

6.3. Dust Prevention

When foreign matter enters an LM system, it will cause abnormal wear or shorten the service life, and it is necessary to prevent foreign matter from entering the system. Therefore, when possible entrance of foreign matter is predicted, it is important to select an effective sealing device or dust-prevention device that meets the atmospheric conditions.

THK offers dust prevention accessories for LM Guides by model number, such as end seals made of special synthetic rubber with high wear resistance, and side seals and inner seals for further increasing dust-prevention effect.

In addition, for locations with adverse atmosphere, Laminated Contact Scraper LaCS and dedicated bellows are available by model number. Also, THK offers dedicated caps for LM rail mounting holes, designed to prevent cutting chips from entering the LM rail mounting holes.

When it is required to provide dust prevention for a Ball Screw in an atmosphere exposed to cutting chips and moisture, we recommend using a telescopic cover that protects the whole system or a large bellows.

6.3.1. Dust Prevention Accessories

THK offers various dust prevention accessories.

Dedicated Caps for LM Rail Mounting Holes

If any of the LM rail mounting holes of an LM Guide is filled with cutting chips or foreign matter, they may enter the LM block structure. Entrance of such foreign matter can be prevented by covering each LM rail mounting hole with the dedicated cap.

Since the dedicated cap C for LM rail mounting holes uses a special synthetic resin with high oil resistance and high wear resistance, it is highly durable. Different sizes of the dedicated cap C are in stock as standard for hexagon socket bolts of M3 to M22.

To attach the dedicated cap to the mounting hole, place a flat metal piece like one shown in Fig. 12 on the cap and gradually hammer in the cap until it is on the same level as the top face of the LM rail.

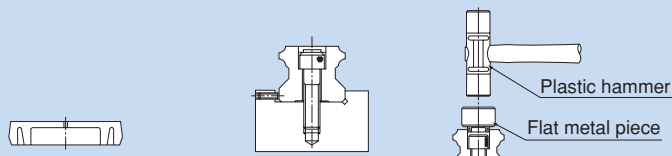


Fig. 12 Cap C

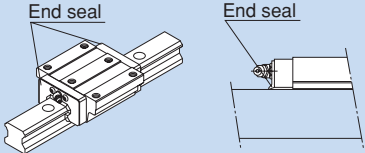
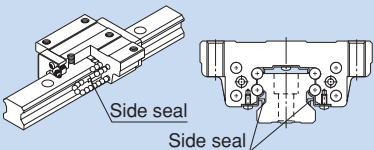
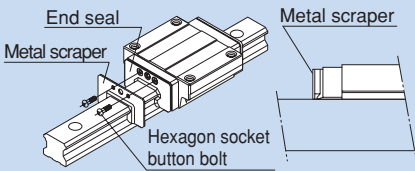
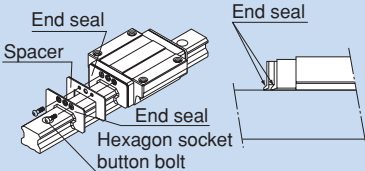
Note: When attaching the dedicated cap C for LM rail mounting holes, do not remove any of the LM blocks from the LM rail.

Table 5 List of Model Numbers Supported for the Dedicated Cap C for LM Rail Mounting Holes

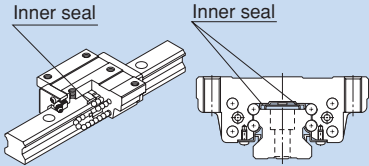
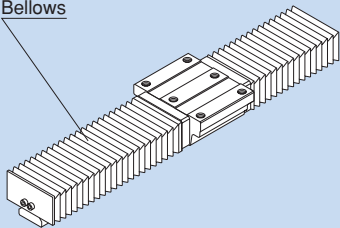
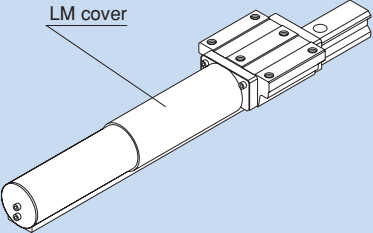
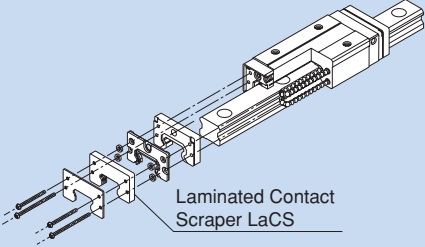
| Model No. | Supported model No. | | | | | | | | | | | |
|-----------|---------------------|-----------|---------|--------|-------------------|------------------------|----------|-----|--------------|-------------|-------------------|----------|
| | SSR | SR | SNR SNS | NR NRS | SHS, HSR CSR, HCR | SHW HRW | SRG SRN | GSR | HR | SRS RSR RSH | SRS-W RSR-W RSH-W | NSR-TBC |
| C3 | — | 15 | — | — | 12 | — | — | — | 1123 1530 | 12 15 | 9 | — |
| C4 | 15Y | — | — | — | 15 | 12, 14, 17, 21, 27, | — | 15 | 2042 | — | — | — |
| C5 | 20 | 20 | 25 | 25X | 20 | — | — | 20 | — | 20 | — | 20 |
| C6 | 25Y 30 | 25Y 30 | 30 | 30 | 25 | 35 | 25 | 25 | — | 25 | — | 25 30 |
| C8 | 35 | 35 | 35 | 35 | 30 35 | 50 | 30 35 | 30 | 2555 3065 | — | — | 40 |
| C10 | — | 45 | — | — | — | 60 | — | 35 | 3575 | — | — | 50 |
| C12 | — | 55 | 45 | 45 | 45 | — | 45 | — | 4085 | — | — | 70 |
| C14 | — | — | 55 | 55 | 55 | — | 55 | — | — | — | — | — |
| C16 | — | 70 85 | 65 | 65 | 65 | — | 65 | — | 50105 | — | — | — |
| C22 | — | — | — | 85 | 85 | — | — | — | — | — | — | — |

Seals, Scrapers and Bellows

The following dust prevention accessories are also available.

| Item name | Schematic diagram / mounting location | Purpose/location of use |
|---------------|---|---|
| End seal |  | Used in locations exposed to dust |
| Side seal |  | Used in locations where dust may enter the LM block from the side or bottom surface, such as vertical, horizontal and inverted mounts |
| Metal scraper |  | Used in locations where welding spatter may adhere to the LM rail |
| Double seals |  | Used in locations exposed to much dust or many cutting chips |

Note: Some of the dust prevention accessories cannot be used depending on the LM Guide model. For details, see the sections on the subject model in the "THK General Catalog - Product Specifications," provided separately.

| Item name | Schematic diagram / mounting location | Purpose/location of use |
|--------------------------------|---|---|
| Inner seal |  | Used in locations severely exposed to dust or cutting chips |
| Dedicated bellows |  | Used in locations exposed to dust or cutting chips |
| Dedicated LM cover |  | Used in locations exposed to dust or cutting chips Used in locations where high-temperature foreign matter such as spatter flies |
| Laminated Contact Scraper LaCS |  | Used in harsh environments exposed to foreign matter such as fine dust and liquids |

Note: For details of dust prevention accessories, see the sections on the corresponding model numbers in the "THK General Catalog - Product Specifications," provided separately.

Plate Cover SV and Steel Tape SP

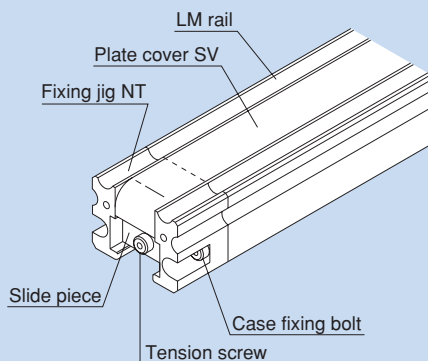
To increase the dust preventive capability of an LM Guide, it is necessary to increase sealability of the end seals and prevent foreign matter, such as cutting chips and dust, and a coolant from penetrating through the LM rail mounting holes. THK's plate cover and steel tape outperform conventional bolt hole plugs in the following properties.

- ① Drastically increased workability (long-size)
- ② Drastically increased sealability

- The plate cover, made of a thin steel sheet, is secured with a tension given using a fixing jig.
 - The steel tape, consisting of a thin steel sheet with an adhesive tape, is affixed using the adhesive tape and secured with end pieces on both ends.
- The plate cover is available only for models SNR/SNS (35 to 65) and NR/NRS (35 to 100). The steel tape is available for small models SNR/SNS, SHS and NR/NRS as well as models HSR and SR.

●Plate Cover SV

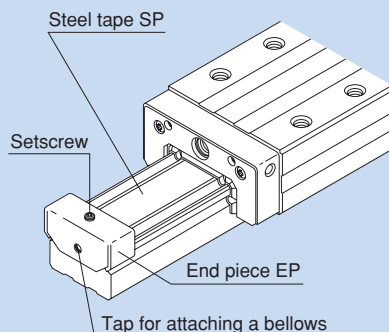
- Secured with fixing jig NT
(for SNR/SNS35 to 65)
(for NR/NRS35 to 100)



- Plate cover: SV
- Fixing jig: NT

●Steel Tape SP

- Secured with adhesive tape + end piece
(for SNR/SNS25 to 65)
(for NR/NRS25 to 100)
(for HSR15 to 100)
(for SR15 to 70)
(for SHS15 to 65)

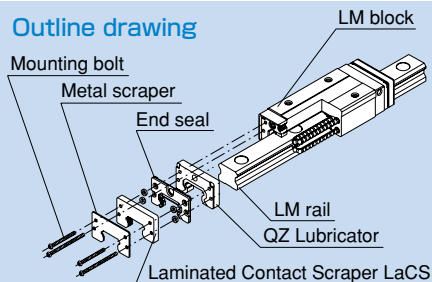


- Steel tape: SP
- End piece: EP

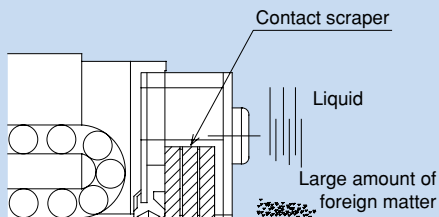
6.3.2. Laminated Contact Scraper LaCS® for the LM Guide®

LaCS removes minute foreign matter adhering to the LM rail in multiple stages and prevents it from entering the LM block with laminated contact structure (3-layer scraper).

Outline drawing



Structural drawing



Features

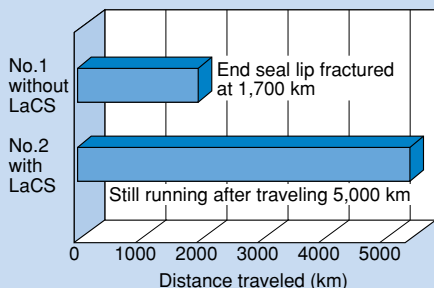
- Since the 3 layers of scrapers fully contact the LM rail, LaCS is highly capable of removing minute foreign matter.
- Since it uses oil-impregnated, foam synthetic rubber with a self-lubricating function, low friction resistance is achieved.

Test under an Environment with a Water-soluble Coolant

[Test conditions] Test environment: water-soluble coolant

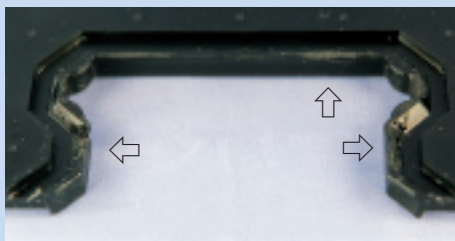
| Item | Description |
|--------------------------|---|
| Tested model | No.1 SHS45R1SS+3000L (end seal only) |
| | No.2 SHS45R1SSH+3000L (end seal and LaCS) |
| Max speed | 200m/min |
| Environmental conditions | Coolant sprayed: 5 times per day |

[Test result]



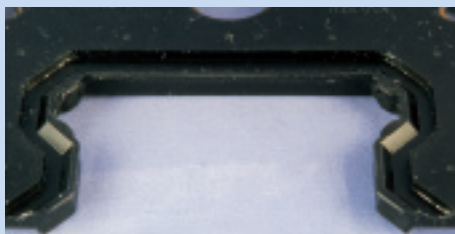
Magnified view of the end seal lip

No. 1: without LaCS; lip fractured at 1,700 km



↔Areas marked with arrow are fractured

No. 2: with LaCS; no anomaly observed after traveling 5,000 km



Lip has not been fractured

Test under an Environment with Minute Foreign Matter

[Test conditions] Test environment: minute foreign matter

| Item | Description | |
|---------------------------|--|------------------------------------|
| Tested model | No.1 | SNR45R1DD+600L (double seals only) |
| | No.2 | SNR45R1HH+600L (LaCS only) |
| Max speed/acceleration | 60m/min, 1G | |
| External load | 9.6kN | |
| Foreign matter conditions | Type:(particle diameter: 125 μ m or less) | |
| | Sprayed amount: 1g / 1hour (total sprayed amount: 120 g) | |

[Test result] Amount of foreign matter entering the raceway

| Seal configuration | | Amount of foreign matter entering the raceway g |
|---|----------------|---|
| Double-seal configuration (2 end seals superposed with each other) | Tested model 1 | 0.3 |
| | Tested model 2 | 0.3 |
| | Tested model 3 | 0.3 |
| LaCS | Tested model 1 | 0 |
| | Tested model 2 | 0 |
| | Tested model 3 | 0 |

No. 1 Traveled 100 km (double-seal configuration)



Large amount of foreign matter has entered the ball raceway

No. 2 Traveled 100 km (LaCS only)



No foreign matter entering the ball raceway observed