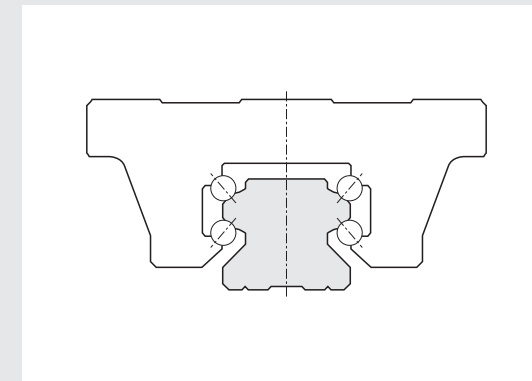


SBC LINEAR RAIL SYSTEM FEATURES

- Circular-Arc raceway structure achieves the high rigidity and large permissible load.
- Four row circular arc groove with 2 points contact creates the same load in all directions.
- DF structure maintains low instrumental errors.
- Low frictional coefficient achieves the high energy efficiency.
- Easy maintenance.
- Improve the productivity of the machine.
- Various options, Easy machine design and Longer life span.

Comparison the Linear Rail System with others

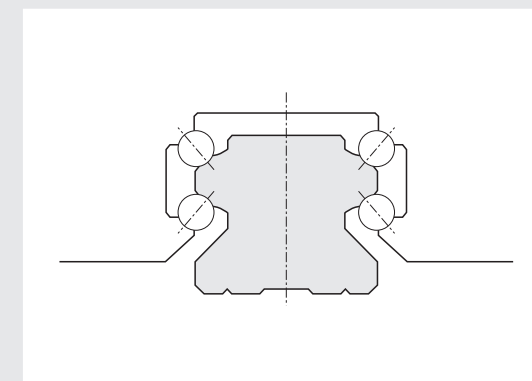
Item	Linear Rail System	Plane Ball System	Sliding Friction Guide
Assembly	Self-adjusting	△	Additional working need
Precision	Absorbing errors	X	Machining necessary
Maintenance	Various grease feeding	○	Hard to grease feeding
Sway	○	○	X
Impact	○	Low rating load	○
Moment	High rating load	Low rating load	Vulnerable to eccentric load



DF Structure

DF structure maintains low instrumental errors.

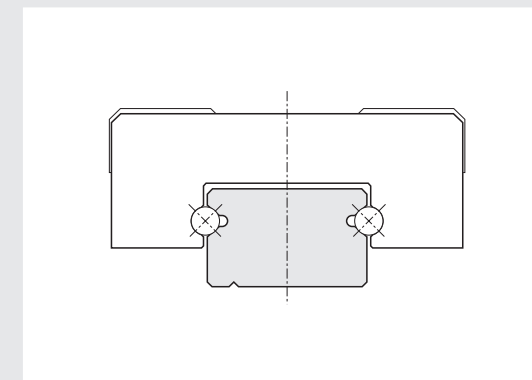
Applied model : SBI, SBG, SBS, SPG, SPS



The Structure of Raceway Groove and Ball Contact

Circular-Arc Groove, Four Raceway, Two-Point Contact Structure absorb the instrumental errors and create smooth movement even under high load operation.

Applied Model : SBI, SBG, SBS, SPG, SPS



Gothic-Arch Groove, Two Row, Four Point Contact Structure is not effective for absorbing errors but it is optimized for miniaturized machine which is necessary for smooth movement under high load condition.

Applied Model: SBM, SBML, SBMW

Load Rating & Life

Under normal conditions, the linear rail system can be damaged by metal fatigue as the result of repeated stress. The repeated stress causes flaking of the raceways and steel balls. The life of linear rail system is defined as the total travel distance that the linear rail system travels until flaking occurs.

Nominal Life : L (km)

We define the nominal life as the total distance of travel (L=km) without flaking by 90% of a group of an identical group of linear rail systems operating under the same condition.

[In case of ball]

$$L = \left(\frac{C}{P} \right)^3 \times 50\text{km}$$

- L : Nominal life
- P : Pay load
- C : Basic dynamic load rating

[In case of roller]

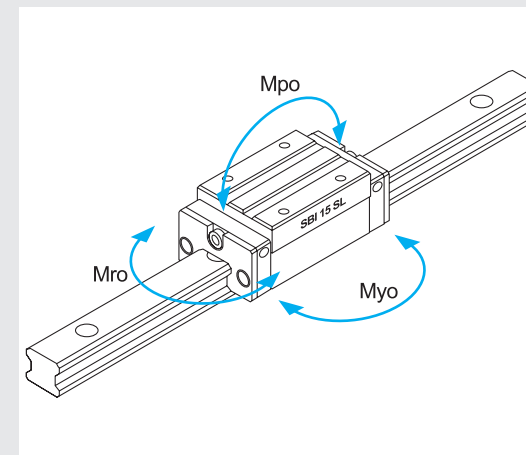
$$L = \left(\frac{C}{P} \right)^{\frac{10}{3}} \times 100\text{km}$$

Basic Dynamic Load Rating : C (kN)

The basic dynamic load rating C is a statistical number and it is based on 90% of the bearings surviving 50Km of travel carrying the full load.

Basic Static Load Rating : Co (kN)

If an excessive load or shock is applied to the linear rail system in the static or dynamic state, permanent but local deformation can occur to the steel balls and raceway. The Basic Static Load Rating is the maximum load the bearing can accept without affecting the dynamic life. This value is usually associated with a permanent deformation of the race way surface of 0.0001 time the ball diameter



Static Permissible Moment : Mo (kN.m)

These load are maximum moments or torque loads that can be applied to the bearing without damaging the bearing or affecting subsequent dynamic life.

- Mro : Moment in rolling direction
- Mpo : Moment in pitching direction
- Myo : Moment in yawing direction

Static Safety Factor : fs

When calculating a load exerted on the linear rail system, both mean load and maximum load need to be considered. Reciprocating machines create moment of inertia. When selecting the right linear rail system, consider all of the loads.

- Co : Basic Static Load Rating
- P : Pay Load
- Mo : Static Permissible Moment (Mpo, Mro, Myo)
- M : Pay Load Moment

$$f_s = \frac{C_o}{P} \quad (\text{Radial Load})$$

$$f_s = \frac{M_o}{M} \quad (\text{Moment Load})$$

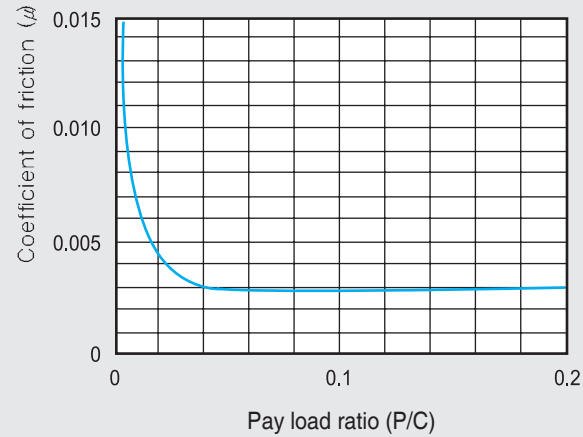
(Table, Static Safety Factor)

Operating	Load conditions	fs
Normally stationary	Impact load or machine deflection is small	1.0 ~ 1.3
	Impact or twisting load is applied	2.0 ~ 3.0
Normally moving	Normal load is exerted or machine deflection is small	1.0 ~ 1.5
	Impact or twisting load is applied	2.5 ~ 7.0

Frictional Resistance

The static and dynamic coefficient of friction of the SBC linear rail systems are so small that they minimize the required driving force and temperature increase. Frictional force depends on load, preload, velocity and lubrication. In general, the light load with high speed is more affected by the lubricant, while the medium or heavy load are more affected by the load and are less sensitive to lubrication selection.

*Coefficient of friction for linear rail system(μ) : 0.002~0.004



P : Load
C : Basic dynamic load rating

(Relationship between pay load and coefficient of friction)

Calculate comparison by different guide system

$$F = \mu \cdot P$$

- F : Frictional force
- μ : Coefficient of friction
- P : Load

(1) Linear rail system

P : 5000N

μ : 0.003

F = 0.003 x 5000N = **15N**

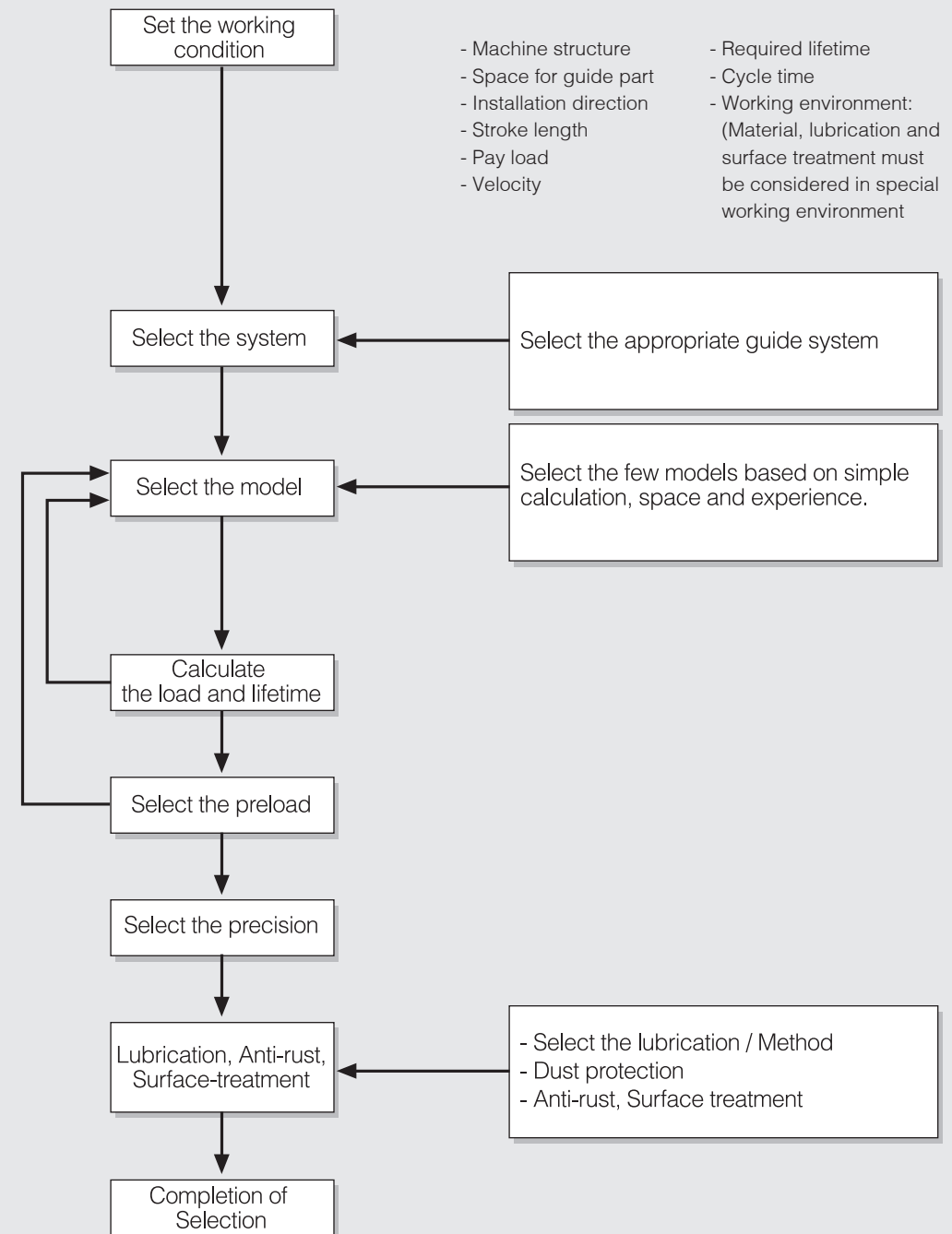
(2) Sliding linear rail system

P : 5000N

μ : 0.2

F = 0.2 x 5000N = **1000N**

The procedure of selecting linear rail system



Linear Rail System

Technical Data

Select the system / Model

1. Select System

Select the appropriate guide system after considering rigidity, cost of machine and manufacturing time.

2. Select Model

Select the few models based on simple calculation, space and experience.

3. Calculate the load and life time

Judge the expected life time after calculating the load and life time and apply the model to machine design.

3-1. Calculating the applied loads

Loads exerted on a linear rail system vary according to direction. It is important to consider this condition before selecting the type of linear rail systems and model. Refer to the below example when calculating the loads.

[Condition of calculating the applied load]

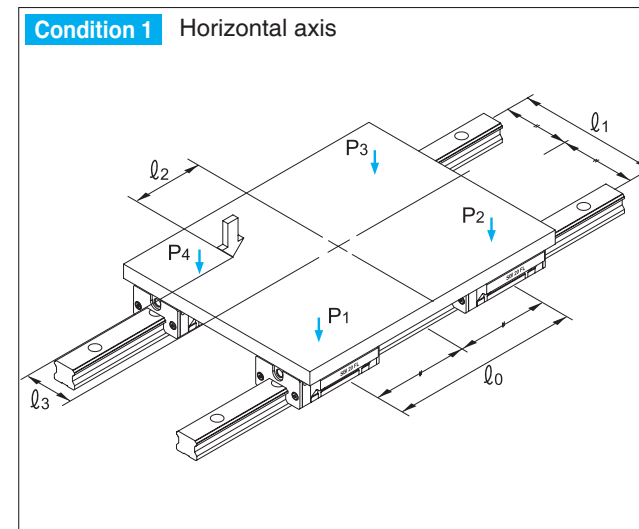
Select the few models after considering space and experience and simple calculation for working conditions.

- m (kg) : Load
- l_n (mm) : Distance(mm)
- P_n : Radial load
- P_{nT} : Lateral load
- g (m/s²) : Gravitational acceleration (=9.8 m/s²)
- V (m/s) : Velocity
- a_n (m/s²) : Acceleration

Linear Rail System

Technical Data

Calculating the applied loads and life time

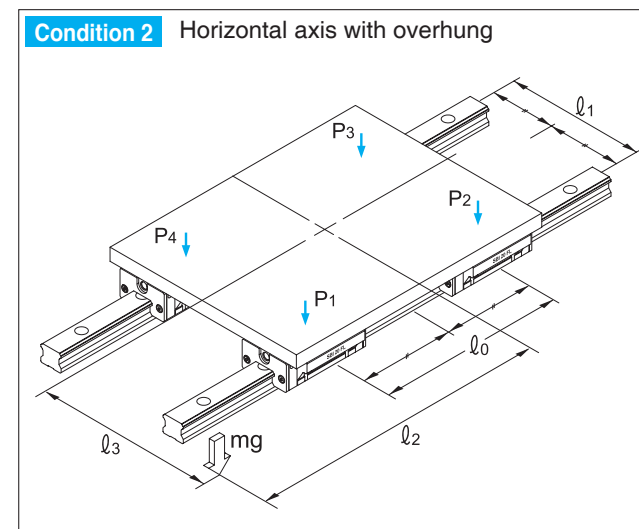


$$P_1 = \frac{mg}{4} + \frac{mg \cdot l_2}{2 \cdot l_0} - \frac{mg \cdot l_3}{2 \cdot l_1}$$

$$P_2 = \frac{mg}{4} - \frac{mg \cdot l_2}{2 \cdot l_0} - \frac{mg \cdot l_3}{2 \cdot l_1}$$

$$P_3 = \frac{mg}{4} - \frac{mg \cdot l_2}{2 \cdot l_0} + \frac{mg \cdot l_3}{2 \cdot l_1}$$

$$P_4 = \frac{mg}{4} + \frac{mg \cdot l_2}{2 \cdot l_0} + \frac{mg \cdot l_3}{2 \cdot l_1}$$



$$P_1 = \frac{mg}{4} + \frac{mg \cdot l_2}{2 \cdot l_0} + \frac{mg \cdot l_3}{2 \cdot l_1}$$

$$P_2 = \frac{mg}{4} - \frac{mg \cdot l_2}{2 \cdot l_0} + \frac{mg \cdot l_3}{2 \cdot l_1}$$

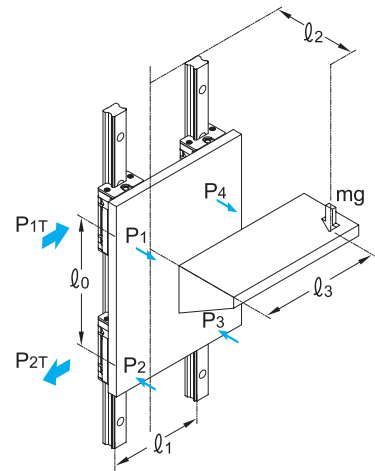
$$P_3 = \frac{mg}{4} - \frac{mg \cdot l_2}{2 \cdot l_0} - \frac{mg \cdot l_3}{2 \cdot l_1}$$

$$P_4 = \frac{mg}{4} + \frac{mg \cdot l_2}{2 \cdot l_0} - \frac{mg \cdot l_3}{2 \cdot l_1}$$

Linear Rail System

Technical Data

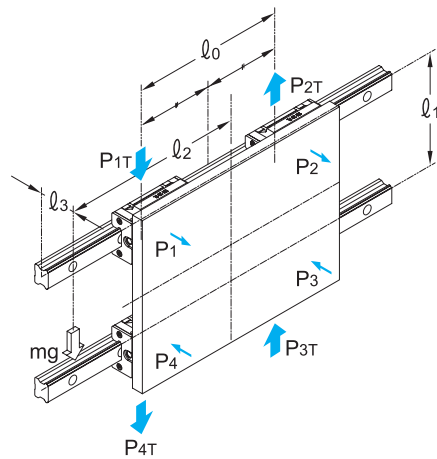
Condition 3 Vertical axis



$$P_1 \sim P_4 = \frac{mg \cdot l_2}{2 \cdot l_0}$$

$$P_{1T} \sim P_{4T} = \frac{mg \cdot l_3}{2 \cdot l_0}$$

Condition 4 Vertical axis with wall mounted



$$P_1 \sim P_4 = \frac{mg \cdot l_3}{2 \cdot l_1}$$

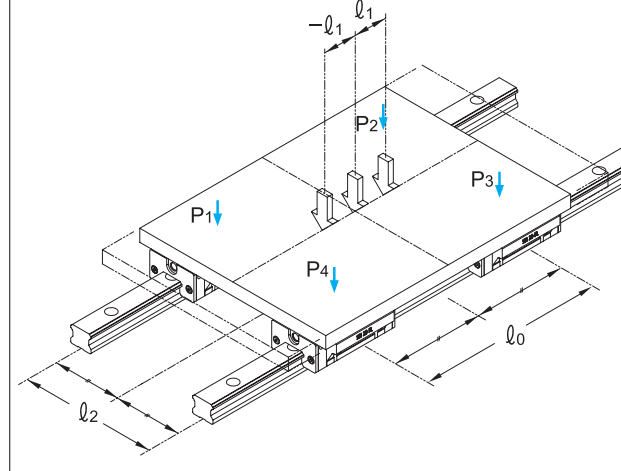
$$P_{1T} = P_{4T} = \frac{mg}{4} + \frac{mg \cdot l_2}{2 \cdot l_0}$$

$$P_{2T} = P_{3T} = \frac{mg}{4} - \frac{mg \cdot l_2}{2 \cdot l_0}$$

Linear Rail System

Technical Data

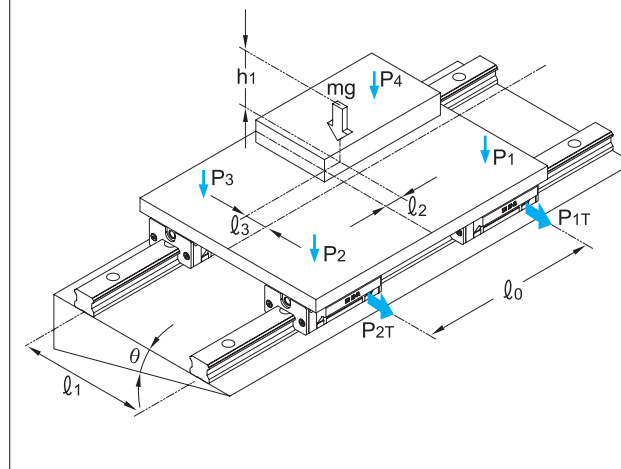
Condition 5 Horizontal axis with rail movable



$$P_1 \sim P_{4 \text{ (max)}} = \frac{mg}{4} + \frac{mg \cdot l_1}{2 \cdot l_0}$$

$$P_1 \sim P_{4 \text{ (min)}} = \frac{mg}{4} - \frac{mg \cdot l_1}{2 \cdot l_0}$$

Condition 6 Lateral axis



$$P_1 = \frac{mg \cdot \cos \theta}{4} + \frac{mg \cdot \cos \theta \cdot l_2}{2 \cdot l_0} - \frac{mg \cdot \cos \theta \cdot l_3}{2 \cdot l_1} + \frac{mg \cdot \sin \theta \cdot h_1}{2 \cdot l_1}$$

$$P_{1T} = \frac{mg \cdot \sin \theta}{4} + \frac{mg \cdot \sin \theta \cdot l_2}{2 \cdot l_0}$$

$$P_2 = \frac{mg \cdot \cos \theta}{4} - \frac{mg \cdot \cos \theta \cdot l_2}{2 \cdot l_0} - \frac{mg \cdot \cos \theta \cdot l_3}{2 \cdot l_1} + \frac{mg \cdot \sin \theta \cdot h_1}{2 \cdot l_1}$$

$$P_{2T} = \frac{mg \cdot \sin \theta}{4} - \frac{mg \cdot \sin \theta \cdot l_2}{2 \cdot l_0}$$

$$P_3 = \frac{mg \cdot \cos \theta}{4} - \frac{mg \cdot \cos \theta \cdot l_2}{2 \cdot l_0} + \frac{mg \cdot \cos \theta \cdot l_3}{2 \cdot l_1} - \frac{mg \cdot \cos \theta \cdot h_1}{2 \cdot l_1}$$

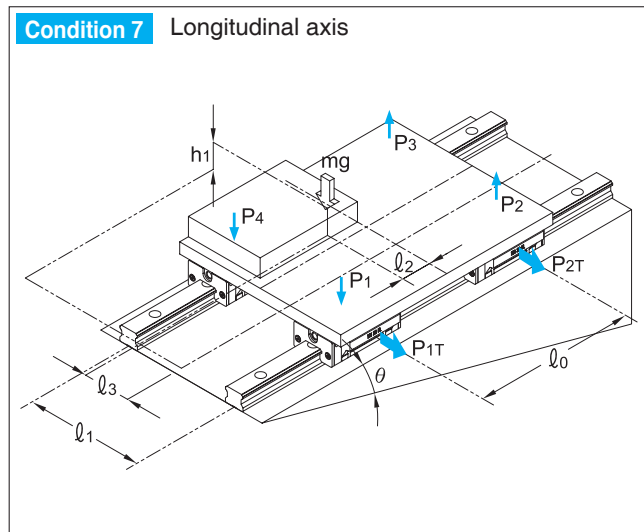
$$P_{3T} = \frac{mg \cdot \sin \theta}{4} + \frac{mg \cdot \sin \theta \cdot l_2}{2 \cdot l_0}$$

$$P_4 = \frac{mg \cdot \cos \theta}{4} + \frac{mg \cdot \cos \theta \cdot l_2}{2 \cdot l_0} + \frac{mg \cdot \cos \theta \cdot l_3}{2 \cdot l_1} - \frac{mg \cdot \sin \theta \cdot h_1}{2 \cdot l_1}$$

$$P_{4T} = \frac{mg \cdot \sin \theta}{4} + \frac{mg \cdot \sin \theta \cdot l_2}{2 \cdot l_0}$$

Linear Rail System

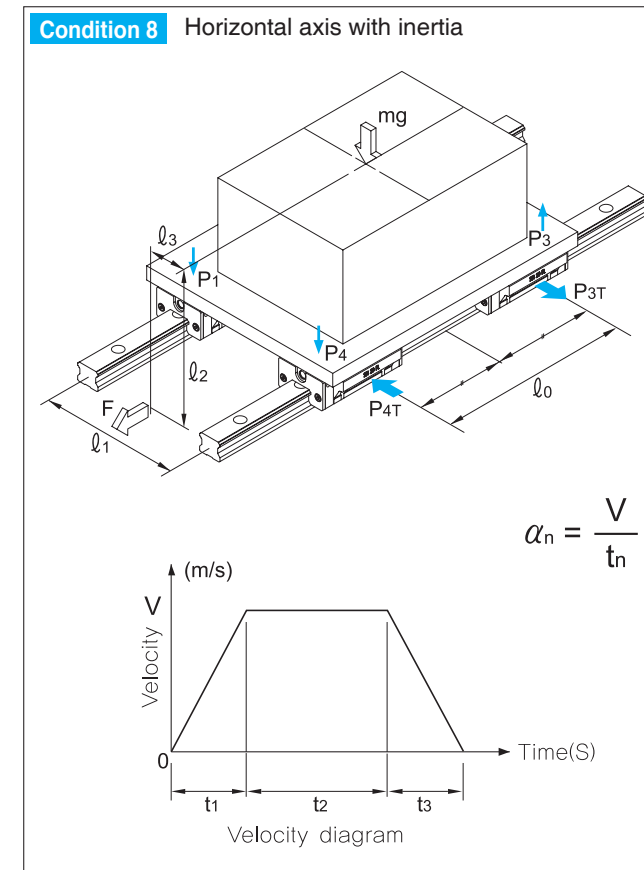
Technical Data



$$\begin{aligned}
 P_1 &= \frac{mg \cdot \cos\theta}{4} + \frac{mg \cdot \cos\theta \cdot l_2}{2 \cdot l_0} - \frac{mg \cdot \cos\theta \cdot l_3}{2 \cdot l_1} + \frac{mg \cdot \sin\theta \cdot h_1}{2 \cdot l_0} \\
 P_{1T} &= \frac{mg \cdot \cos\theta \cdot l_3}{2 \cdot l_0} \\
 P_2 &= \frac{mg \cdot \cos\theta}{4} - \frac{mg \cdot \cos\theta \cdot l_2}{2 \cdot l_0} - \frac{mg \cdot \cos\theta \cdot l_3}{2 \cdot l_1} - \frac{mg \cdot \sin\theta \cdot h_1}{2 \cdot l_0} \\
 P_{2T} &= \frac{mg \cdot \sin\theta \cdot l_3}{2 \cdot l_0} \\
 P_3 &= \frac{mg \cdot \cos\theta}{4} - \frac{mg \cdot \cos\theta \cdot l_2}{2 \cdot l_0} + \frac{mg \cdot \cos\theta \cdot l_3}{2 \cdot l_1} - \frac{mg \cdot \sin\theta \cdot h_1}{2 \cdot l_0} \\
 P_{3T} &= \frac{mg \cdot \sin\theta \cdot l_3}{2 \cdot l_0} \\
 P_4 &= \frac{mg \cdot \cos\theta}{4} + \frac{mg \cdot \cos\theta \cdot l_2}{2 \cdot l_0} + \frac{mg \cdot \cos\theta \cdot l_3}{2 \cdot l_1} + \frac{mg \cdot \sin\theta \cdot h_1}{2 \cdot l_0} \\
 P_{4T} &= \frac{mg \cdot \sin\theta \cdot l_3}{2 \cdot l_0}
 \end{aligned}$$

Linear Rail System

Technical Data



Acceleration

$$P_1 = P_4 = \frac{mg}{4} - \frac{m \cdot \alpha_1 \cdot l_2}{2 \cdot l_0}$$

$$P_2 = P_3 = \frac{mg}{4} + \frac{m \cdot \alpha_1 \cdot l_2}{2 \cdot l_0}$$

$$P_{1T} \sim P_{4T} = \frac{m \cdot \alpha_1 \cdot l_3}{2 \cdot l_0}$$

In uniform motion

$$P_{1T} \sim P_{4T} = \frac{mg}{4}$$

Deceleration

$$P_1 = P_4 = \frac{mg}{4} + \frac{m \cdot \alpha_3 \cdot l_2}{2 \cdot l_0}$$

$$P_2 = P_3 = \frac{mg}{4} - \frac{m \cdot \alpha_3 \cdot l_2}{2 \cdot l_0}$$

$$P_{1T} \sim P_{4T} = \frac{m \cdot \alpha_3 \cdot l_3}{2 \cdot l_0}$$

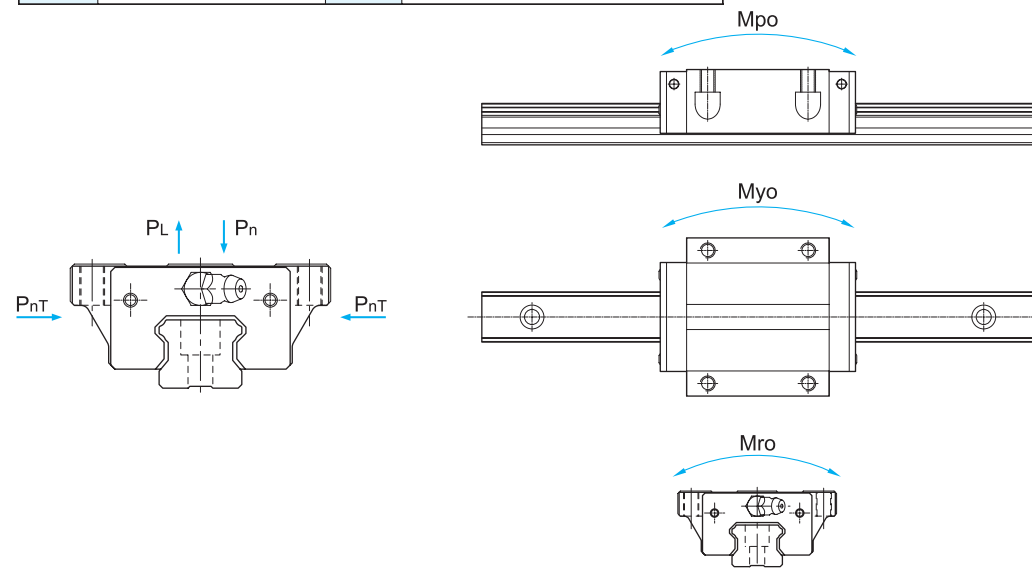
3-2. Calculating the Equivalent Load

Linear Rail Systems can accept normal and moment (M_{ro}, M_{po}, M_{yo}) loads in all directions including radial, reverse-radial and lateral loads at the same time. Therefore, calculate the equivalent load accordingly.

$$P_E \text{ (Equivalent load)} = P_n + P_{nT}$$

P_n : Vertical load
P_{nT} : Horizontal load

P _n	Radial load	M _{ro}	Moment in rolling direction
P _L	Reverse-radial load	M _{po}	Moment in pitching direction
P _{nT}	Lateral load	M _{yo}	Moment in yawing direction



3-3. Static Safety Factors (fs)

When calculating a load exerted on the linear rail system, both mean and maximum load need to be considered. Reciprocating machines create moment of inertia. When selecting the right linear rail system, consider all of loads.

Radial load is large	$\frac{f_H \cdot f_T \cdot f_C \cdot C_{oL}}{P_n} \geq f_s$
Reverse-radial load is large	$\frac{f_H \cdot f_T \cdot f_C \cdot C_{oR}}{P_L} \geq f_s$
lateral load is large	$\frac{f_H \cdot f_T \cdot f_C \cdot C_{oT}}{P_{nT}} \geq f_s$

- f_s : Static safety factor
- C_{o(N)} : Basic static load rating (radial)
- C_{oL(N)} : Basic static load rating (reverse-radial)
- C_{oT(N)} : Basic static load rating (lateral)
- P_{n(N)} : Calculated load (radial)
- P_{L(N)} : Calculated load (reverse-radial)
- P_{nT(N)} : Calculated load (lateral)
- f_H : Hardness factor
- f_T : Temperature factor
- f_C : Contact factor

[Value of static safety factor (fs)]

Operating	Load conditions	Lower limit of fs
Normally stationary	Impact load or machine deflection is small	1.0 ~ 1.3
	Impact or twisting load is applied	2.0 ~ 3.0
Normally moving	Normal load is exerted or machine deflection is small	1.0 ~ 1.5
	Impact or twisting load is applied	2.5 ~ 7.0

3-4. Calculating the Mean Load

Loads acting on a linear rail system can vary according to various conditions. All load conditions must be taken into consideration in order to calculate the required linear rail system capacity

[Equation for calculating the mean load]

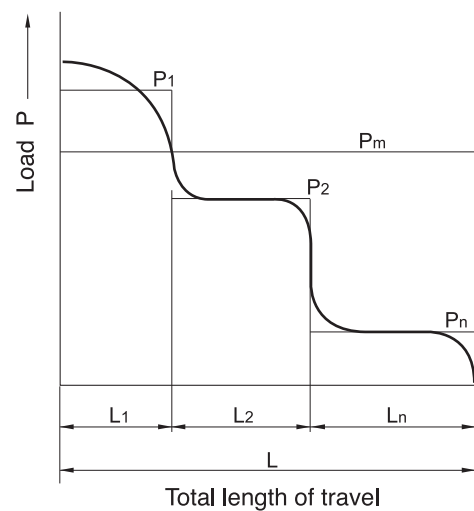
P_m : Mean load (N)
 P_n : Varying load (N)
 L : Total length of travel (mm)
 L_n : Length of travel carrying P_n (mm)

$$P_m = \sqrt[3]{\frac{1}{L} \cdot \sum_{m=1}^n (P_n^3 \cdot L_n)}$$

1) Step loads

$$P_m = \sqrt[3]{\frac{1}{L} (P_1^3 \cdot L_1 + P_2^3 \cdot L_2 + \dots + P_n^3 \cdot L_n)} \dots (1)$$

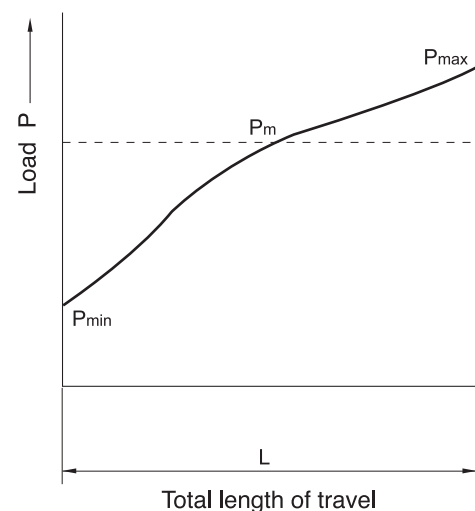
P_m : Mean load (N)
 P_n : Varying load (N)
 L : Total length of travel (mm)
 L_n : Length of travel carrying P_n (mm)



2) Loads that vary linearly

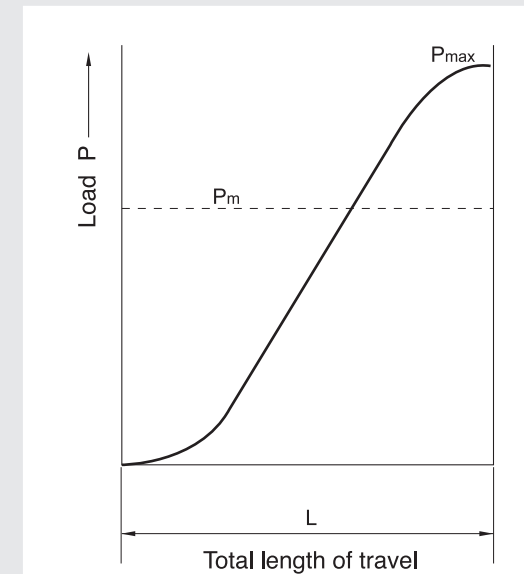
$$P_m \doteq \frac{1}{3} (P_{min} + 2 \cdot P_{max}) \dots (2)$$

P_{min} : Minimum load (N)
 P_{max} : Maximum load (N)

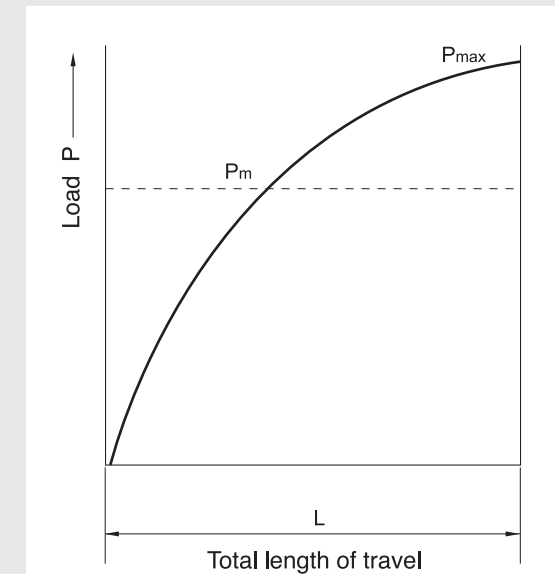


3) Loads varying sinusoidally

a) $P_m \doteq 0.65 P_{max} \dots (3)$



b) $P_m \doteq 0.75 P_{max} \dots (4)$



Technical Data

Technical Data

3-5. Life Calculation

The equation of nominal life for linear rail system is shown as below.

[Calculation of nominal life]

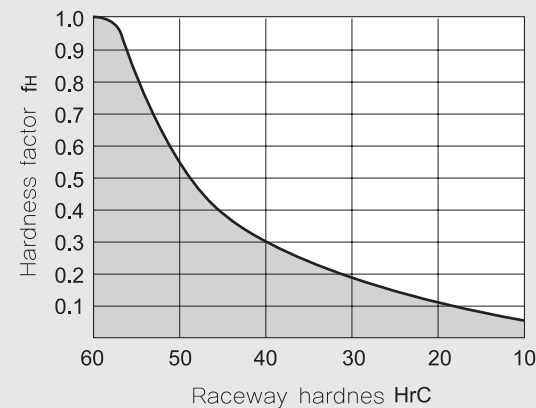
$$L = \left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P_C} \right)^3 \times 50$$

- L (km) : Nominal life
- P_C(N) : Calculated load
- C (N) : Basic dynamic load rating
- f_H : Hardness factor
- f_T : Temperature factor
- f_C : Contact factor
- f_W : Load factor

Hardness factor (f_H)

To optimize the load capacity of a linear rail system, the hardness of the rail should be HrC 58~62.

※ The value for linear rail system is normally 1.0 since the linear rail system has sufficient hardness.

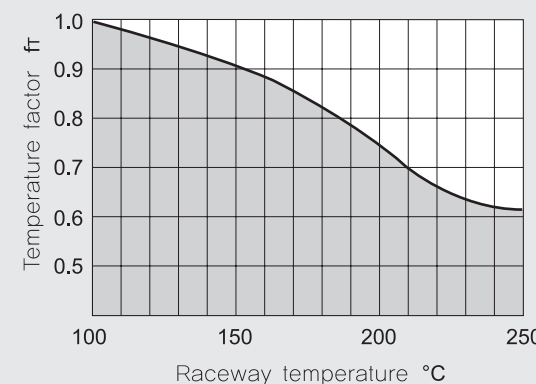


Temperature factor (f_T)

If the temperature of the linear rail system is over 100°C, The hardness of the block and rail will be reduced, and as the result, the temperature factor, f_T should be taken into Account.

※ The value for linear rail system is normally 1.0 when operation temperature is under 80°C.

※ Please contact us if you need linear rail system with over 80°C working condition.



Contact factor (f_C)

When two or more blocks are used in close contact, it is hard to obtain a uniform load distribution because of mounting errors and tolerances. The basic dynamic load C should be multiplied by the contact factors f_C shown here.

Number of blocks in close contact	Contact factor f _C
2	0.81
3	0.72
4	0.66
5	0.61
6 or more	0.6
Normal condition	1.0

Load factor (f_W)

Reciprocating machines create vibrations. The effects of vibrations are difficult to calculate precisely. Refer to the following table to compensate for these vibrations.

Vibration and Impact	Velocity (V)	Load factor f _W
Very slight	Very low V ≤ 0.25m/s	1 ~ 1.2
Slight	Low 0.25 < V ≤ 1.0m/s	1.2 ~ 1.5
Moderate	Medium 1.0 < V ≤ 2.0m/s	1.5 ~ 2.0
Strong	High V > 2.0m/s	2.0 ~ 3.5

[Life calculation]

When the nominal life (L) is calculated. The life of linear rail system can be calculated by following equation, if the stroke and reciprocating cycles per minute are constant.

- L_h (h) : Hours of nominal life
- L (km) : Nominal life
- ℓ_s (mm) : Stroke
- n₁ (min⁻¹) : Reciprocation cycles per minute

$$L_h = \frac{L \times 10^6}{2 \times \ell_s \times n_1 \times 60}$$

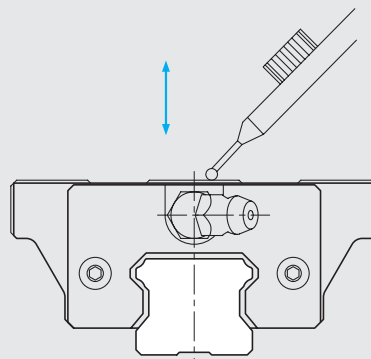
4. Rigidity

4-1. Radial-Clearance

The block side to side movement by vibration is called clearance.

Clearance checking

After mounting the linear rail system, move the block up and down then check the change of value.



4-2. Preload

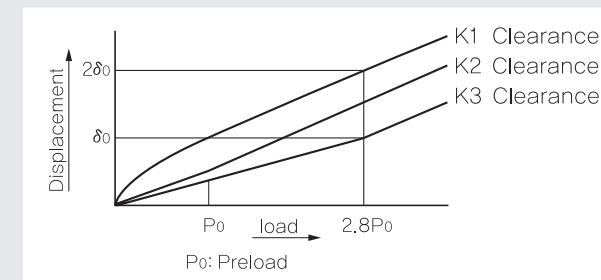
Preload affects the rigidity, internal-load and clearance. Also, it is very important to select appropriate preload according to applied load, impact and vibration expected in the application.

Preload	Conditions	Example
K3 [Heavy preload]	<input type="checkbox"/> Where rigidity is required, vibration and impact are present. <input type="checkbox"/> Engineered machinery for heavy equipment	<ul style="list-style-type: none"> ● Machining center ● NC lathe ● Grinding machine ● Milling machine ● Vertical axis of machine tool
K2 [Light preload]	<input type="checkbox"/> Where overhung loads or moment occur <input type="checkbox"/> Single axis operation. <input type="checkbox"/> Light load that requires precision.	<ul style="list-style-type: none"> ● Measuring equipment ● Electric discharge machine ● High speed material handling equipment ● NC drilling machine ● Industrial robot ● Z axis for general industrial equipment
K1 [Normal preload]	<input type="checkbox"/> Where the load direction is constant, impact and vibration are light. <input type="checkbox"/> Precision is not required	<ul style="list-style-type: none"> ● Welding machine ● Binding machine ● Automatic wrapping machine ● Material handling equipment

4-3. Rigidity

When the load is applied to Linear Rail Systems, the balls, blocks and rails experience the elastic deformation within permissible range. The ratio of displacement is known as the rigidity. The rigidity increases as the preload increases.

In case of four way equal load type, the preload is available until the load increases to some 2.8 times the preload applied.



$$K = \frac{P}{\delta}$$

K (N/ μ m) : Rigidity

δ (μ m) : Displacement

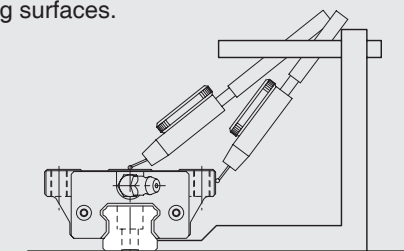
P (N) : Calculated load

5. Accuracy

Accuracy of linear rail system is generally defined by the running parallelism or the vertical and horizontal variations between the block and the rail mounting surfaces.

5-1. Running parallelism

It is tolerance of parallelism between reference of block and rail when the rail is mounted and block is moving in the whole length of rail.



5-2. Difference in Height

Difference in height between blocks on the same rail.

5-3. Difference in width

Difference in width between rail and blocks on the same rail

5-4. Accuracy level

Accuracy levels are divided into three type – **N**, **H** and **P**.

※See the dimension pages for each accuracy.

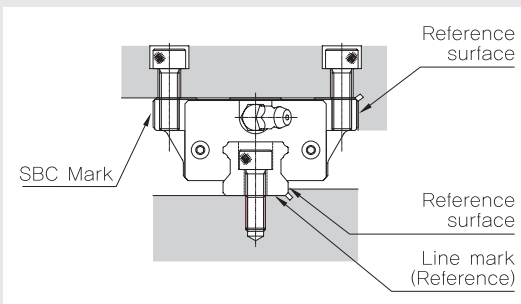
6. Design of system

Mounting method, tolerance of the mounting surfaces, and order in which the rails are mounted all affect the accuracy of machine. Therefore we recommend considering below conditions.

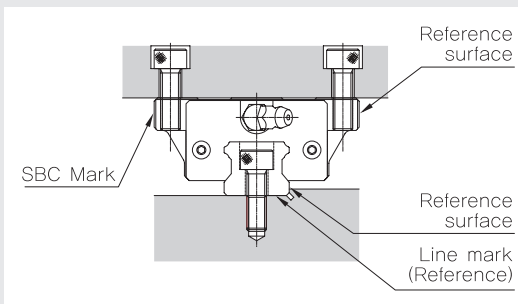
6-1. Identifying reference surface

The unmarked edge of the block and the lined edge of the rail define the reference surfaces. Please note the methods below for locating these surfaces in your design.

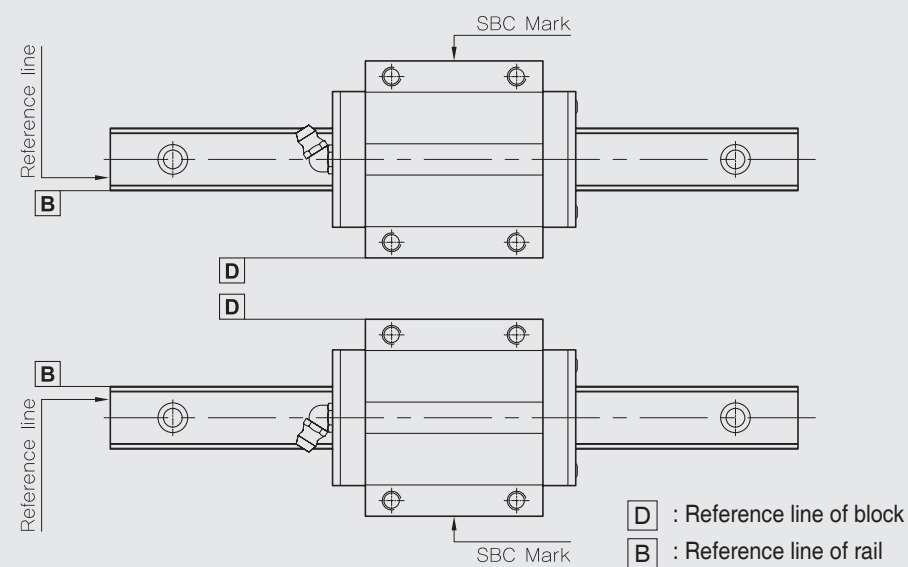
[Master linear rail system]



[Subsidiary linear rail system]



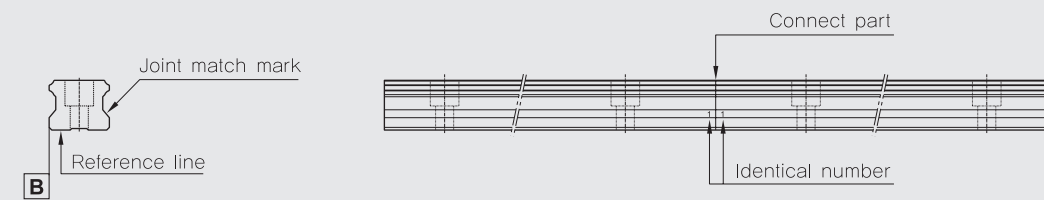
[Example of identifying reference line for pair usage]



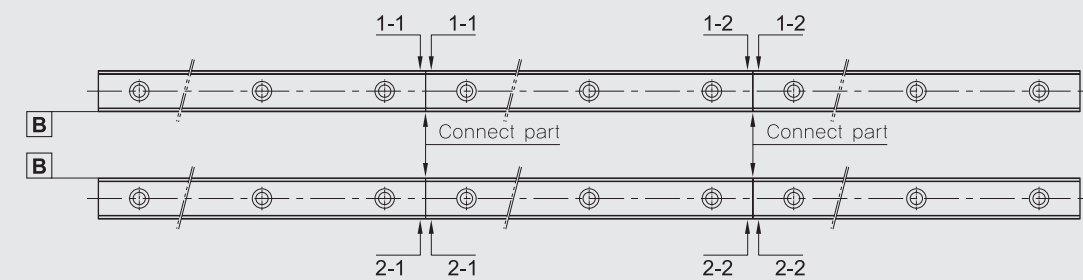
[Rail joint marking]

For extremely long travel applications it may be necessary to join the rails via a butt joint. These joints are matched for continuous smooth motion at the factory and numbered. When installing the segments insure that the numbers at the joints match. In the case of a double rail system the first of the two numbers identifies the rail.

Two rail joining method



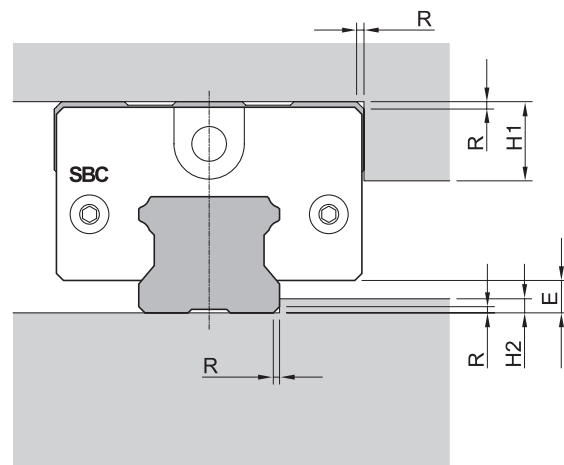
2 axis application and multiple rail joining method



6-2. Shoulder height and fillet radius R

When the bearing and rail are installed on the table and base, the fillet radius, chamfer size and shoulder height must be considered.

※ See the each pages for shoulder height and fillet radius R.

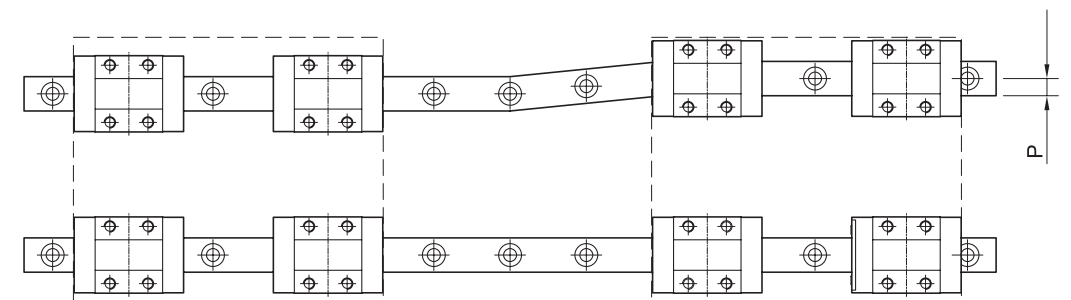


6-3. Permissible tolerance of mounting surface

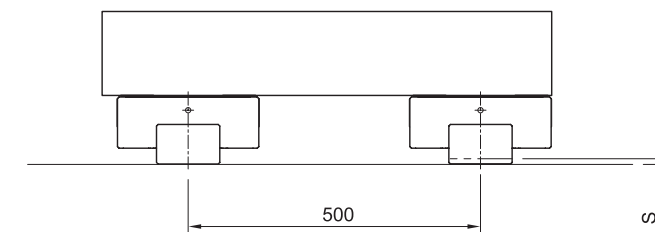
Mounting errors can cause rolling resistance to motion. Due to the self adjusting feature of the SBC linear rail system, rolling resistance or bearing will not be affected as long as the permissible tolerance is observed as per the table shown in the catalogue.

※ See the each page for permissible tolerance of mounting surface.

[Permissible tolerance (P) of parallelism]



[Permissible tolerance (S) of rail mounting surface height variation]



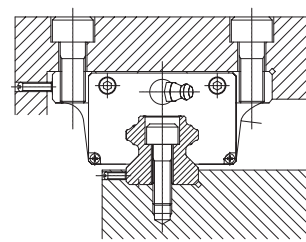
6-4. Mounting linear rail system

[Securing Method for Blocks and Rails]

Normally, both the bearing block and rail are mounted to the structure with bolts. When a horizontal load is applied, shock, or vibration, it is recommended that the rail be clamped horizontally against the reference surface.

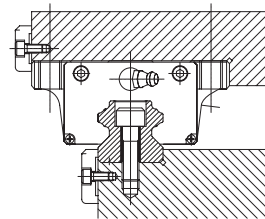
(1) Cap screw mounting

Small bolts are used when space is limited. The number of bolts can be adjusted as necessary.



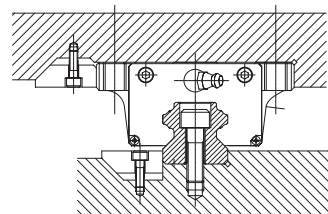
(2) Horizontal clamp mounting

This method provides an easy solution to shock and vibration applications.



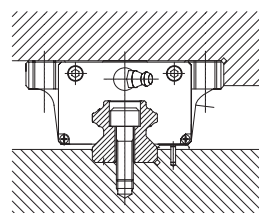
(3) Tapered Gib

This method offers the most secure means for locating the rail and block against the reference surface.



(4) Dowel Pin

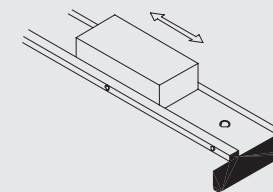
Where the forces are lower and the costs more critical, dowel pins can be used to fix the rail.



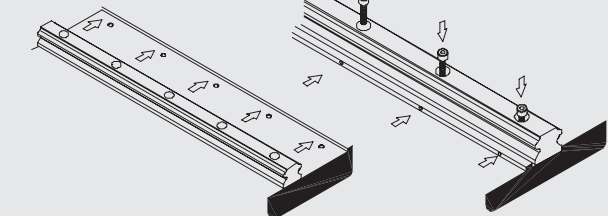
[Rail Mounting procedure]

- ① Clean and dry the mounting surface.
- ② Coat each surface with low viscosity spindle oil, then place the rail on the surface and then lightly tighten the mounting bolts temporarily.
- ③ Place the carriage plate on the blocks carefully and tighten the mounting bolts temporarily.
- ④ Position the carriage plate by tightening the master block against the reference surface using the selected securing method and tighten the mounting bolts with a torque wrench.
※ Follow the above order to mount subsidiary blocks.

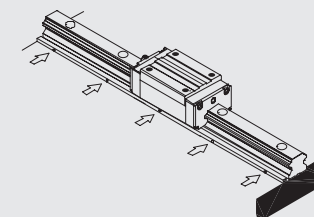
① Checking the mounting



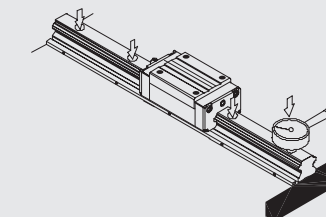
② Setting the rail against the datum plane



③ Tightening set screws

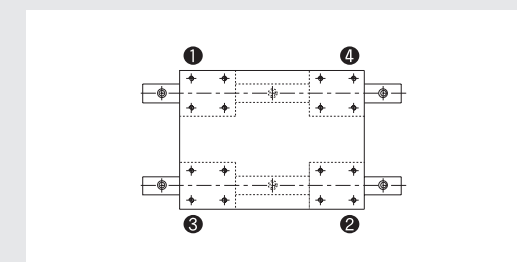


④ Final tightening of mounting bolts



[Block Mounting procedure]

- ① Clamp the reference rail in place and tighten the mounting bolts with a torque wrench, making several passes to reach the desired torque
- ② Carefully position the table with bearings onto the rails and tighten the non-reference blocks with a torque wrench.
- ③ Starting at one end, move the table along the rail and tighten the non-reference rail slowly during several passes with a final pass using the torque wrench. Do not over tighten



[Bolt mounting torque]

Below bolt mounting torque is recommended for mounting the rail.

Unit : N.cm

Bolt	Mounting torque		
	Steel	Cast iron	Aluminum
M2	58.8	39.2	29.4
M2.3	78.4	53.9	39.2
M2.6	118	78.4	58.8
M3	196	127	98
M4	412	274	206
M5	882	588	441
M6	1370	921	686
M8	3040	2010	1470
M10	6760	4510	3330
M12	11800	7840	5880
M14	15700	10500	7840
M16	19600	13100	9800
M20	38200	25500	19100
M22	51900	34800	26000
M24	65700	44100	32800
M30	130000	87200	65200

7. Lubrication

Lubrication for linear rail system is a key part of its performance.

- Reduce friction and wearing for each moving part.
- Eliminate the heat on linear rail system.
- Prevent corrosion on inside and outside of linear rail system.
- Dust-prevention.

7-1. Lubrication requirements for linear rail system

- Form a strong oil film
- Have high thermal stability
- Low-friction
- High water resistance
- Oil must have high-viscosity and grease must have consistency again repeated agitation of grease
- Non-corrosive

7-2. Comparison of lubrication

A comparison of the application features for oil and grease used in linear rail system is shown in the table below.

Item	Grease	Oil
Rotation	Low, intermediate	High
Seal	Simple	Cautious
Lubrication change	Complicated	Simple
Life	Short	Long
Thermal radiation	Bad	Good
Friction torque	Large	Less
Performance	Good	Excellent

(1) How to grease

- **With grease gun** : The grease is fed through the grease fitting on linear rail system.
- **With pump** : The grease is fed periodically by automation pump.

(2) How to feed oil

- Oil-brushed on, sprayed or pumped.

7-3. Lubricants interval

Lubricants intervals vary according to the environment and working condition of machine. Therefore, below lubricant intervals are recommended. Do not mix oil and grease systems.

Item	Checking time	Lubricant interval	Working condition and outcome
Grease	3 ~ 6 months	100km	Normal working condition (Load \leq 0.15C)
Oil	1 week	40km	Volume and (Load \leq 0.3C, V \leq 1m/s)
	Everyday	Any time	Volume of oil

7-4. Class of oil

Lubricant	Class
Oil	Coolant oil, turbine oil ISOVG32 ~ 68

7-5. Classification and selection of lubrication

Lubricant for linear rail system must be selected after considering vibration, clean room, vacuum and working condition.

SBC supplies two kinds of grease as standards.

Item	Application	Brand
Normal working condition	Multipurpose industrial application	Shell Gadus S2 V100 3 [Korea Shell]
Special working condition	Clean room	SNG 5050 [NTG Korea]
	Vibration	
	Wide temperature	

* Please contact SBC for the requests below

- when you need MSDS(Material Safety Data Sheet) according to Grease Type
- when you use our product in environments beyond the scope of use

[Normal working condition: Multipurpose industrial application]

[1] General

- **Name :** Shell Gadus S2 V100 3
- **Company :** Korea Shell
- **Appearance :** Bright brown color, semi-solid in normal temperature

[2] Special feature

- High load resistance
- Anti-corrosive
- High liquidity
- High mechanical stability

[3] Representative feature

- **Consistency enhancer :** Lithium/Calcium
- **Base oil :** Mineral oil
- **Working temperature :** -10°C ~ 120°C

Test item	Representative value	Test method
Base oil Kinematic Viscosity @ 40°C cSt 100°C cSt	Mineral oil 100 11	IP 71/ASTM-D445
Cone Penetration Confusion @ 25°C 0.1mm	220~250 (3)	IP 50/ASTM-D217 (NLGI *)
Dropping Point °C	195	IP 396

* NLGI :National Lubricating Grease Institute

Consistency test method	KS	NLGI
	220 ~ 250	3

[Special working condition : Wide-temperature and low dust accumulating]

[1] General

- **Name :** SNG5050
- **Company :** NTG Korea
- **Appearance :** Butter in normal temperature

[2] Special feature

- Excellent stability of oxidation
- Long life grease
- Low dust accumulating and excellent chemical-resistance
- Wide temperature range

[3] Representative feature

- **Consistency :** Urea
- **Base oil :** Synthetic oil
- **Working temperature :** -40°C ~ 200°C

Test item	Representative value	Test method
Consistency [25°C, 60 times]	3	NLGI *
Dropping point	280°C	JIS K 2220 5.4
Evaporation (22h) mass %	99°C	0.11%
	150°C	0.57%
Oil separation rate (24h) mass %	150°C	0.5%
Film evaporation (24h) mass %	150°C	5.54%
	180°C	16.44%
Stability of oxidation [99°C, 100h] mass %	0.015%	JIS K 2220 5.8
Mixing stability [100,000cycles]	Pass	ASTM D 1743
Wear resistance (1200rpm, 392N, room temperature 1h)	0.57	ASTM D 2266

* NLGI : National Lubricating Grease Institute

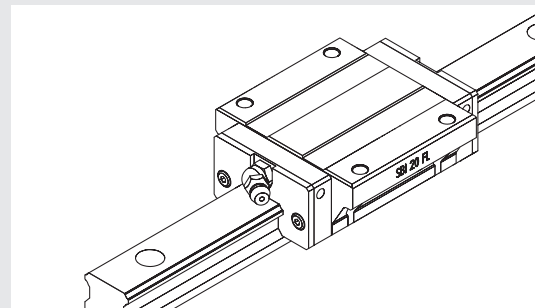
Consistency test method	KS	NLGI
	220 ~ 250	3

7-6. Grease fitting

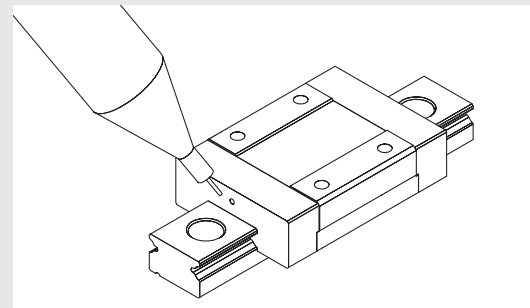
Select the appropriate grease fitting from below options in accordance with design.

[Standard grease fitting]

Front grease fitting (except SBM, SBMW) for linear rail system is standard grease fitting.



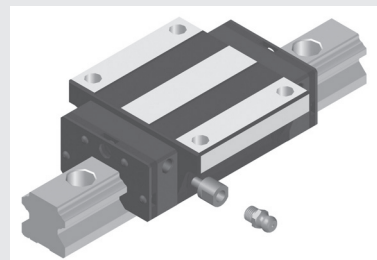
(SBG, SBI front grease fitting)



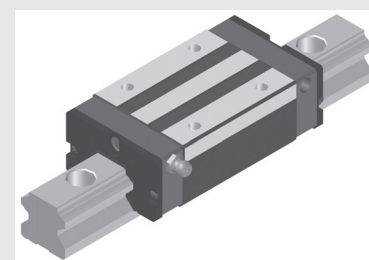
(SBM, SBMW front grease fitting)

[Side grease fitting]

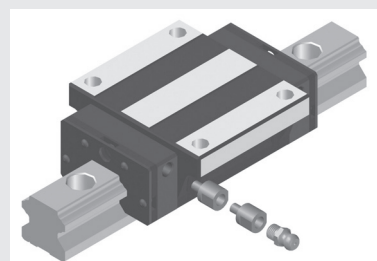
When greasing is difficult because of limited space in front of the grease nipple, the side grease fitting can be supplied. (*Side grease fitting is not available for SBM, SBMW.)



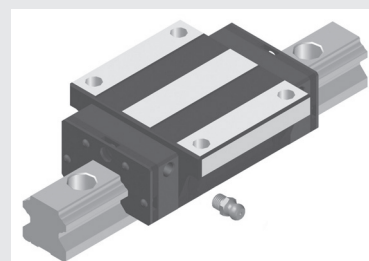
(SBG, SBI 15~25 FL side grease fitting)



(SBG, SBI SL side grease fitting)



(SBG 30~35 FL side grease fitting)
(SBI 30~45 FL side grease fitting)



(SBG 45~65 FL side grease fitting)
(SBI 55~65 FL side grease fitting)

8. Safety design

Dust prevention, rust prevention and re-lubrication according to working conditions of the linear rail system are necessary for required life time.

8-1. Anti-rust (Anti-rust Treatment)

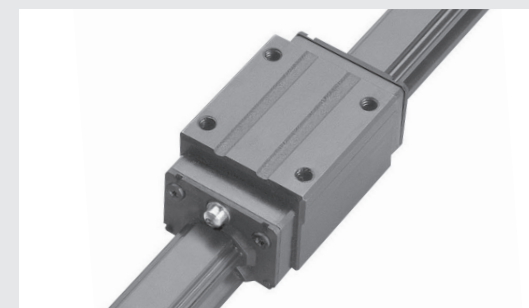
2 types of surface treatment are available for anti-rust and appearance.

[AR-H : Black chrome coating]

Since black chrome coating is penetrating to rail and block, so it achieves higher corrosion resistance.

[AR-2F : Fluorocarbon chrome coating]

Fluorocarbon chrome coating on black chrome coating is suitable when high corrosion resistance is required (water or salty water working condition).



(AR-H : Black chrome coating)

[Caution for surface treatment]

- ① Be aware that the rail hole may not surface treated.
- ② Set the higher safety factor in case surface treated linear rail system is selected.
- ③ Except above surface treatments, the other plating may cause performance problems.
- ④ Contact SBC for other information on surface treatments.

8-2. Dust protection

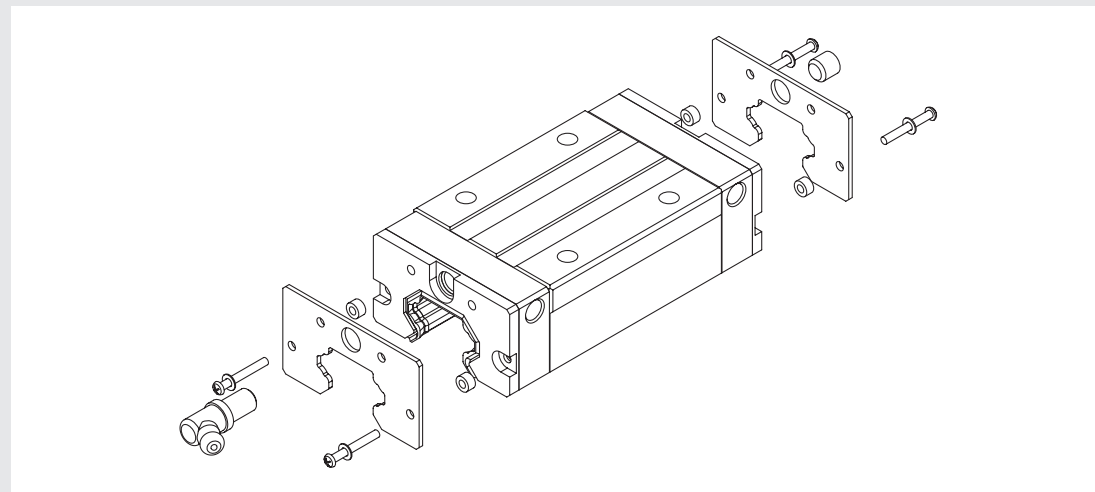
The dimensions for each seal is shown on dimension page.

[Seal options]

Select the appropriate seal options according to working conditions.

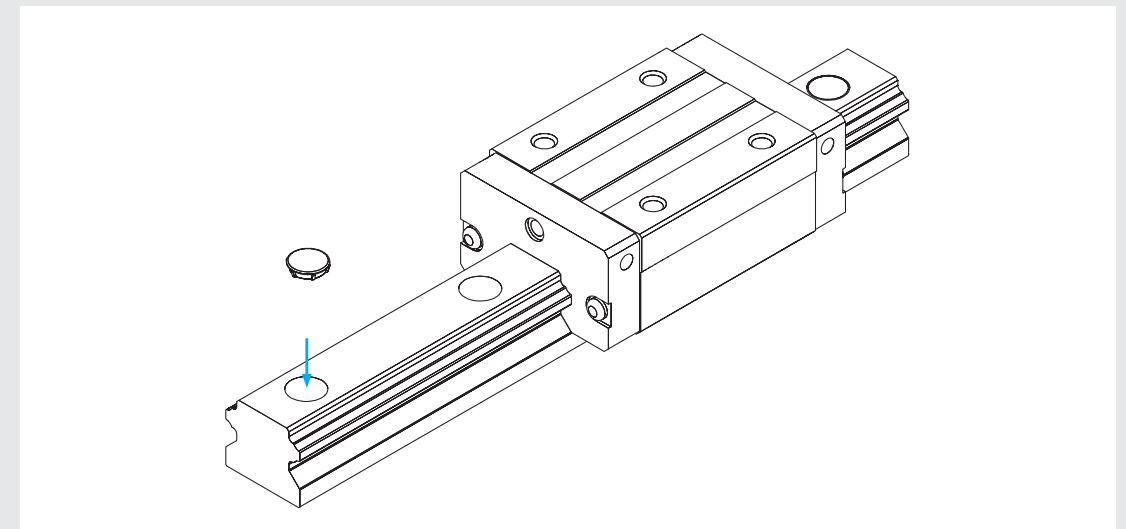
Item	Symbol	Application
End seal + Bottom seal	No symbol (Standard)	Normal condition
End seal + End seal + Bottom seal	DD	Dust condition
End seal + Scraper + Bottom seal	ZZ	Welding spatter
End seal + End seal + Scraper + Bottom seal	KK	Dust and chips

* Bottom seal is not available for SBI, SBG, SBS15



[RC cap: rail hole cap]

Contaminants invade into the bolt holes of the rail and pollute the inside of the bearing. You can use hole caps made from hardened rubber to fill the holes. RC caps are provided with the rails.



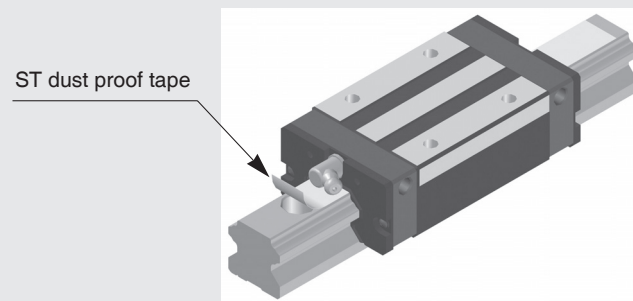
◁ RC cap mounting method ▷

- ① Bolt the rail on the plate.
- ② Put the RC cap on the rail mounting hole and place the bigger steel plate on the cap then tap it with hammer.
- ③ Check the RC cap to make sure it is properly seated.

[ST dustproof tape]

Stainless steel ST dustproof tape greatly improves rail face sealing and works in conjunction with guide block seals. Conventional plastic plugs do not offer the same improved sealing performance.

※ If you use ST tape and RC cap together, it would be more effective.



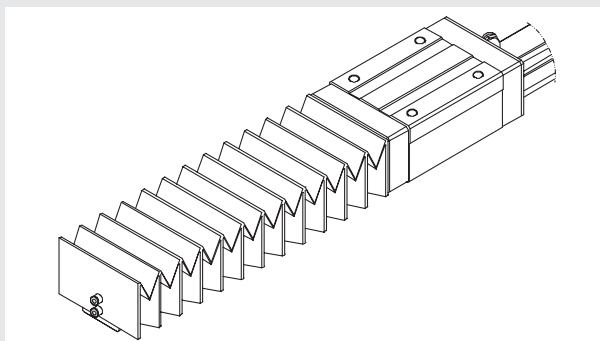
◁ Installation of ST tape ▷

- ① After assembling a rail to the bed, clean the surface of the rail and remove any oil.
 - ② Attach the ST tape slowly over the rail length to within 2 or 3 mm from each end of the rail.
 - ③ After attachment to the rail, apply pressure with dry cloth 3 or 4 times along the length of the rail to release encapsulated epoxy. Tape should be applied 4 to 6 hours prior to use to allow initial bonding.
- ※ It is strongly recommended to wear safety gloves, the edge of this tape is sharp and can cut as you attach it to the rail.

[Bellows]

For the best protection of the linear rail system, bellows should be used.

※ We recommended to use additional Telescopic tool, if you use it in dust environment.



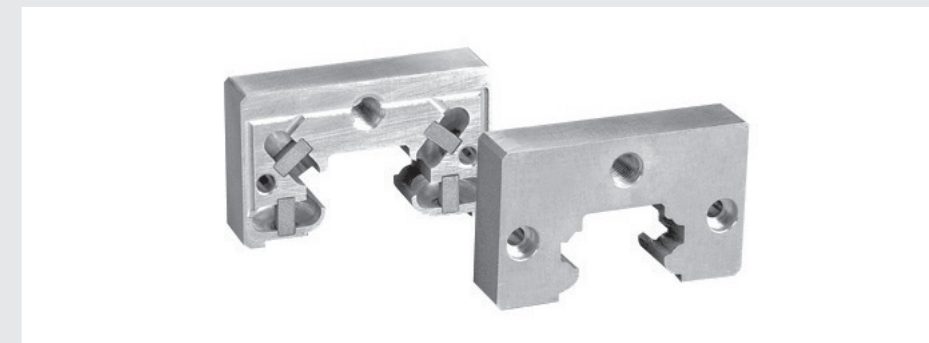
- Reference : SBI type : SH-A
SBG type : SH

8-3. High temperature design

[HT end-plate]

If working temperature is more than 80°C, SBC supply the high temperature end-plate which is made of aluminum.

- Recommended working temperature : -30 ~ 150°C



- ※ When High Temperature end-plate is applied to a block,
 - The product will be released without all plastic components (end-plate, end-seal, bottom seal, return tube plate)
 - Please set up additional measures to prevent dust

8-4. High dust-proof and self-lubricant container

For protecting the linear rail system from fine foreign matter and where the grease feeding is not easy, SBC created the high dust-proof, (DF) seal and self-lubricant container (MF).

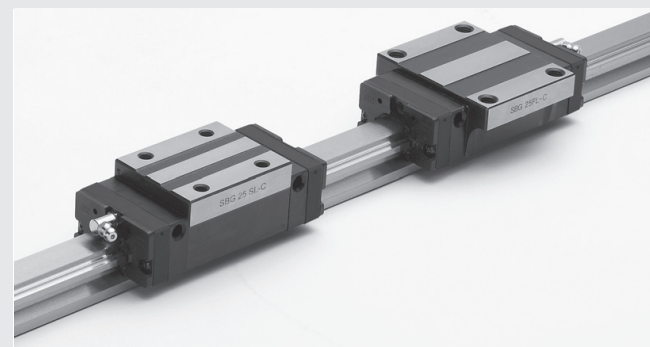
- Function and classification in accordance with seal type

DF : Dust protection for microscopic dust

MF : Self lubricating for long maintenance intervals

- Components and Order of assembly based on the type of seal

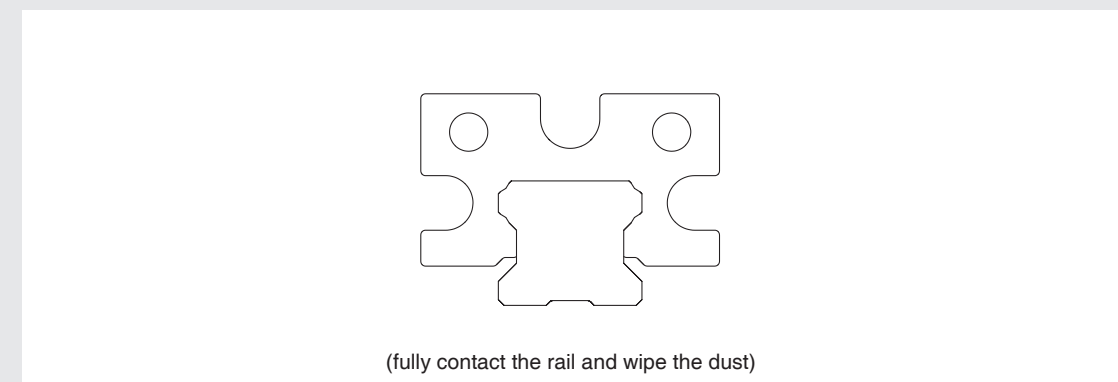
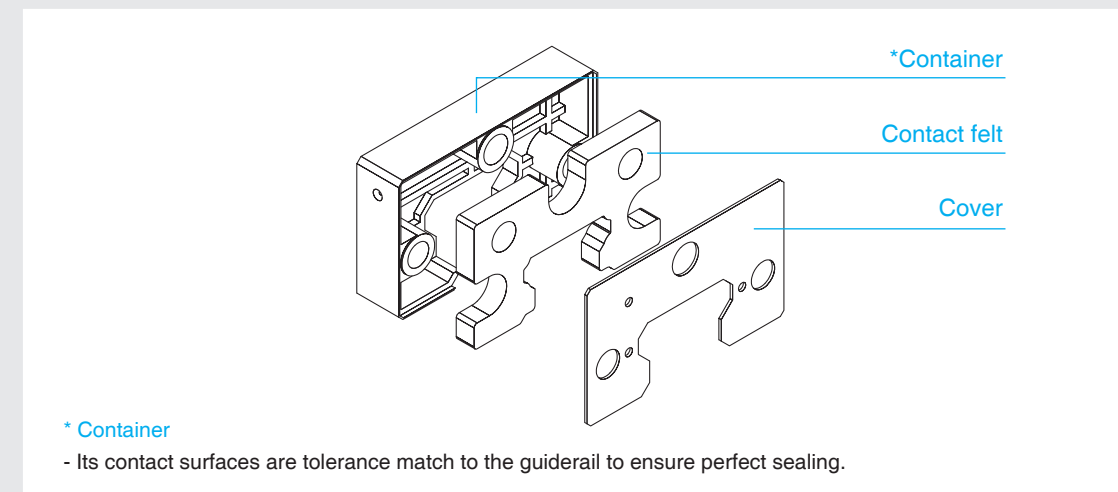
DF : Dust protection for microscopic dust		MF : Self lubricating for long maintenance intervals	
Symbol	Components and Order of assembly	Symbol	Components and Order of assembly
DF	End plate+End seal+DF	MF	End plate+MF+End seal
DFDD	End plate+End seal+End seal+DF	MFDD	End plate+MF+End seal+End seal
DFZZ	End plate+End seal+DF+Scraper	MFZZ	End plate+MF+End seal+Scraper
DFKK	End plate+End seal+End seal+DF+Scraper	MFKK	End plate+MF+End seal+End seal+Scraper



[High dust-proof seal : DF seal]

High-density felt built in DF container wipes the raceway tracking profile so it achieves higher dust protection.

An additional seal or scraper may be added for highly contaminated applications.

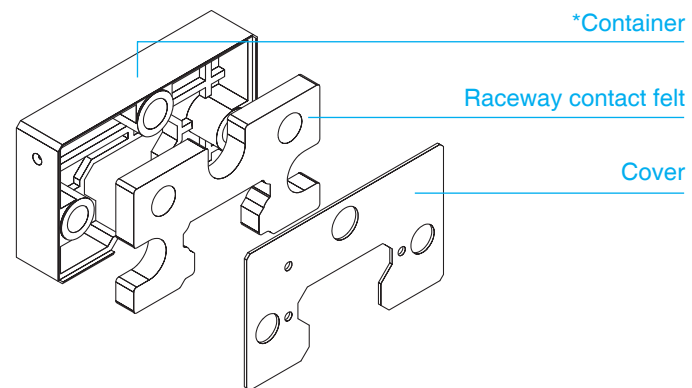


※ Caution

If you would like to use DF seal in watery or clean-room working condition, please contact SBC.

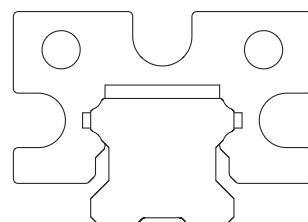
[Self lubricant : MF container]

MF (Self lubricating) contains grease impregnated felt which feeds the grease on the raceway continuously. Each compact seal kit will guarantee total surface lubrication and long maintenance free bearing life.



* Container

- Its contact surfaces are tolerance match to the guiderail to ensure perfect sealing.



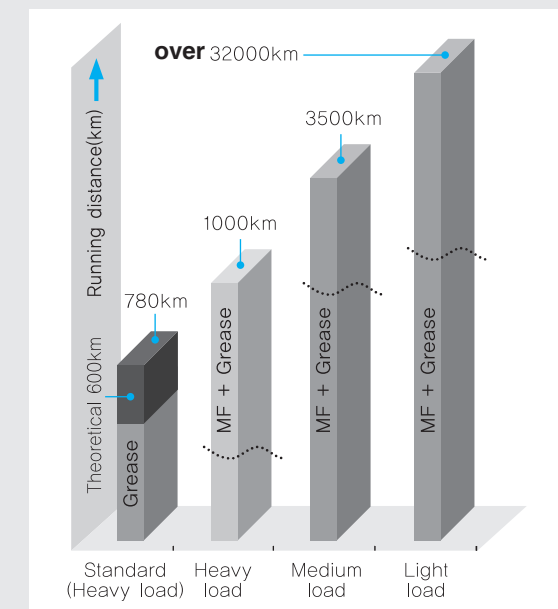
(Wipe the raceway and grease is coating on the raceway)

8-5. MF container Lifetime test

[Performance test]

● SBG20SL-1-K1-1500-N

Condition	Heavy	Medium	
Load	4.9kN	2.5kN	1.0kN
Velocity	20m/min		
Theoretical Lifetime	600km	1500km	-



[Grease feeding]

The MF container may be re-charged by adding grease to hole inside of block with a syringe.

※ Caution

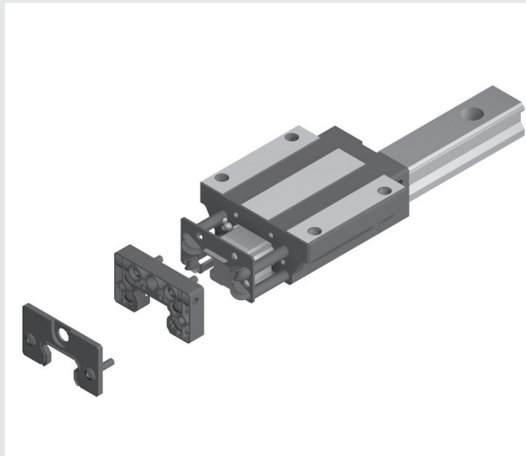
If MF container is required to use in special working condition like clean room, please contact SBC.

Linear Rail System

The Types of Linear Rail System

SBI high-load type

With all advantages of our SBG type, SBI improves load capacity, and increases speed capabilities for the rail system.

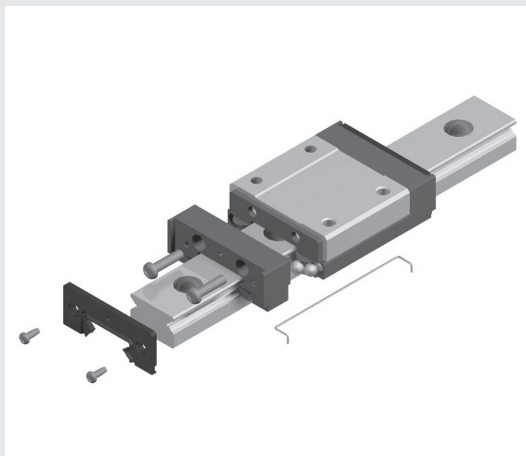


SBI type

-Type: SBI15~65

SBM miniature type

Miniature linear rail system with compact size also achieve high-load.



SBM (Standard miniature)

-Type: SBM07~15

SBML (High-load miniature)

-Type : SBML09~15

SBMW (Wide type miniature)

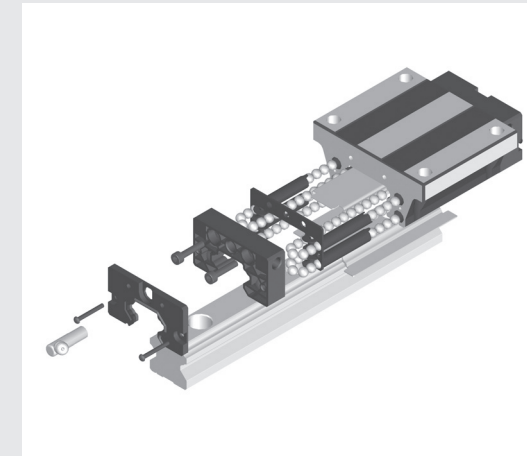
-Type: SBMW09~15

Linear Rail System

The Types of Linear Rail System

SBG standard type

Standard SBC linear rail system.



SBG type

Type: SBG 15~65

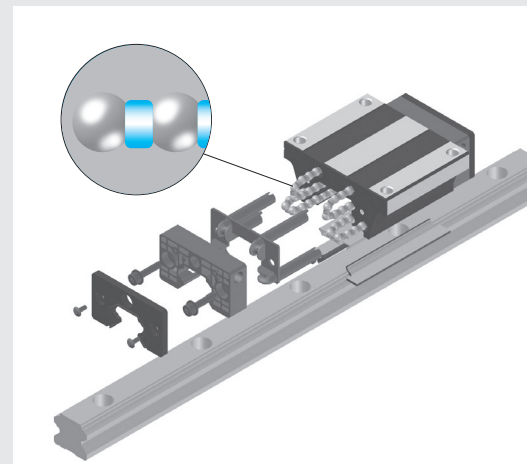
SBS type

-Assembly height is lower than SBG type

-Type : SBS 15~45

SPG spacer type

Low noise type in which the plastic spacer are inserted in between balls.



Low noise (Spacer type)

Spacer are inserted in between balls

SPG Type (=SBG dimensionally interchangeable)

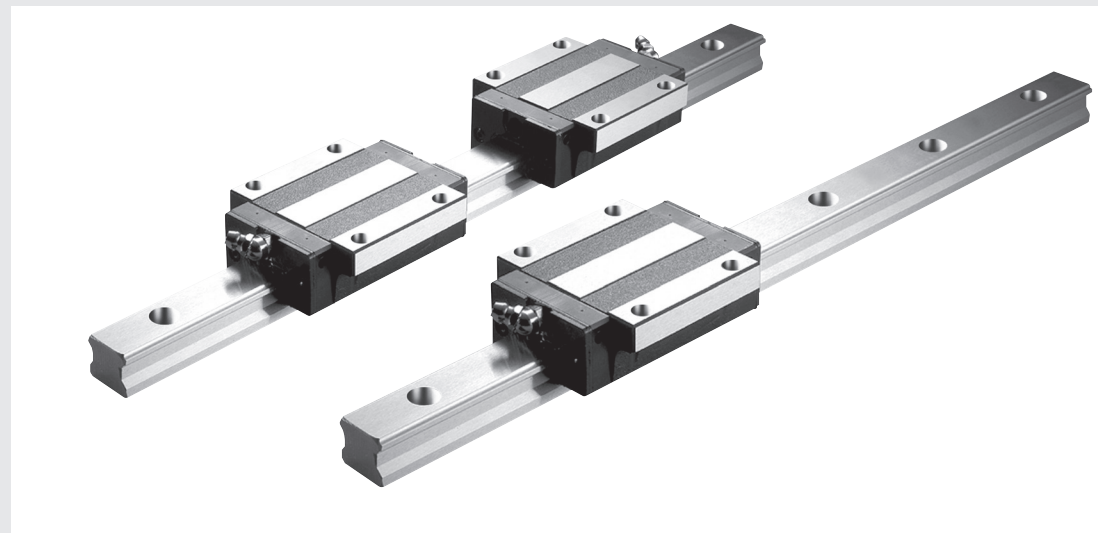
Type : SPG 20~35

SPS Type (=SBS dimensionally interchangeable)

-Type: SPS 20~35

Linear Rail System

SBI High-load Linear Rail System



Circular arc groove

Two point contact structure of circular arc groove. It keeps the function of self-aligning and smooth rolling performance.

45° angle of contact

Four rows of circular arc groove contact balls at an angle of 45 degrees provides the same capacity in all directions.

DF structure

Low noise and High rigidity

Optimized ball recirculation structure and design provides low noise and high-rigidity.

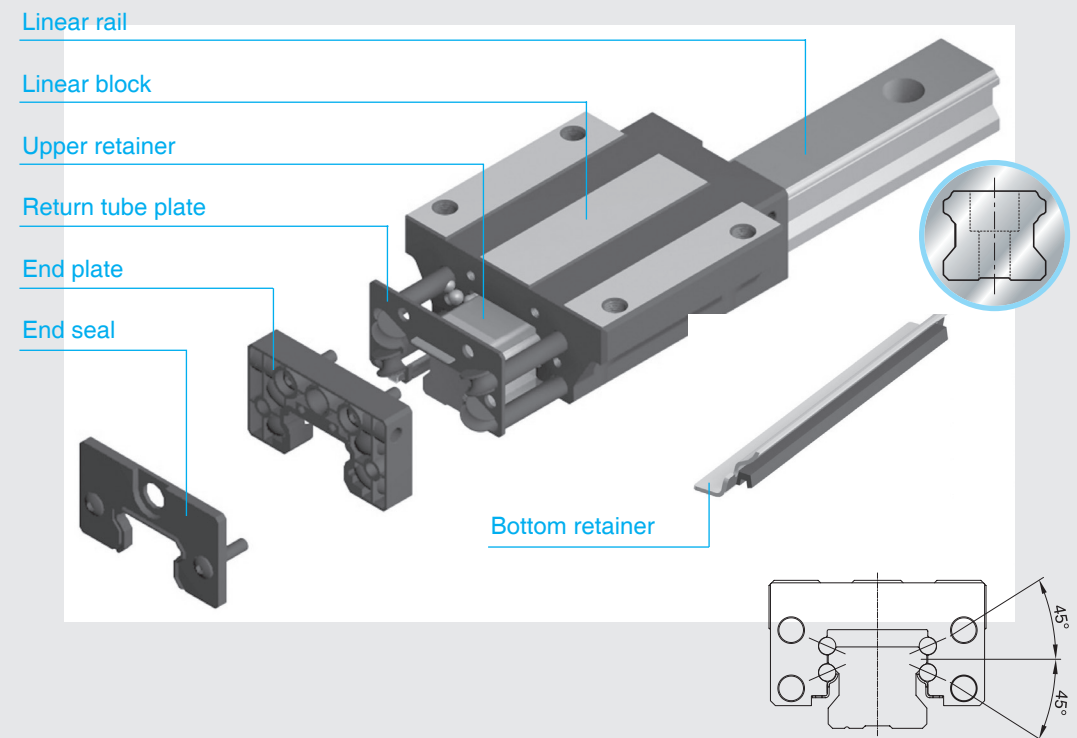
The same dimension

The dimension of height, width and mounting holes are the same as SBG series, with only a slight variation in block length.

Linear Rail System

SBI High-load Linear Rail System

The feature of structure



End seal New double lip structure which improves resistance to dust and particle contamination.

End-plate Manufactured with a new high rigidity engineered plastic. Designed to withstand the highest of unplanned impact loads without breaking.

Retainer Ball retainer plates now snap assembled to the blocks and this unique assembly method allows an amount of internal self-alignment and load sharing while maintaining rigid ball control.

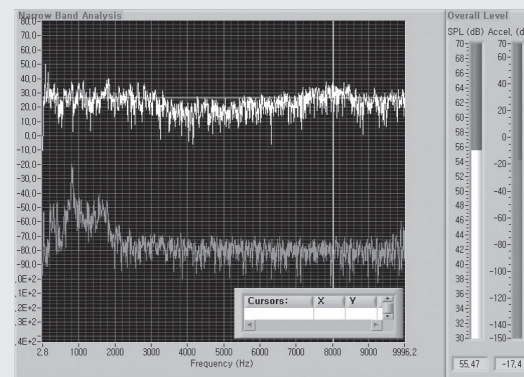
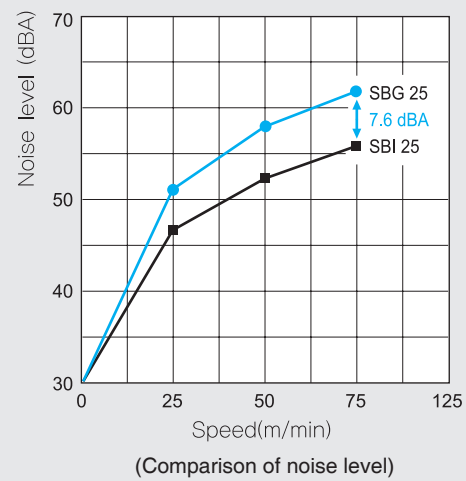
Return tube plate The end plate and reversing ramps of new ball return tubes are now molded as one complete body. This allows for smoother ball rotation through the critical transition points, significantly improving rolling performance, lower operating better lubricant retention inside the bearing.

Linear block Highly rigid structure with a larger recirculation radius for the smooth movement and longer block length for higher load capacity.

Linear rail SBI rail is designed with a low profile and wide base. This characteristic allows greater stability in operation and during manufacture. Results in greater linear precision.

[Low noise]

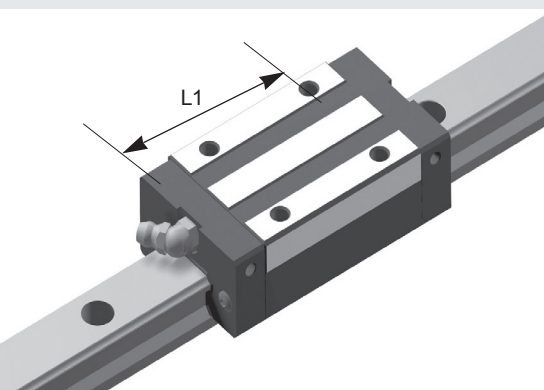
- SBI25 / SBG25 noise level test data



[High load performance]

SBI type is improved load capacity from the longer block length and changed radius of curvature

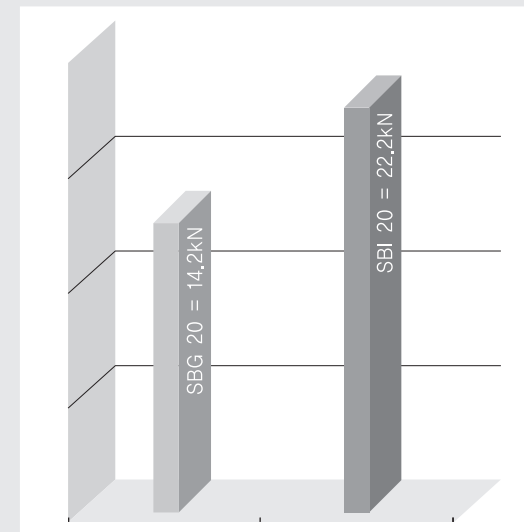
- The comparison of SBI / SBG block length



(Unit : mm)

L1 length	SBG	SBI
15SL	38.8	45.2
20SL	50.8	56.8
25SL	59.5	70

- The comparison of basic dynamic load rating



Improved geometry and tolerances increases basic dynamic load rating

- Comparison of lifetime calculation

- L (km) : Nominal life
- C (kN) : Basic dynamic load rating
- P (kN) : Calculated load

$$L = \left(\frac{C}{P}\right)^3 \times 50\text{km}$$

In case of P = 5 kN

Basic dynamic load rating (C) of SBI20 SL : 22.2 kN

Basic dynamic load rating (C) of SBG20 SL : 14.2 kN

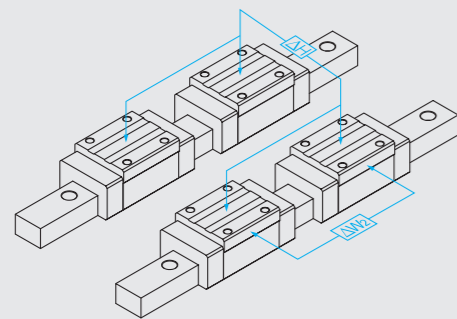
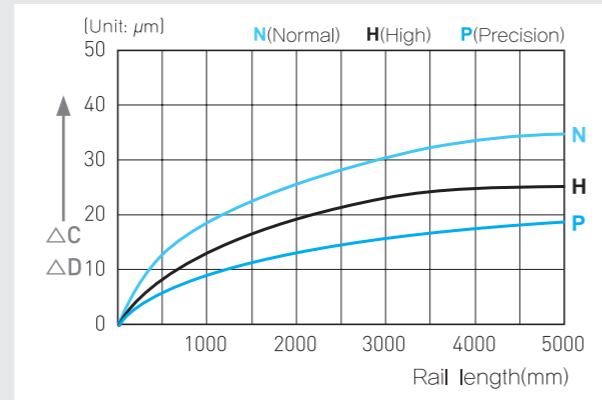
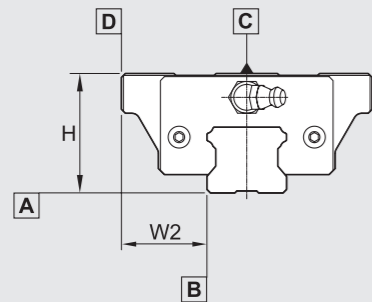
$$\text{SBI 20SL} : L = \left(\frac{C}{P}\right)^3 \times 50 = \left(\frac{22.2}{5}\right)^3 \times 50 = 4376 \text{ km}$$

$$\text{SBG 20SL} : L = \left(\frac{C}{P}\right)^3 \times 50 = \left(\frac{14.2}{5}\right)^3 \times 50 = 1145 \text{ km}$$

Linear Rail System

SBI High-load Linear Rail System

Accuracy



- Measuring dimension difference H and W2 between the carriages of the same guide
- ΔW2 (Dimension difference W2 between the carriages of the same guide): measuring the center of block side surface(reference surface
- ΔH (Dimension difference H between the carriages of the same guide): measuring the center of block top

Item	N	H	P
Tolerance for the height H	±0.1	±0.04	±0.02
Tolerance for the rail-to-block lateral distance W2	±0.1	±0.04	±0.02
Tolerance for the height difference among blocks H	0.03	0.015	0.007
Tolerance for rail-to-block lateral distance W2 distance among blocks	0.03	0.015	0.007
Running parallelism of surface C with surface A		ΔC	
Running parallelism of surface D with surface B		ΔD	

● **N** : Normal ● **H** : High ● **P** : Precision

Preload

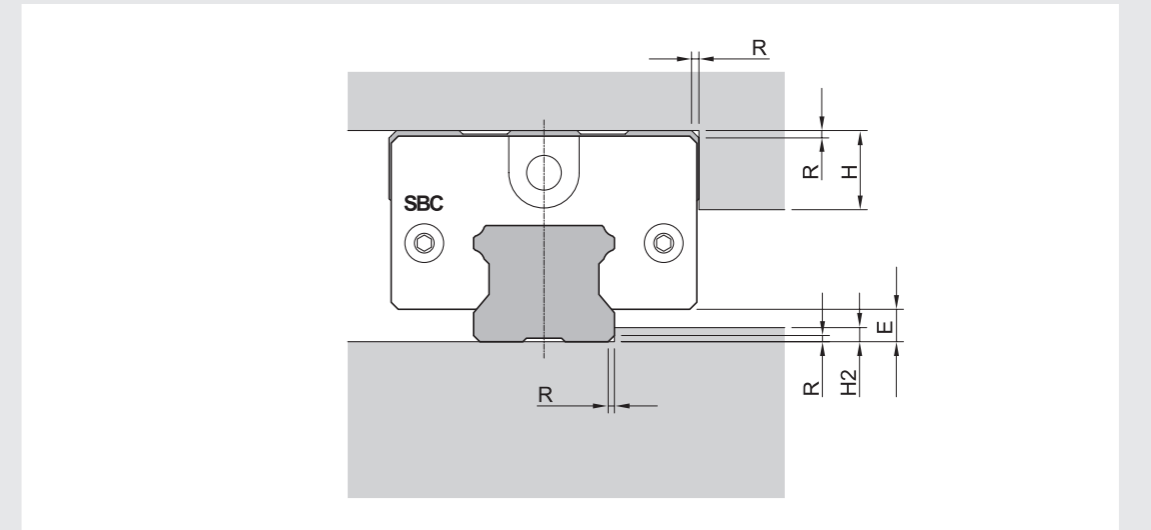
Reference	Volume of preload
K0 (None)	Clearance within 0.01mm
K1 (Normal)	Max. 0.02C
K2 (Light)	0.04 ~ 0.06C
K3 (Heavy)	0.08 ~ 0.10C

- C(kN) : Basic dynamic load rating
- ※ "K3" Preload is not available for SBI15 type

Linear Rail System

SBI High-load Linear Rail System

Shoulder height and fillet radius R

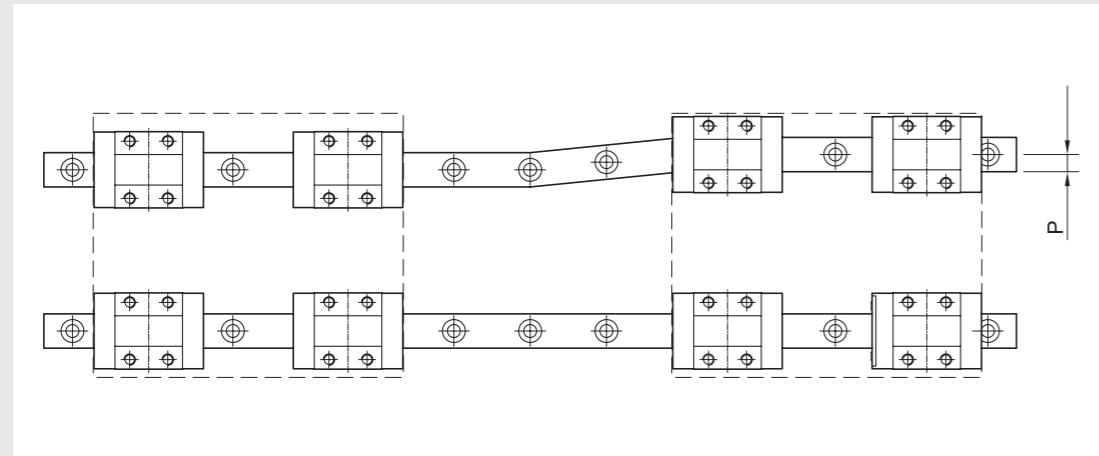


Model number	Fillet radius R	Shoulders height H1	Shoulders height H2	E
15	0.6	7	2.5	3
20	0.6	8	3.5	4.6
25	1	10	4.5	5.5
30	1	11	5	7
35	1	13	6	7.5
45	1.6	16	8	9
55	1.6	20	10	12
65	1.6	25	15	19

Linear Rail System

SBI High-load Linear Rail System

Permissible tolerance (P) of parallelism



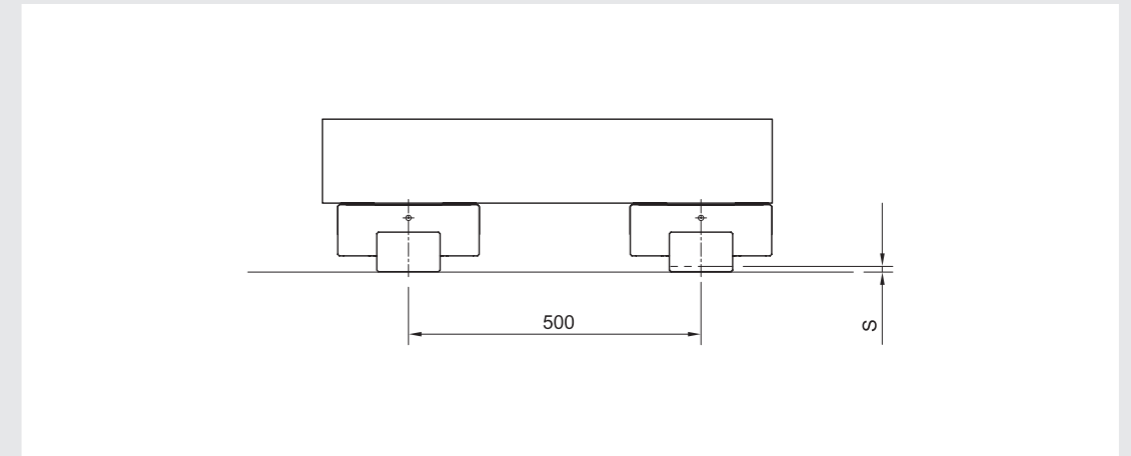
(Unit : mm)

Model size	K1	K2	K3
15	0.025	0.018	-
20	0.025	0.020	0.018
25	0.030	0.022	0.020
30	0.040	0.030	0.027
35	0.050	0.035	0.030
45	0.060	0.040	0.035
55	0.070	0.050	0.045
65	0.080	0.060	0.055

Linear Rail System

SBI High-load Linear Rail System

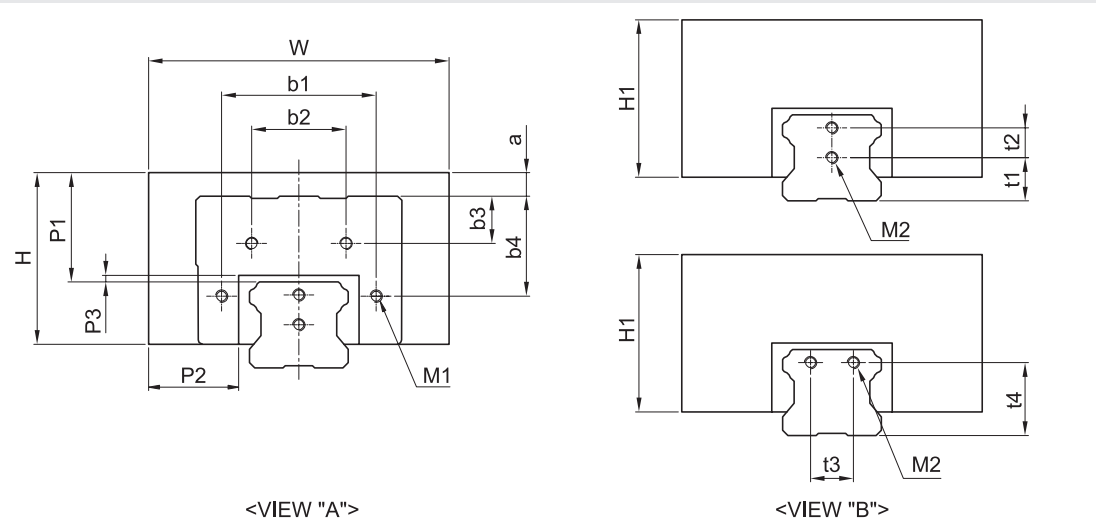
Permissible tolerance (S) of two level offset



(Unit : mm)

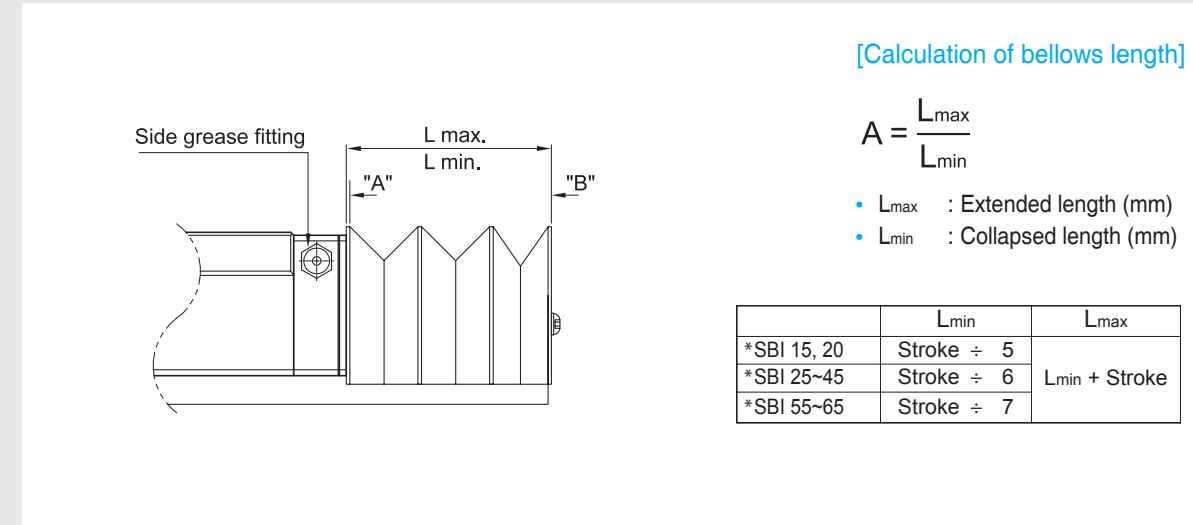
Model size	K1	K2	K3
15	0.13	0.085	-
20	0.13	0.085	0.05
25	0.13	0.085	0.07
30	0.17	0.11	0.09
35	0.21	0.15	0.12
45	0.25	0.17	0.14
55	0.30	0.21	0.17
65	0.35	0.25	0.20

SH Bellows



Model number	Applicable type	W	H	H1	P1	P2	P3	a (*Dimensions according to block types)						b1	b2
								FV	SV	CL	FL	SL	HL		
SH15 A	SBI15	50	25	25	15	15.5	1	4	4	-	4	0	4	26	-
SH15 DA			20	20	10			-1	-1	-	-1	-5	-1		
SH20 A	SBI20	60	29	31	17	18	1	5.5	5.5	5.5	3.5	3.5	-	34	-
SH20 DA			24	26	12			-	-	-	-1.5	-1.5	-		
SH25 A	SBI25	70	35	35	20	21	1	7	7	7	4	0	4	36	-
SH25 DA			30	30	15			-	-	-	-1	-5	-1		
SH30 A	SBI30	80	36	36	20	23	1	-	-	-	1	-2	1	49	-
SH30 DA			33	33	17			-	-	-	-2	-5	-2		
SH35 DA	SBI35	85	39	39	20	22.5	1	-	-	-	-2	-9	-2	56	-
SH45 DA	SBI45	100	48	48	25	25	1	-	-	-	-3	-13	-3	72	-
SH55 DA	SBI55	110	56	56	30	25	1	-	-	-	-2	-12	-2	74	53.4
SH65 DA	SBI65	130	69	69	35	30	1	-	-	-	-2	-2	-	90	64

- * The column of b1 dimension is only applying for SBI20CLS type.
- * The dimension in column "a, b3 and b4" are common for "CL=CLL, CLS", "FL=FLL, FLS", "SL=SLL, SLS", "HL=HLL, HLS"
- * If SH bellows are applying, rail end mounting holes are necessary.
- * When you select SH bellows, please select the side grease fitting for lubrication.
- * Please contact SBC for more information.



(Unit : mm)

b3			b4						t1	t2	t3	t4	M x Bolt length		A Extended ratio
FL	SL	HL	FV	SV	CL	FL	SL	HL					M1(Block)	M2(Rail)	
-	-	-	13.3	13.3	-	13.3	17.3	13.3	10	-	-	-	M3X16	M4X8	6
-	-	-	14	14	14	16	16	-	6	8	-	-	M3X18	M3X6	6
-	-	-	16.3	16.3	16.3	19.3	23.3	19.3	10	7	-	-	M3X18	M3X6	7
-	-	-	-	-	-	22.8	25.8	22.8	11	8	-	-	M4X22	M4X8	7
-	-	-	-	-	-	26.5	33.5	26.5	-	-	14	21	M4X22	M4X8	7
-	-	-	-	-	-	33.5	43.5	33.5	-	-	20	25	M4X25	M5X10	7
7	17	7	-	-	-	38.5	48.5	38.5	-	-	26	29	M5X30	M5X10	8
7	7	-	-	-	-	45	45	-	-	-	34	42	M5X35	M5X10	8

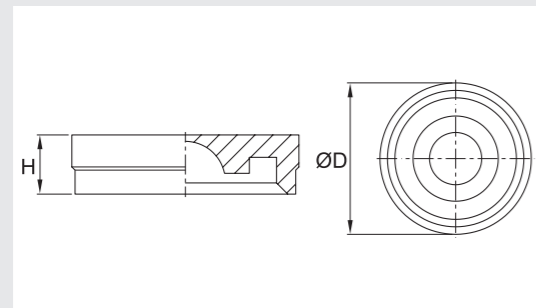
- Ordering example : **SH25A - 70 / 420**
- ① Model number
② Collapsed length (mm)
③ Extended length (mm)

※ 'H' dimension of SH-DA type is lower than SH-A type

Linear Rail System

SBI High-load Linear Rail System

RC Cap

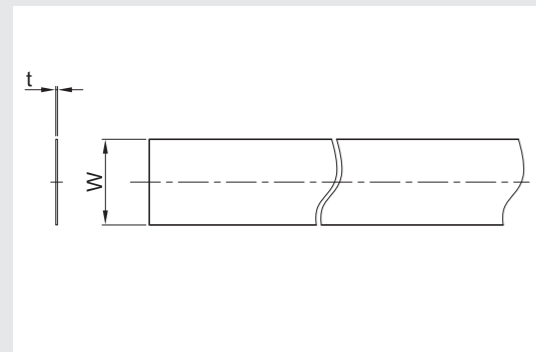


(Unit : mm)

Model	D±0.1	H±0.1
RC 15	7.6	1.3
RC 20	9.6	3.5
RC 25	11.1	2.8
*RC 30	14.2	3.7
RC 45	20.2	4.7
RC 55	23.2	6
RC 65	26.2	6

- RC 30 is used for SBI 30, 35 rail.
- SBI, SBG type use same RC cap.

ST Tape



(Unit : mm)

Model	W	t
ST 15A	11	0.1
ST 20A	15	0.1
ST 25A	17	0.1
ST 30A	21	0.1
ST 35A	27	0.1
ST 45A	37	0.1
ST 55A	43	0.1
ST 65A	51	0.1

Ordering example : **ST15A - 1000L**

① ②

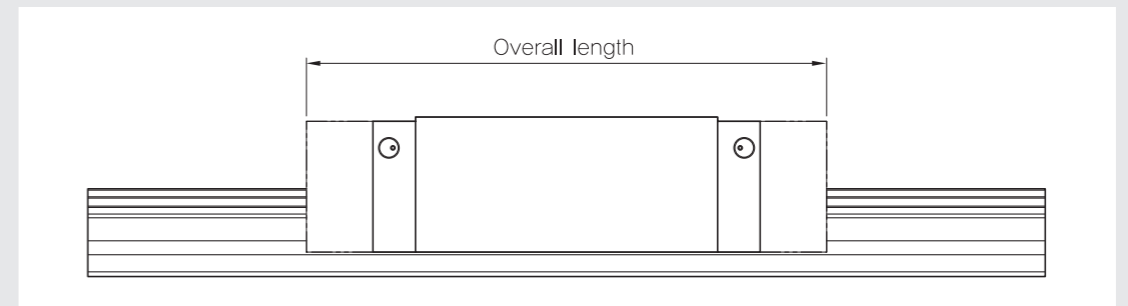
- ① Model number
- ② Length

Linear Rail System

SBI High-load Linear Rail System

Seal and MF container

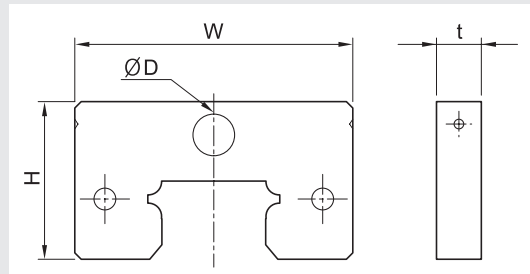
[Method and overall length with each seal]



• E : End seal S : Scraper F : DF (High dust protection seal). MF (Self lubricant) (Unit : mm)

Additional seal	표준	DD	ZZ	KK	MF	MFDD	MFZZ	MFKK	DF	DFDD	DFZZ	DFKK
Indication of seal	E	E+E	E+S	E+E+S	F+E	F+E+E	F+E+S	F+E+E+S	E+D	E+E+D	E+D+S	E+E+D+S
15V	39.9	44.5	45.3	49.9	53.9	58.5	59.3	63.9	56.9	61.5	59.3	63.9
15S	56.8	61.4	62.2	66.8	70.8	75.4	76.2	80.8	73.8	78.4	76.2	80.8
15	63.8	68.4	69.2	73.8	77.8	82.4	83.2	87.8	80.8	85.4	83.2	87.8
15L	79.4	84	84.8	89.4	93.4	98	98.8	103.4	96.4	101	98.8	103.4
20V	49.1	54.1	54.5	59.5	63.1	68.1	68.5	73.5	66.1	71.1	68.5	73.5
20CLS	65.2	70.2	70.6	75.6	79.2	84.2	84.6	89.6	82.2	87.2	84.6	89.6
20S	73.8	78.8	79.2	84.2	87.8	92.8	93.2	98.2	90.8	95.8	93.2	98.2
20	78.8	83.8	84.2	89.2	92.8	97.8	98.2	103.2	95.8	100.8	98.2	103.2
20L	96.4	101.4	101.8	106.8	110.4	115.4	115.8	120.8	113.4	118.4	115.8	120.8
25V	52.6	57.6	58	63	66.6	71.6	72	77	69.6	74.6	72	77
25S	83	88	88.4	93.4	97	102	102.4	107.4	100	105	102.4	107.4
25	92	97	97.4	102.4	106	111	111.4	116.4	109	114	111.4	116.4
25L	108	113	113.4	118.4	122	127	127.4	132.4	125	130	127.4	132.4
30S	96.8	102.8	103.2	109.2	112.8	118.8	119.2	125.2	116.8	122.8	119.2	125.2
30	107.6	113.6	114	120	123.6	129.6	130	136	127.6	133.6	130	136
30L	131.6	137.6	138	144	147.6	153.6	154	160	151.6	157.6	154	160
35S	108.2	114.2	114.6	120.6	-	-	-	-	-	-	-	-
35	124.6	130.6	131	137	140.6	146.6	147	153	144.6	150.6	147	153
35L	152.6	158.6	159	165	168.6	174.6	175	181	172.6	178.6	175	181
45	142	148	148.4	154.4	158	164	164.4	170.4	162	168	164.4	170.4
45L	174	180	180.4	186.4	190	196	196.4	202.4	194	200	196.4	202.4
55	172.4	179.4	179.2	186.2	190.4	197.4	197.2	204.2	194.8	201.8	197.2	204.2
55L	211.8	218.8	218.6	225.6	229.8	236.8	236.6	243.6	234.2	241.2	236.6	243.6
65	219.8	226.8	226.6	233.6	237.8	244.8	244.6	251.6	242.2	249.2	244.6	251.6
65L	272.2	279.2	279	286	290.2	297.2	297	304	294.6	301.6	297	304

- If block is assembled with MF container, the grease fitting is not supplied. If you would like to feed the grease to the block, please order side grease fitting type.



[Dimension of MF container]

(Unit : mm)

Reference	Model	Applied model	Block type	W	t	H	D
DF / MF	15A	SBI15	FL/FLS/FLL/HL/HLL/HLS/SL/SLL/SLS/FV/SV	33.4	7	20.2	4
	20A	SBI20	FL/FLL/FLS/SL/SLL/SLS	43.4	7	24.6	6.5
	20B		CL/CLL/FV/SV			22.6	
	20C		CLS				
	25A	SBI25	FL/FLL/FLS/HL/HLL/HLS/SL/SLL/SLS	47	7	29.7	6.5
	25B		CL/CLL/FV/SV			26.7	
	30A	SBI30	FL/FLL/FLS/HL/HLL/HLS/SL/SLL/SLS	59	8	34.2	6.5
	35A	SBI35	FL/FLL/HL/HLL/SL/SLL	69	8	39.7	6.5
	45A	SBI45	FL/FLL/HL/HLL/SL/SLL	85	8	49.7	10.5
	55A	SBI55	FL/FLL/HL/HLL/SL/SLL	98	9	56	10.5
65A	SBI65	FL/FLL/SL/SLL	123	9	69	10.5	

[Seal resistance]

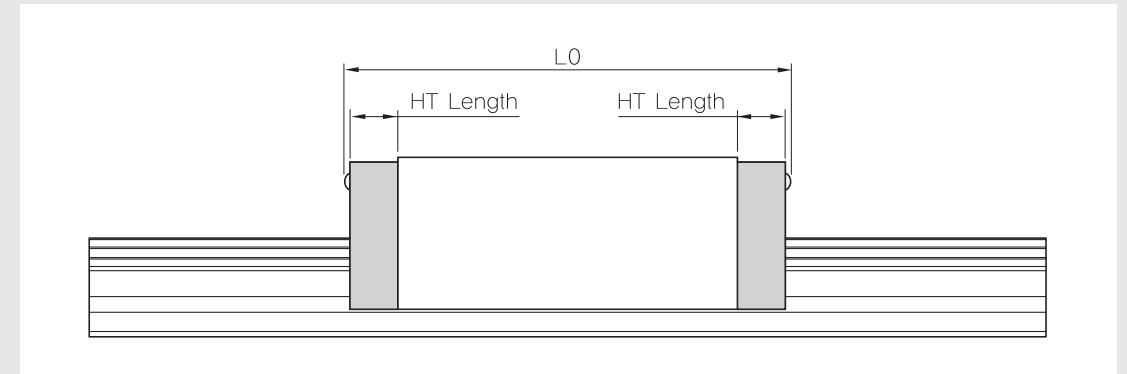
For the maximum value of seal resistance of SBI standard type per block, in which grease is not applied.

※ Scraper has no resistance because it is not contacting rail.

(Unit : N)

Model	End seal	DF	MF
SBI 15	2.0	4.7	3.5
SBI 20	2.5	4.9	3.0
SBI 25	3.0	5.5	3.5
SBI 30	3.9	5.6	3.5
SBI 35	2.5	5.7	3.7
SBI 45	3.4	5.9	4.1
SBI 55	3.5	6.2	4.2
SBI 65	3.6	6.4	4.4

HT high temperature end plate



(Unit : mm)

Reference	HT Length	Overall length									
		Applied model	Lo	Applied model	Lo	Applied model	Lo	Applied model	Lo	Applied model	Lo
HT 15A	6.5	SBI 15V	38.3	-	-	SBI 15S	53.2	SBI 15	62.2	SBI 15L	77.8
HT 20A	8	SBI 20V	47.1	SBI 20CLS	63.2	SBI 20S	71.8	SBI 20	76.8	SBI 20L	94.4
HT 25A	8	SBI 25V	50.6	-	-	SBI 25S	81	SBI 25	90	SBI 25L	106
HT 30A	10	-	-	-	-	SBI 30S	94.8	SBI 30	105.6	SBI 30L	129.6
HT 35A	11	-	-	-	-	SBI 35S	106.2	SBI 35	122.6	SBI 35L	150.6
HT 45A	13	-	-	-	-	-	-	SBI 45	140	SBI 45L	172
HT 55A	16	-	-	-	-	-	-	SBI 55	168.5	SBI 55L	207.9
HT 65A	20	-	-	-	-	-	-	SBI 65	215.9	SBI 65L	268.3

Ordering example : **SBI25FL - HT - 2 - K1 - 800 - N**

① ② ③ ④ ⑤ ⑥

- ① Model
- ② High temperature end plate
- ③ Block quantity
- ④ Preload
- ⑤ Rail length
- ⑥ Accuracy

※ All plastic components are replace with steel or aluminum in the High Temperature Blocks.

※ Side grease fitting is not available for high temperature end plates

Grease and nipple specification

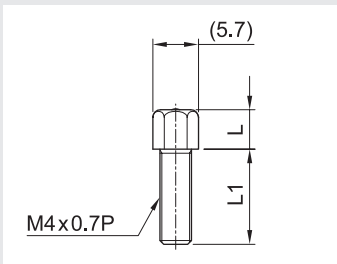
[Grease]

SBI uses two types of grease according to working conditions. For details, please see the technical data for grease.

[Grease fitting Specification]

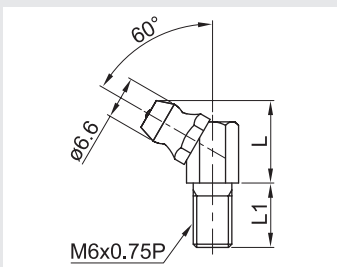
(1) Standard grease fitting (Front grease fitting)

(Unit : mm)



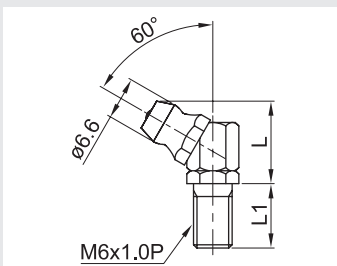
Specification		M4x0.7P		
Applied model	Grease fitting model	Seal Symbol	L	L1
SBI 15	1N	None	7	5.5
	1D	DD, ZZ	5	9
	1Z	KK	5	11
	1F	DF, DFDD, DFZZ, DFKK	5	13

(Unit : mm)



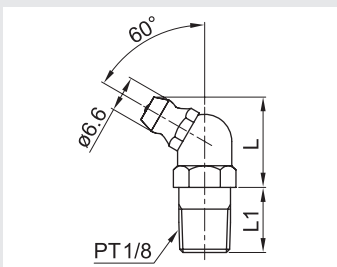
Specification		M6x0.75P, Asia type		
Applied model	Grease fitting model	Seal Symbol	L	L1
SBI 20~35	A2N	None	13.5	7
	A2D	DD, ZZ	13.5	10
	A2Z	KK, DF	13.5	13
	A2K	DFDD, DFZZ	13.5	16
	A2F	DFKK	13.5	19

(Unit : mm)



Specification		M6x1.0P, Europe type		
Applied model	Grease fitting model	Seal Symbol	L	L1
SBI 20~35	E2N	None	13.5	7
	E2D	DD, ZZ	13.5	10
	E2Z	KK, DF	13.5	13
	E2K	DFDD, DFZZ	13.5	16
	E2F	DFKK	13.5	19

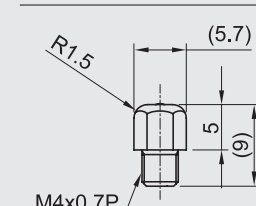
(Unit : mm)



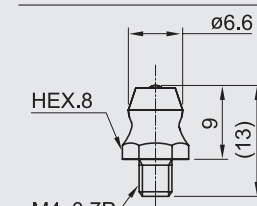
Specification		PT 1/8		
Applied model	Grease fitting model	Seal Symbol	L	L1
SBI 45~65	4N	None, DD, ZZ	17	12
	4D	KK	17	16
	4F	DF, DFDD, DFZZ, DFKK	17	23

※ We provide M6 x 0.75P for front Grease fitting of SBI 20~35.
If you need M6 x 1.0P, Please contact SBC.

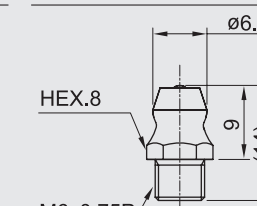
(2) Side grease fitting



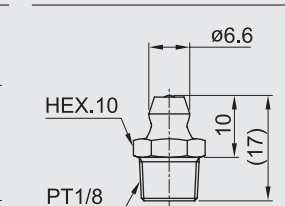
Specification	M4x0.7P
Applied model	SBI 15
Grease fitting model	S1N



Specification	M4x0.7P
Applied model	SBI 20, 25
Grease fitting model	S2N

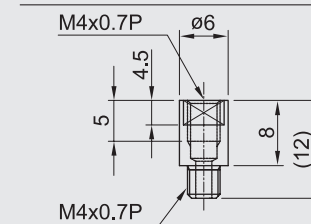


Specification	M6x0.75P
Applied model	SBI 30, 35, 45
Grease fitting model	S3N

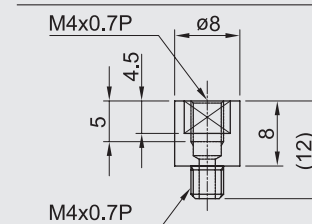


Specification	PT1/8
Applied model	SBI 55, 65
Grease fitting model	S4N

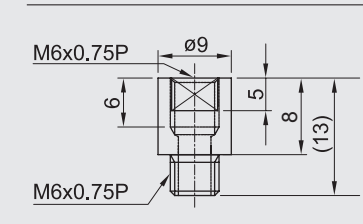
(3) FS nipple connector for side grease fitting (FL, FLL flange type only) ※Please see the page @/36 for assembling the nipple connector.



Specification	M4x0.7P
Applied model	SBI 15
Grease fitting model	S1C



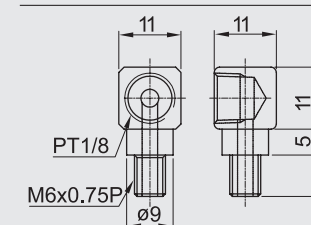
Specification	M4x0.7P
Applied model	SBI 20, 25
Grease fitting model	S2C



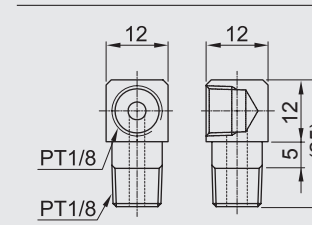
Specification	M6x0.75P
Applied model	SBI 30, 35, 45
Grease fitting model	S4C

* For size 30~45, two pieces of FS nipple connector are applied.

(4) Copper pipe



Input size	PT1/8
Output size	M6x0.75P
Applied model	SBI 20, 25, 30, 35
Grease fitting model	SB01



Input size	PT1/8
Output size	PT1/8
Applied model	SBI 45, 55, 65
Grease fitting model	SB21

Ordering example

[Ordering example for block]

SBI20 **FL** - **N** - **DFDD** - **K1** - **KR**
 [1] [2] [3] [4] [5] [6]

- [1] Model
- [2] Block type
- [3] Position of grease fitting : None (front), N (side)
- [4] Option Symbol : No symbol (standard), DF (high dust protection), MF (self lubricant), Seal (DD, ZZ, KK)
* Please refer to Option table
- [5] Preload : K0, K1, K2, K3
- [6] Surface treatment : No symbol (standard), KR (Block surface treatment)

※ "K3" Preload is not available for SBI 15 type

[Ordering example for rail]

SBI20 - **1000L** - **RR** - **B**
 [1] [2] [3] [4]

- [1] Model
- [2] Rail length
- [3] Surface treatment : No symbol (standard), RR (Rail surface treatment)
- [4] Bottom mounting : No symbol (standard), B (bottom mounting rail)

※ If only rail is ordered, N grade is available.

[Ordering for assembled rail and block]

SBI20 **FL** - **N** - **MFDD** - **2** - **K1** - **5000** - **J2** - **N** - **AR** - **B** - **II**
 [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12]

- [1] Model
- [2] Block type
- [3] Position of grease fitting : None (front), N (side)
- [4] Option Symbol : No symbol (standard), DF (high dust protection), MF (self lubricant), Seal (DD, ZZ, KK)
* Please refer to Option table
- [5] Block quantity on rail
- [6] Preload : K0, K1, K2 ,K3
- [7] Rail length
- [8] Rail connection symbol : J2 (2PCS of rail), J3 (3PCS of rail), J4 (4PCS of rail)...
- [9] Accuracy : N, H, P
- [10] Surface treatment : No symbol (standard), AR(Block and Rail), RR (Rail only) KR (Block only)
- [11] (B) Bottom mounting : No symbol (standard), B (bottom mounting rail)
- [12] Rail : number of rails per axis, None=I, 2=II...4=IV etc.

[Option symbol table]

No symbol	End seal
DD	Double seal (End seal+End seal)
ZZ	End seal+Scraper
KK	Double seal+Scraper
DF	End seal+DF
DFDD	Double seal+DF
DFZZ	End seal+DF+Scraper
DFKK	Double seal+DF+Scraper
MF	MF+End seal
MFDD	MF+Double seal
MFZZ	MF+Scraper
MFKK	MF+Double seal+Scraper
HT	High Temperatue End plate

※ We recommend block and rail assembled to be ordered where high-precision and high- rigidity are required.

※ For surface treatment, please mark according to each surface treatment symbol.

※ If special G dimension is required, please mark when you place an order.

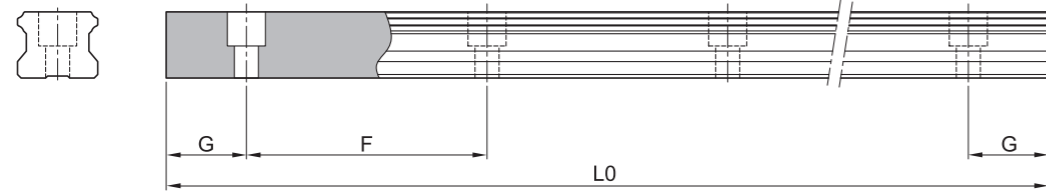
※ Please contact SBC for high temperature order.

※ "K3" Preload is not available for SBG, SBS 15 type

Linear Rail System

SBI High-load Linear Rail System

Standard and Max. Length of SBI rail



(Unit : mm)

Model number	SBI15	SBI20	SBI25	SBI30	SBI35	SBI45	SBI55	SBI65
Standard length	160	220	220	280	280	570	780	1270
	220	280	280	440	440	885	900	1570
	280	340	340	600	600	1095	1020	2020
	340	460	460	760	760	1200	1140	2470
	460	640	640	1000	1000	1410	1260	2620
	640	820	820	1240	1240	1620	1380	2920
	820	1000	1000	1480	1480	1830	1500	3070
	1000	1240	1240	1640	1640	2040	1620	—
	1240	1480	1480	1800	1800	2250	1740	—
	1480	1600	1600	2040	2040	2460	1860	—
	1600	1840	1840	2200	2200	2985	1980	—
	1960	2080	2080	2520	2520	3510	2220	—
	2200	2200	2200	2840	2840	—	2580	—
	2500	2500	2500	3000	3000	—	2940	—
	2860	2960	2980	3480	3480	—	3540	—
—	3520	3520	—	—	—	—	—	
—	4000	4000	—	—	—	—	—	
F	60	60	60	80	80	105	120	150
G	20	20	20	20	20	22.5	30	35
L0(Max length)	3,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000

* If the maximum length exceeds this size, butt joints can be supplied.

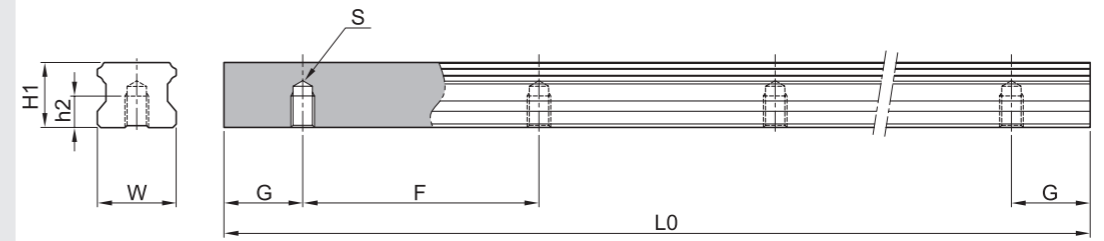
* For more information about butt jointing, please refer to the page of safety design.

* If the G is not standard, please indicate it in the order sheet.

Linear Rail System

SBI High-load Linear Rail System

Bottom mounting rail (SBI-B type)



(Unit : mm)

Model number	W1	H1	S	h2	G	F	L0 (Max length)	Weight (kg/m)
SBI 15-B	15	13	M5X0.8	8	20	60	3,000	1.39
SBI 20-B	20	16.5	M6	9	20	60	4,000	2.37
SBI 25-B	23	20	M6	9	20	60	4,000	3.26
SBI 30-B	28	23	M8	12	20	80	4,000	4.63
SBI 35-B	34	26	M8	12	20	80	4,000	6.45
SBI 45-B	45	32	M12	18	22.5	105	4,000	10.49

* If the maximum length exceeds this size, please contact SBC.