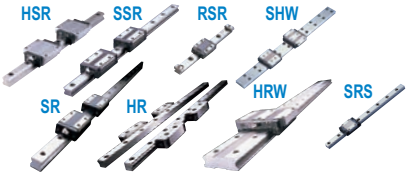
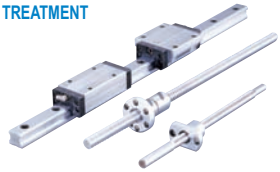
Protecting an LM System

An LM System may be used in a variety of environments. If using an LM System in a special environment such as a vacuum, a corrosive environment, or extreme heat or cold, it is necessary to select a material and surface treatment that suit the service environment.
To support use in various special environments, THK offers the following materials and surface treatments for each type of LM System.

	Description	Model No.	Features and capabilities
Material	Martensitic stainless steel	HSR SSR RSR SHW SR HR HRW SRS 	Corrosion resistance ★★★
Material	Martensitic stainless steel	SR-M1 HSR-M1 RSR-M1 	High temperature ★★★★★ Note: up to 150℃
Material	Austenitic stainless steel	HSR-M2 	Corrosion resistance ★★★★★
Surface treatment	AP-HC	THK AP-HC TREATMENT 	Low dust generation ★★★★★ Corrosion resistance ★★★ Surface hardness ★★★★★
Surface treatment	AP-C	THK AP-C TREATMENT 	Corrosion resistance ★★★★
Surface treatment	AP-CF	THK AP-CF TREATMENT 	Corrosion resistance ★★★★★

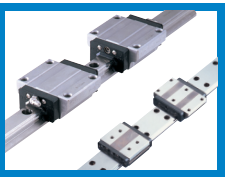
Note: If you desire a surface treatment other than the above, contact THK.

Selecting a Material

When operating under normal service conditions, THK's linear motion products use types of steel best suited to use in an LM System. However, if using an LM System in a special environment, it is necessary to select a material that suits the service environment.
For locations that require corrosion resistance, stainless steel is used.

Material Specifications
Stainless Steel Products

●Material: Martensitic stainless steel, austenitic stainless steel, or THK-EX50



For use in environments where corrosion resistance is required, some LM System models can use martensitic or austenitic stainless steel.
THK has also developed THK-EX50, a martensitic stainless steel material that meets JIS corrosion resistance standards, specifically for LM systems.
Furthermore, this material can achieve the hardness required of an LM system, and so offers exceptional service life.
If the model number of an LM System contains symbol M, it means that the model is made of stainless steel. See the section concerning the corresponding model.

Model number coding

HSR25 C 2 QZ UU C0 M +1200L P M -II

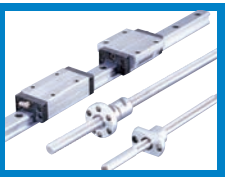
- HSR25: Model number
- C: Type of LM block
- 2: No. of LM blocks used on the same rail
- QZ: With QZ Lubricator
- UU: Contamination protection option
- C0: Radial clearance symbol
- M: Stainless steel LM block
- +1200L: LM rail length (mm)
- P: Accuracy symbol
- M: Stainless steel LM rail
- -II: Symbol for No. of rails used on the same plane

Surface Treatment

The surfaces of the rails and shafts of an LM System can be treated for anti-corrosive or aesthetic purposes.
THK offers THK-AP treatment, which is the optimum surface treatment for an LM System.
The THK-AP treatment consists of the following three types.

AP-HC

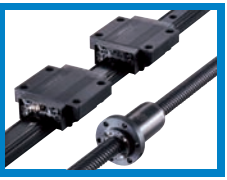
●**Surface treatment: industrial-use hard chrome plating**
●**Film hardness: 750 HV or higher**



Equivalent to industrial-use hard chrome plating, AP-HC achieves almost the same level of corrosion resistance as martensitic stainless steel. In addition, it is highly resistant to wear since the film is extremely hard, 750 HV or higher.

AP-C

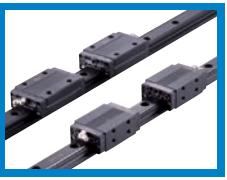
●**Surface treatment: industrial-use black chrome coating**



A type of industrial-use black chrome coating designed to increase corrosion resistance. It achieves lower cost and higher corrosion resistance than martensitic stainless steel.

AP-CF

●**Surface treatment: industrial-use black chrome coating/ special fluorocarbon resin coating**



A compound surface treatment that combines black chrome coating and special fluorine resin coating and is suitable for applications requiring high corrosion resistance.
In addition to the above options, other surface treatments are sometimes performed on areas other than the raceways, such as alkaline coloring treatment (black oxidizing) and colored alumite treatment. However, some of them are not suitable for use in an LM System. For details, contact THK.
If using an LM System whose raceways are surface treated, set a higher safety factor.

Model number coding

SR15 V 2 F + 640L F

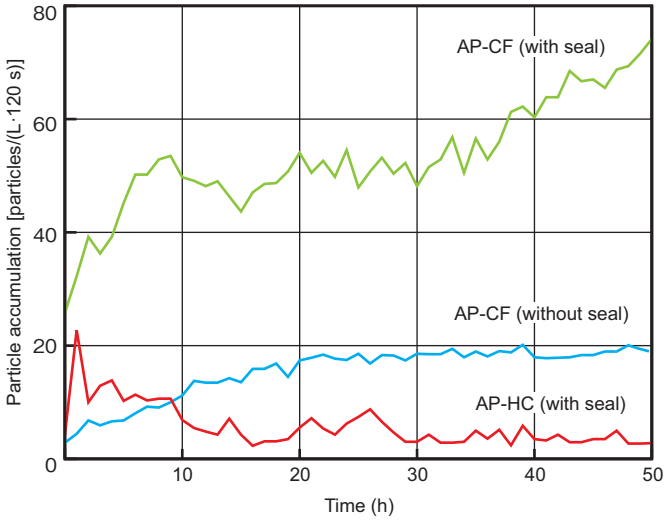
- SR15: Model number
- V: Type of LM block
- 2: No. of LM blocks used on the same rail
- F: With surface treatment on the LM block
- 640L: LM rail length (mm)
- F: With surface treatment on the LM rail

Note: Note that the inside of the mounting hole is not provided with surface treatment.

Data on Comparison of Dust Generation with AP Treatment

Test Conditions

Item	Description
LM Guide model number	SSR20WF+280LF (AP-CF, without seal)
	SSR20UUF+280LF (AP-CF, with seal)
	SSR20WUUF+280LF (AP-HC, with seal)
Grease used	THK AFE-CA Grease
Grease volume	1 cc (per LM block)
Speed	30 m/min (max)
Stroke	200 mm
Flow rate during measurement	1 L/120 s
Clean room volume	1.7 L (acrylic casing)
Measuring instrument	Dust counter
Measured particle diameter	0.3 μm or more



THK AP-HC treatment provides high surface hardness and has high wear resistance. The high level of wear in the early stage in the graph above is considered to be due to the initial wear of the end seal.

Note: THK AP-HC treatment (equivalent to hard chrome plating)
THK AP-CF treatment (equivalent to black chrome plating + fluorine resin coating)

Data on Comparison of Rust Prevention

Salt-Water Spray Resistance Cycle Test

Item	Description
Spray liquid	1% NaCl solution
Cycles	Spraying for 6 h, drying for 6 h
Temperature conditions	35℃ during spraying
	60℃ during drying

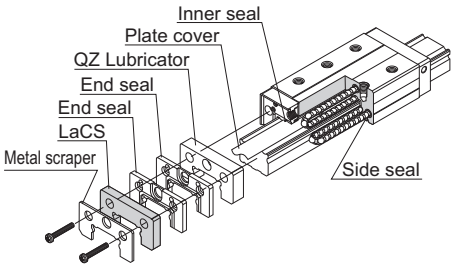
Specimen material / Time		Austenitic stainless steel	Martensitic stainless steel	THK AP-HC	THK AP-C	THK AP-CF
Before test						
6 hours						
24 hours						
96 hours						
Test results	Anti-rust property	◎	○	○	◎	◎
	Wear resistance	○	◎	◎	△	○
	Surface hardness	△	◎	◎	△	△
	Adherence	—	—	◎	△	○
	Appearance	Metallic luster	Metallic luster	Metallic luster	Black luster	Black luster

Contamination Protection

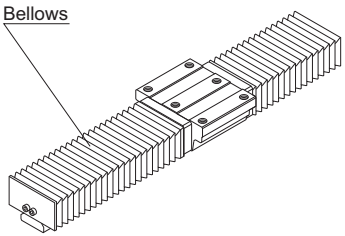
Contamination protection is the most important factor in using an LM System. Entrance of dust or other foreign material into the LM System will cause abnormal wear or shorten the service life. Therefore, when entrance of dust or other foreign material is a possibility, it is necessary to select a sealing device or contamination protection option that meets the service environment conditions.

(1) Dedicated seals for use in an LM System
Seals made of special synthetic rubber with high wear resistance (e.g., Laminated Contact Scraper LaCS) and a wiper ring are available as contamination protection seals for an LM System.
For locations with severe environments, dedicated bellows and dedicated covers are available for some models.
For details and the symbols that represent these seals, see the section concerning options (contamination protection) for the corresponding model.
To provide contamination protection for ball screws in service environments subject to cutting chips and cutting fluids, it is advisable to use a telescopic cover that protects the whole system and a large-sized bellows.

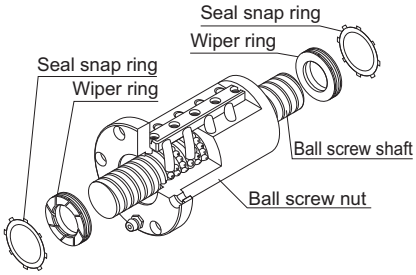
(2) Dedicated bellows
Standardized bellows are available for the LM Guide.
THK also manufactures dedicated bellows for other LM System products such as ball screws and ball splines. Contact THK for details.



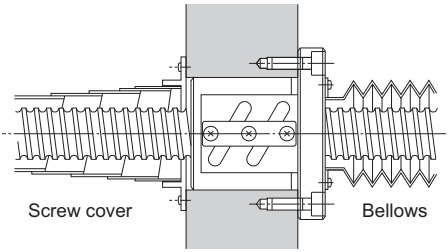
Contamination Protection Seals for the LM Guide



Dedicated Bellows for the LM Guide



Wiper Ring for the Ball Screw



Contamination Protection Cover for the Ball Screw