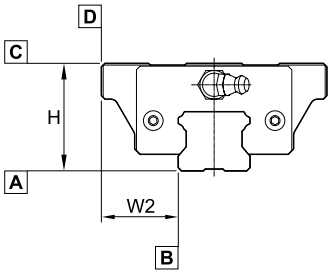
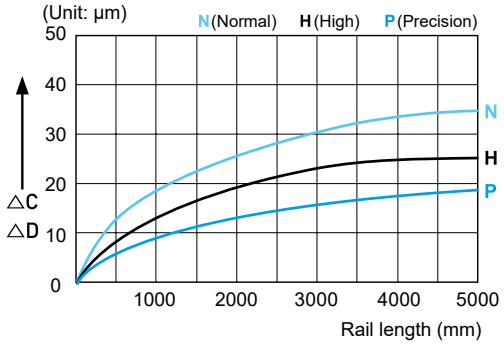
Precision Classes (μm)

Precision classes are divided into three classes. (Standard version is N.)





Item	Standard 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 H difference among blocks	0,03	0,015	0,007
Tolerance for the rail-to-block lateral distance W2 distance among blocks	0,03	0,015	0,007
Running parallelism of surface C with surface A		Δ C	
Running parallelism of surface D with surface B		Δ D	

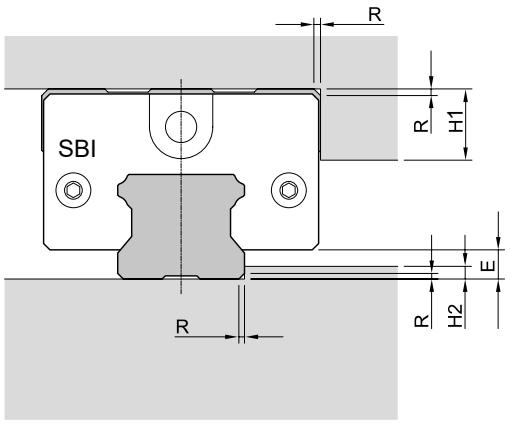
N: Normal H: High P: Precision

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.

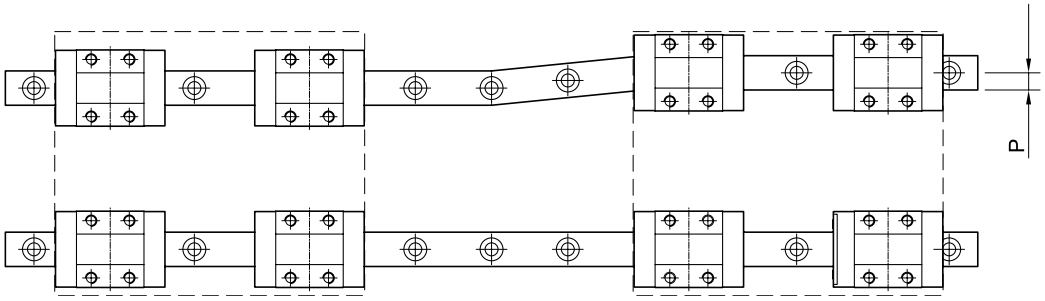
Preload	Volume of preload	Conditions	Example
K0 (No preload)	Clearance within 0,01 mm	• Where the load direction is constant, impact and vibration are light • Precision is not required	• Welding machine • Binding machine • Automatic wrapping machine • Material handling equipment
K1 (Normal preload) Standard version	Max. 0,02 C	• Where the load direction is constant, impact and vibration are light • Precision is not required	• Welding machine • Binding machine • Automatic wrapping machine • Material handling equipment
K2 (Light preload)	0,04 ~ 0,06 C	• Where overhung loads or moment occur • Single axis operation • Light load that requires precision	• Measuring equipment • Electric discharge machine • High speed material handling equipment • NC drilling machine • Industrial robot • Z axis for general industrial equipment
K3 (Heavy preload)	0,08 ~ 0,10 C	• Where rigidity is required, vibration and impact are present • Engineered machinery for heavy equipment	• Machining center • NC lathe • Grinding machine • Milling machine • Vertical axis of machine tool

Shoulder Height and Fillet Radius R



Model size	Fillet radius R	Shoulders height H1	Shoulders height H2	E
15	0,6	7	2,5	3
20	1	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

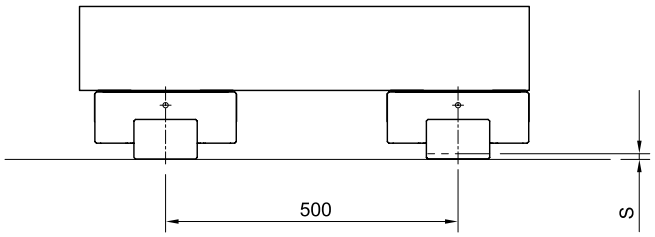
Permissible Tolerance (P) of Parallelism



Model size	K1 (standard version)	K2 (light preload)	K3 (heavy preload)
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

Permissible Tolerance (S) of Height

Permissible tolerance (S) of two level offset



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

Lubrication

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

- To reduce friction and wearing for each moving part.
- To eliminate the heat on linear rail system.
- To prevent corrosion on inside and outside of linear rail system.
- Dust-prevention.

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	Working condition and outcome
Grease	Normal working condition 100 km/6 months
Oil	Volume and contamination of oil according to manual inspection

Classification and Selection of Lubrication

Lubricant for linear rail system must be selected after considering vibration, clean room, vacuum and working condition. For special working conditions please contact Rollco.

Item	Application	Brand
Normal working condition	Multipurpose industrial application	Shell Alvania EP(LF)0

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.

The nominal life is defined 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.

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

L: Nominal life
P: Load
C: Basic dynamic load rating (N)

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

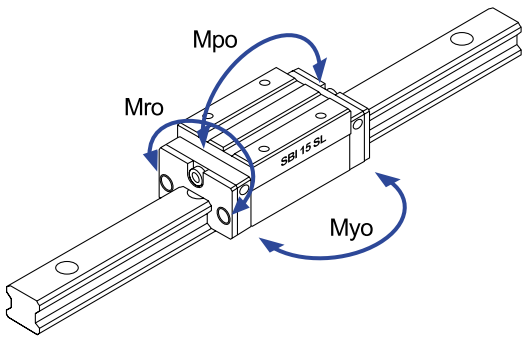
Basic Static Load Rating: Co (N)

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 (Nm)

These loads 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



Life Calculation

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

Calculation of Nominal Life

L (km): Nominal life
PC(N): Calculated load
C (N): Basic dynamic load rating
fC: Contact factor
fW: Load factor

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

Contact Factor (fc)

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 fc shown here.

Number of blocks in close contact	Contact factor fc
Normal condition	1,0
2	0,81
3	0,72
4	0,66
5	0,61
6 or more	0,6

Load Factor (fw)

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	Load factor fw
Very slight	Very low V ≤ 0,25 m/s	1 ~ 1,2
Slight	Low 0,25 < V ≤ 1,0 m/s	1,2 ~ 1,5
Moderate	Medium 1,0 < V ≤ 2,0 m/s	1,5 ~ 2,0
Strong	High V > 2,0 m/s	2,0 ~ 3,5

Temperature

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

Static Safety Factor: fs

$$fs = \frac{Co}{P}$$ (radial load)

$$fs = \frac{Mo}{M}$$ (moment load)

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

Co: Basic static load
P: Load
Mo: Static permissible moment (Mro, Mpo, Myo)
M: Load moment

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