Grease is an H1 grease product certified and registered by NSF International.* Using a high-grade synthetic oil as the base oil in conjunction with a calcium sulfonate complex-based consistency enhancer, L700 Grease maintains excellent water and corrosion resistance and withstands extreme pressure. It is intended for use in medical, pharmaceutical, and food equipment.

* A third party certification body for matters related to public safety and health

[Features]

(1) NSF-certified

L700 Grease is an H1 grease product certified and registered by NSF International (NSF H1).

(2) Water and corrosion resistance

Calcium sulfonate (the consistency enhancer) makes L700 Grease more resistant to water and corrosion than ordinary H1 grease.

(3) Extreme pressure resistance

L700 Grease displays better extreme pressure resistance than general-purpose grease.

[Representative Physical Properties]

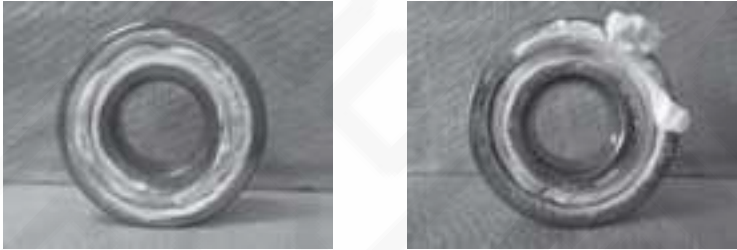
Item	Representative value	Test method
Consistency enhancer	Calcium sulfonate complex-based	
Base oil	High-grade synthetic oil	
Base oil kinematic viscosity: mm ² /s (40°C)	89	JIS K 2220 23
Worked penetration (25°C, 60 W)	314	JIS K 2220 7
Mixing stability (100,000 W)	324	JIS K 2220 15
Dropping point: °C	250	JIS K 2220 8
Evaporation amount: mass% (99°C, 22 h)	0.15	JIS K 2220 10
Oil separation rate: mass% (100°C, 24 h)	2.9	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	JIS K 2220 9
Low-temperature torque: mN-m (-20°C)	Starting	JIS K 2220 18
	Rotational	
4-ball testing (welding load): N	3922	ASTM D2596
Service temperature range: °C	-40 to 200	
Color	Tan	

[Water Resistance]

- Leakage comparison with ordinary H1 grease by rotating a bearing containing grease mixed with 10 mass% of water

Test conditions	
Item	Description
Bearing	JIS B 1521 6204, Open type, Class 0, C3 clearance
Water content	10% of the grease weight
Rpm	600 min ⁻¹
Test duration	60 min

Test result



L700 Grease Ordinary H1 grease

[Low Sliding Resistance]

- Measurement of sliding resistance when an LM Guide is injected with grease and operated at low speed to high speed

