

Structure and Features of the Caged Ball LM Guide

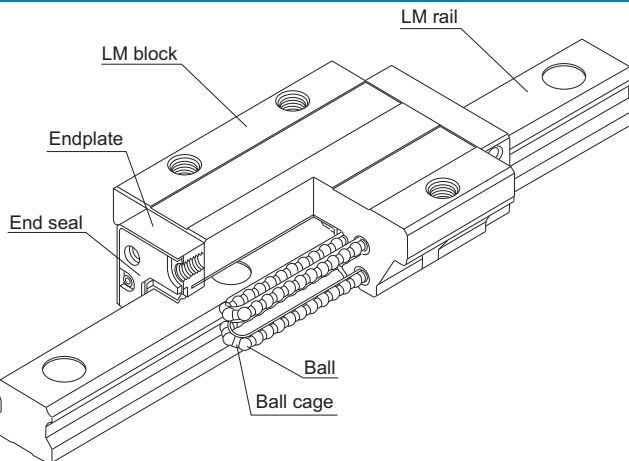


Fig.1 Structural Drawing of the Caged Ball LM Guide Model SHS

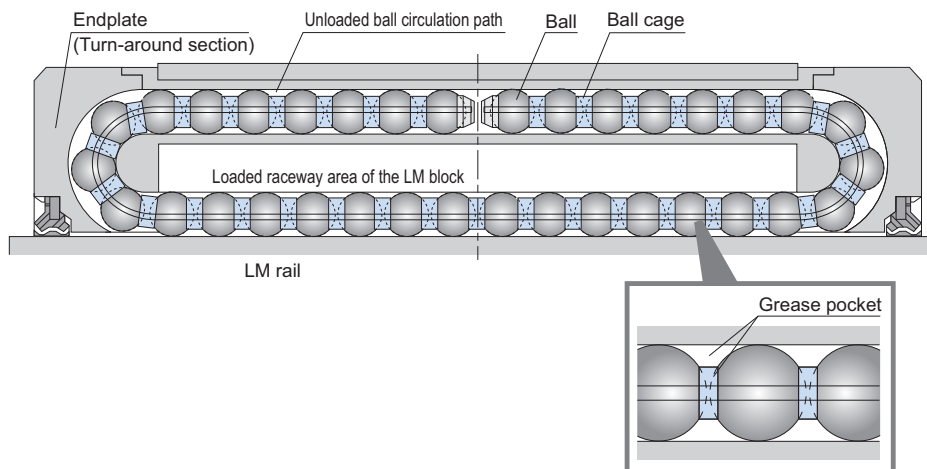


Fig.2 Circulation Structure inside the LM Block of the Caged Ball LM Guide

With the Caged Ball LM Guide, the use of a ball cage allows lines of evenly spaced balls to circulate, thus to eliminate friction between the balls.

In addition, grease held in a space between the ball circulation path and the ball cage (grease pocket) is applied on the contact surface between each ball and the ball cage as the ball rotates, forming an oil film on the ball surface. As a result, an oil film is not easily broken.

Advantages of the Ball Cage Technology

- (1) The absence of friction between balls, together with increased grease retention, achieves long service life and long-term maintenance-free (lubrication-free) operation.
- (2) The absence of ball-to-ball collision achieves low noise and acceptable running sound.
- (3) The absence of friction between balls achieves low heat generation and high speed operation.
- (4) The circulation of lines of evenly spaced balls ensures smooth ball rotation.
- (5) The absence of friction between balls allows high grease retention and low dust generation.

[Long Service Life and Long-term Maintenance-free Operation]

● Data on Long Service Life and Long-term Maintenance-free Operation

Use of a ball cage eliminates friction between balls and increases grease retention, thus to achieve long service life and long-term maintenance-free operation.

[Condition]

Speed : 60m/min

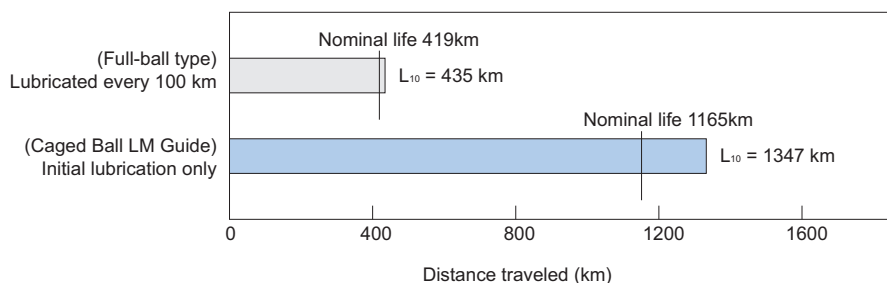
Stroke : 350mm

Acceleration: 9.8m/s²

Orientation : horizontal

Load : Caged Ball LM Guide : 11.1kN

Full-ball type : 9.8kN

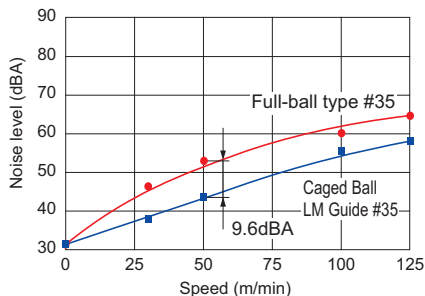


Caged Ball LM Guide and Full-Ball Type Durability Testing Data

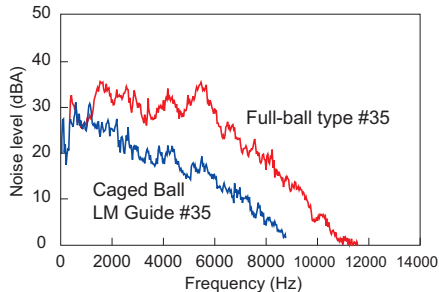
[Low Noise, Acceptable Running Sound]

● Noise Level Data

Since the ball circulation path inside the LM block is made of resin, metallic noise between balls and the LM block is eliminated. In addition, use of a ball cage eliminates metallic noise of ball-to-ball collision, allowing a low noise level to be maintained even at high speed.



Comparison of Noise Levels between Caged Ball LM Guide #35 and Full-Ball Type #35



Comparison of Noise Levels between Caged Ball LM Guide #35 and Full-Ball Type #35 (at speed of 50 m/min)

[High Speed]

● High-speed Durability Test Data

Since use of a ball cage eliminates friction between balls, only a low level of heat is generated and superhigh speed is achieved.

[Condition]

Model No. : Caged Ball LM Guide Model SHS65LVSS

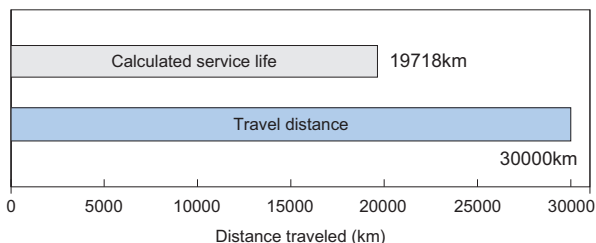
Speed : 200m/min

Stroke : 2500mm

Lubrication : initial lubrication only

Applied load: 34.5kN

Acceleration: 1.5G



Distance traveled (km)

SHS65LVSS High-speed Durability Test Data

Grease remains, and no anomaly is observed in the balls and grease.



Detail view of the ball cage

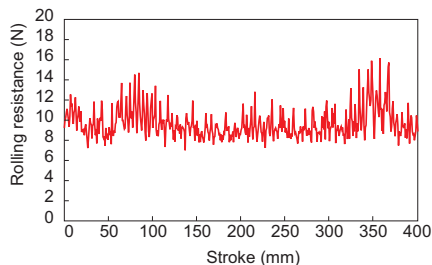
Features and Dimensions of Each Model

Structure and Features of the Caged Ball LM Guide

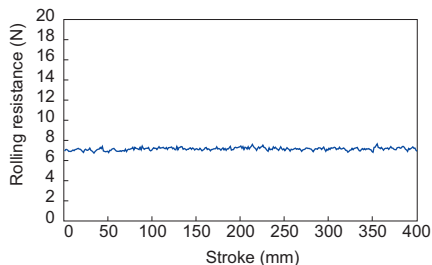
[Smooth Motion]

● Rolling Resistance Data

Use of a ball cage allows the balls to be uniformly aligned and prevents a line of balls from meandering as they enter the LM block. This enables smooth and stable motion to be achieved, minimizes fluctuations in rolling resistance, and ensures high accuracy, in any mounting orientation.



Rolling Resistance Fluctuation Data with Full-Ball Type #25
(Vertical-use feeding speed: 1 mm/s)

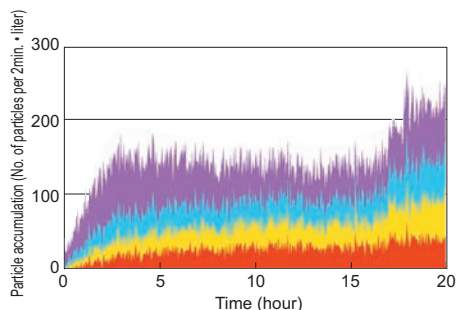
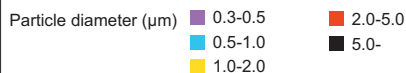


Rolling Resistance Fluctuation Data with Caged Ball LM Guide #25
(Vertical-use feeding speed: 1 mm/s)

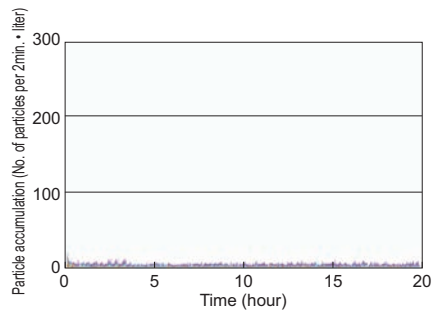
[Low dust generation]

● Low Dust Generation Data

In addition to friction between balls, metallic contact has also been eliminated by using resin for the through holes. Furthermore, the Caged Ball LM Guide has a high level of grease retention and minimizes fly loss of grease, thus to achieve superbly low dust generation.



Full-Ball Type Dust Generation Data



Caged Ball LM Guide Model SSR20
Dust Generation Data