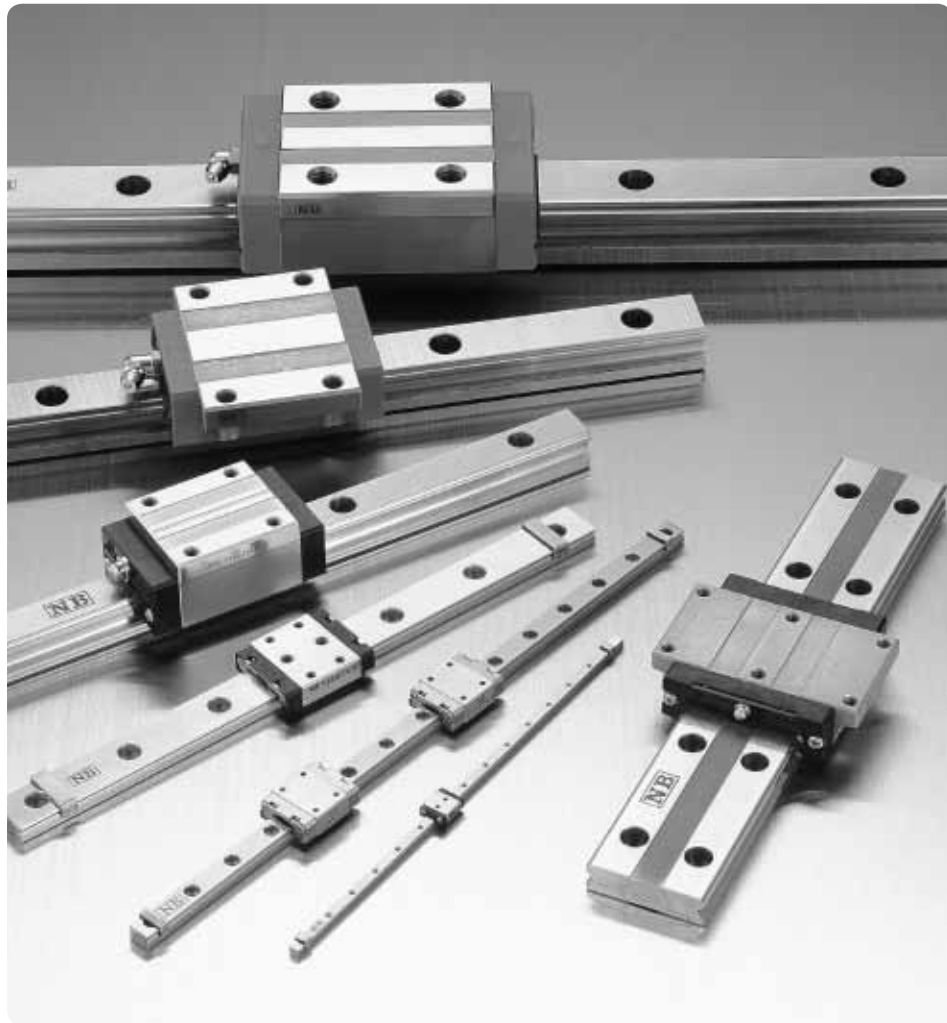


SLIDE GUIDE

NB slide guides are high-precision and high-rigidity linear bearings designed to utilize the motion of rolling elements. They have numerous advantageous characteristics including low friction, no stick-slip, and smooth linear motion even under high load conditions. Since they can maintain their high-efficiency and high-functionality characteristics for an extended period of time, they meet a wide range of needs, from general industrial to precision machinery.



TYPES

Table A-1 Types

rolling element	cross section and contact structure	advantages	page
miniature type	ball retained ball, 2-row, 4-point contact (SEBS-B type) 	<ul style="list-style-type: none"> ● retained ball type ● available with all stainless steel components ● 2-row, compact ● small, light, cost effective 	P.A-20
	2-row, 4-point contact (SEB-A type) 	<ul style="list-style-type: none"> ● 2-row, compact ● small, light, cost effective ● available in various types ● available in stainless steel 	P.A-20
	roller cross roller (SER type) 	<ul style="list-style-type: none"> ● miniature roller guide ● cross roller, high precision ● available with all stainless steel components 	P.A-42
high-rigidity type	ball 4-row, 2-point contact (SGL type) 	<ul style="list-style-type: none"> ● high self-centering characteristics ● high load capacity due to relatively large ball elements ● high dust preventive control with side-seals and under-seals ● available in stainless steel 	P.A-50
	4-row, 2-point contact (SGW type) 	<ul style="list-style-type: none"> ● high-moment resistant ● low-height design ● smooth motion due to large number of effective balls ● high dust preventive control with side-seals and under-seals 	P.A-72

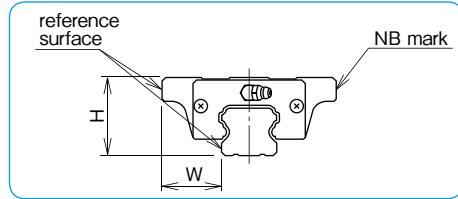
ACCURACY MEASUREMENT METHOD

The accuracy of slide guides is measured by fixing the rail to the reference base. The accuracy is expressed in terms of the average value at the center portion.

Dimensional Tolerance and Paired Difference

The accuracy of the slide guide is obtained by measuring the height H, and width W, as shown in Figure A-1. The dimensional tolerance is measured for each of the blocks attached to the rail and is expressed in terms of the deviation from the basic dimension. The paired difference is obtained by measuring the blocks attached to the rail and is expressed in terms of the difference between the maximum and minimum values.

Figure A-1 Accuracy Measurement

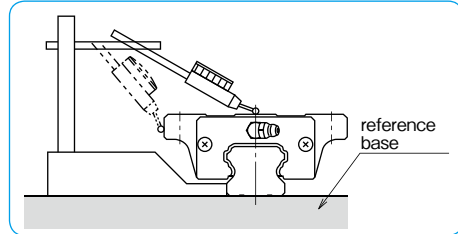


Motion Accuracy

The rail is first fixed to the reference base. The motion accuracy is obtained by measuring the difference in the indicator readings when the block is moved along the entire span of the rail.

Note: Gauge head is placed on the center of the block reference surface.

Figure A-2 Measurement Method for Motion Accuracy



Notation for Number of Axes and Paired Difference

When more than one rail is used in parallel, the dimensional difference must be measured on more than one block on more than one rail. For measuring the paired difference for height H, please specify the number of axes (W2, W3) as the part number example shows. For measuring the paired difference for width W, please contact NB.

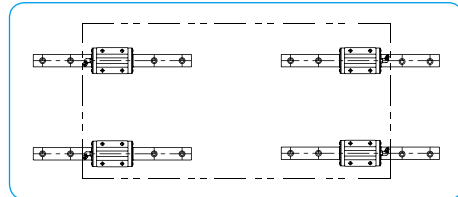
Note : When four rails are used as illustrated in Figure A-3, W4 should be specified in the part number. Please indicate the number of axes when ordering.

part number example

SGL25TF2-350/W2

symbol for number of axes
W2: 2 parallel axes
W3: 3 parallel axes

Figure A-3 4 Parallel Axes



RIGIDITY AND PRELOAD

The rolling elements of the slide guide deform elastically due to the applied load. The amount of deformation depends on the type of rolling element. It is proportional to the 2/3rd power for ball elements. For rollers, it is proportional to the 0.9th power. In either case, the rate of deformation decreases as the applied load increases. Greater rigidity is achieved by applying a preload.

A preload causes internal stress within the slide guide block, resulting in some reduction in lifetime. However, when the guide is used under shock or vibration loading conditions, a preload will absorb the load and will actually help lengthen the life time. Because the preload causes elastic deformation of the rolling elements, it becomes less tolerable to the installation dimensional errors. Extreme care should be exercised in machining the installation surface.

Four levels of preload are available: clearance, standard, light, and medium. This allows the user to select the appropriate level for the application.

Figure A-4 Elastic Deformation of Rolling Elements

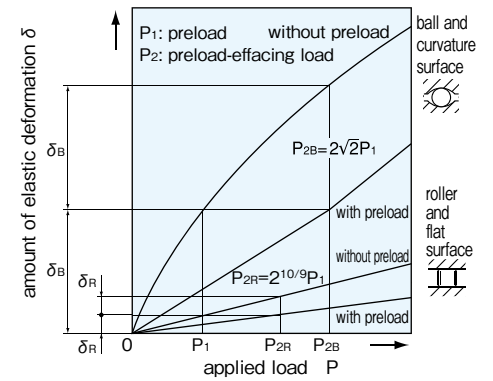


Table A-2 Level of Preload

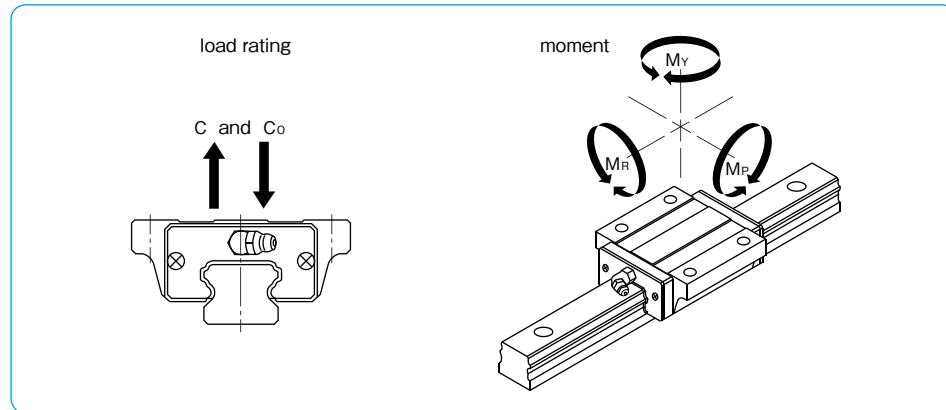
preload	symbol	effect of preload					operating conditions	applicable part number
		vibration absorption ability	self-aligning ability	lifetime	rigidity	frictional resistance		
clearance	T0	increases	reduces	reduces	increases	increases	light motion is required. installation errors to be absorbed.	SEB
standard	blank						minute vibration is applied. accurate motion is required. moment is applied in a given direction.	SEB,SGL SGW
light	T1						light vibration is applied. light torsional load is applied. moment is applied.	SEB,SGL SGW
medium	T2						shock and vibration are applied. over-hang load is applied. torsional load is applied.	SGL,SGW

LOAD RATING AND RATED LIFE

Loading Direction and Load Rating

A slide guide experiences load and moment, as shown in Figure A-5. For each load and moment, the basic load ratings and allowable static moments are defined.

Figure A-5 Direction of Load



Rated Life Calculation

Two types of rolling elements are used in NB slide guides: ball and roller elements. There is a different equation for calculating the rated life of each type.

If the stroke length and cycles are constant, life can be expressed in terms of time, the equation is

$$L_h = \frac{L \cdot 10^3}{2 \cdot \ell_s \cdot n \cdot 60}$$

L_h: life time (hr) ℓ_s: stroke length (m)
L: rated life (km) n: number of cycles per minute (cpm)

For ball elements (SEB, SGL, and SGW types), the equation is

$$L = \left(\frac{f_c \cdot f_T}{f_w} \cdot \frac{C}{P} \right)^3 \cdot 50$$

For roller elements (SER type), the equation is

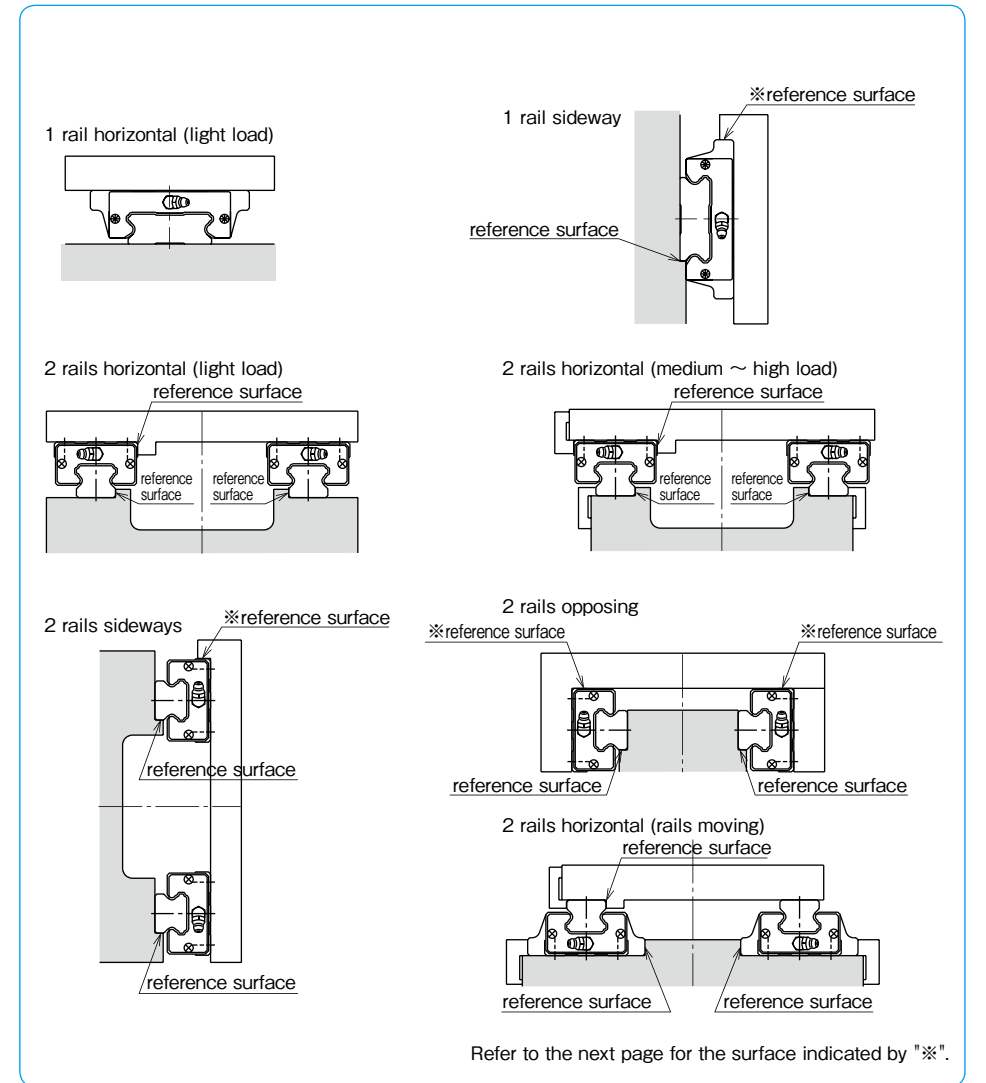
$$L = \left(\frac{f_c \cdot f_T}{f_w} \cdot \frac{C}{P} \right)^{10/3} \cdot 50$$

L: rated life (km) f_c: contact coefficient
f_r: temperature coefficient f_w: applied load coefficient
C: basic dynamic load rating (N) P: applied load (N)
※ Refer to page Eng-5 for the coefficients.
※ The contact coefficient is applied when two or more blocks are used in close contact.

MOUNTING

Slide guides have high load ratings in spite of their compact size. They can be used in various types of machinery and other equipment in various configurations. Figure A-6 shows some typical slide guide arrangements.

Figure A-6 Slide Guide Arrangements



Mounting Surface and Accuracy

NB slide guides are designed and fabricated to achieve high accuracy after mounting them to a machined mounting base. One typical way is to provide a shoulder on the mounting surface and align the reference surface of the rail or block against the shoulder (Figure A-7). To avoid corner interference, an undercut should be provided at the shoulder corner. Alternatively, the radius of the shoulder corner should be smaller than the radius of the slide guide block/rail corner.

The accuracy of the rail mounting surface affects the accuracy of the machinery or equipment along with the slide guide motion accuracy.

The accuracy of the mounting surface should be equivalent to that of the slide guide motion accuracy. The specified preload may not be achieved due to deformation of the block, for example, the mounted block surface is not flat (Figure A-8). Careful attention should therefore be given to achieve the specified flatness.

Note: Please contact NB for the rail straightness in case the mounting shoulder cannot be provided or the rigidity of the mounting surface is not enough.

Reference Surface Indication

Reference surfaces are provided to enable accurate and simplified mounting. They are located on the same side, as shown in Figure A-9, opposite to the NB mark.

Depending on the mounting arrangement, the standard reference surface may not ensure mounting accuracy (for example, 1 rail sideways or 2 rails opposing, Figure A-6, page A-7). In such cases, NB can provide a reference surface on the opposite side. Please specify the side when ordering.

Figure A-7 Profile of Mounting Reference Surface

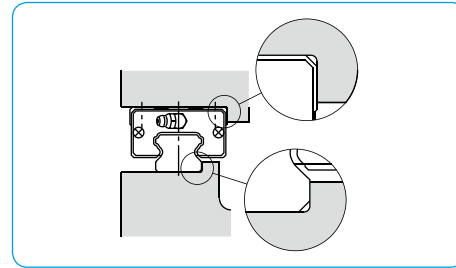


Figure A-8 Effect of Flatness

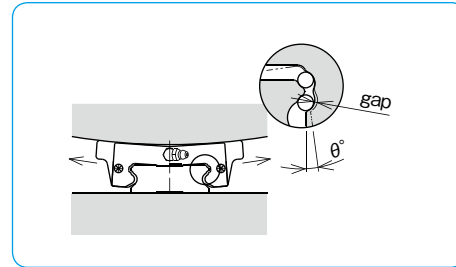
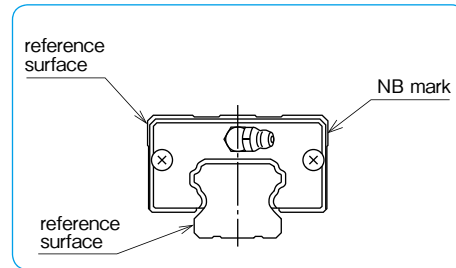


Figure A-9 Reference Surface



Mounting

In general, slide guides are used with 2 rails in parallel. In that case, one rail is on the so-called reference side and the other is on the so-called adjustable side.

- Applications where shock/vibration and high load are involved/high accuracy is required. The effect of shock and vibration on accuracy is eliminated by using side pieces such as side plates (Figure A-10), tightening set screws (Figure A-11), or tapered gibs (Figure A-12).

Figure A-11 Using Tightening Set Screw

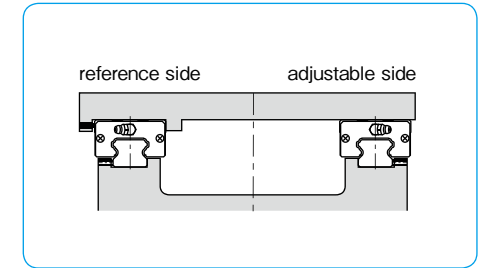


Figure A-10 Using Side Plate

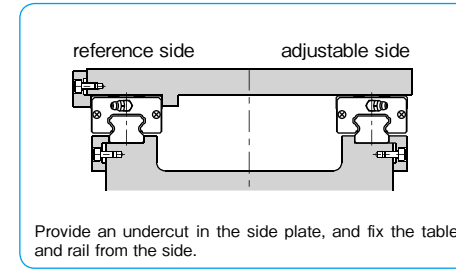
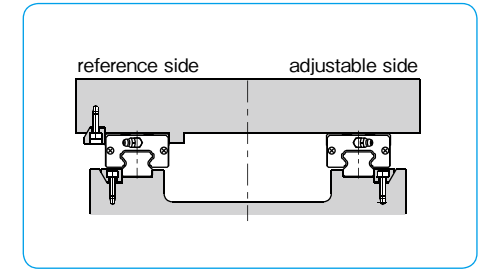


Figure A-12 Using Tapered Gib



- Applications where light load and low speed are involved.

Figures A-13~15 show the mounting methods when high accuracy is not required or the load capacity of the slide guide is sufficient due to a light load or low speed. In these cases, side pieces or reference surface may not be required.

Figure A-14 No Reference Surface on Adjustable Side

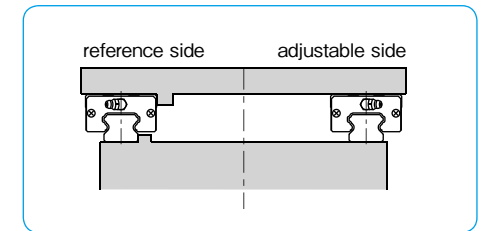


Figure A-13 Without Side Piece

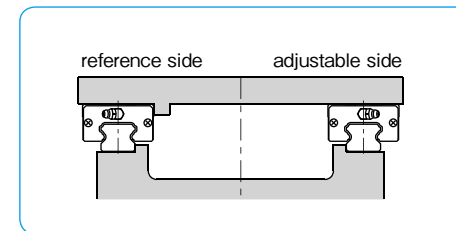
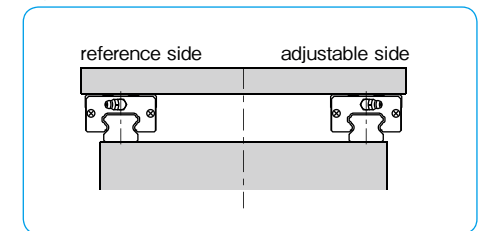


Figure A-15 Without Reference Surface



Mounting Procedure

When reference surfaces are provided for both the table and the base, please follow the following procedure to mount the slide guide.

1. Remove burrs, scratches, dust, etc. from the base and table. Apply a low viscosity oil to the base and the table. Place the slide guide on the base carefully. Temporarily fix the rail mounting screws. (Figure A-16a)

2. Tighten the screw for the side piece so that the installation reference surface and the rail reference surface are in close contact. (Figure A-16b) If a side piece is not provided, use a C clamp to position the mounting reference surface and the rail reference surface so that they contact each other. (Figure A-16d)

3. Tighten the mounting screws to the specified torque, and complete the mounting of the rail. The rail is designed so that its accuracy is optimum when the screws are tightened to the specified value. Please refer to the recommended torque table for each product type. (Figure A-16c)

4. Repeat steps 2 and 3 for the rail on the adjustable side.

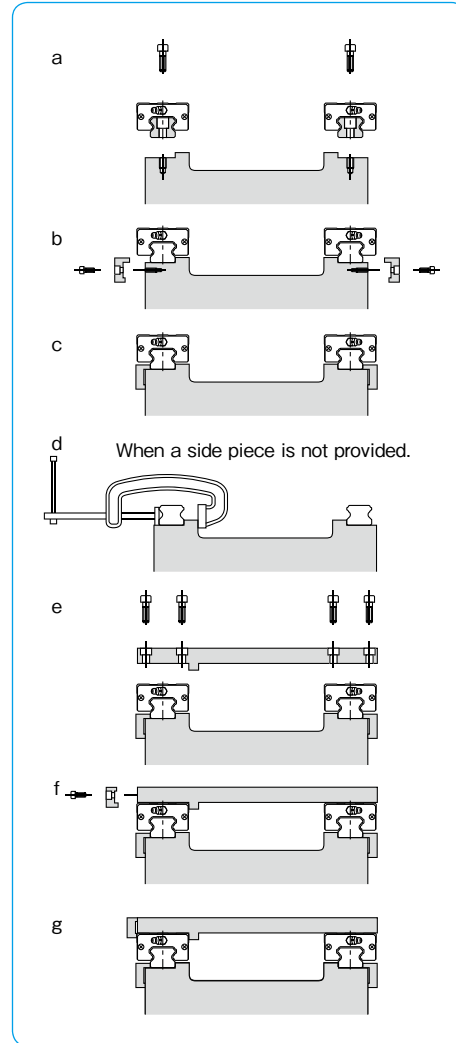
5. Move the blocks at the mounting location of the table, and place the table gently. Then slightly tighten the screws. (Figure A-16e)

6. Fix the reference surface of the block against the table by the side piece. Tighten the mounting screws in a diagonal sequence. (Figure A-16f)

7. In the same manner, tighten the mounting screws for the blocks on the adjustable side. (Figure A-16g)

8. Finally, move the table through the stroke length to check if thrust is even. Please repeat 5 and 6 (2 to 6 when necessary) if thrust is not even. If thrust is even, please do final tightening of the screws.

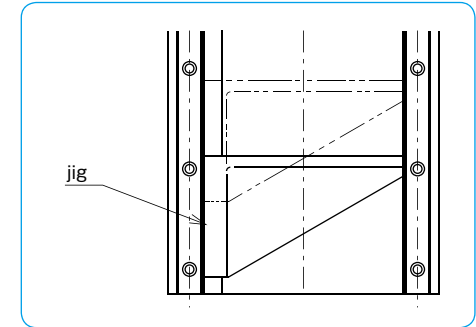
Figure A-16 Mounting Method



When Reference Surface is Not Provided on Adjustable Side

When a reference surface is not provided on the adjustable side, mount the 2 rails in parallel by using a jig, as mounted in Figure A-17. After mounting the reference-side guide, install the adjustable-side guide by moving the table to achieve parallelism.

Figure A-17 Using a Jig



When Reference Surface is Not Provided on Reference Side

When a reference surface is not provided on the reference side, mount the 2 rails by using a reference surface close to the slide guide. Temporarily fix the slide guide to the base, and mount an indicator on a measurement plate. Please fix the measurement plate on two or more blocks. (Figure A-18)

Place the indicator against the reference surface of the base. Tighten the screws from one end of the rail to ensure straightness.

If there is no reference surface close-by, use a straight edge to achieve straightness. (Figure A-19)

Figure A-18 Using Base Reference Surface

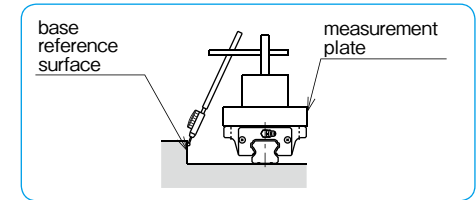
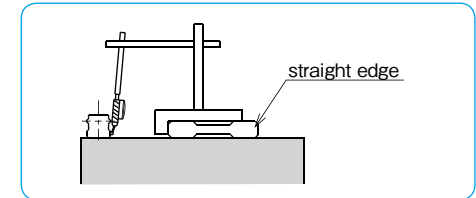


Figure A-19 Using a Straight Edge

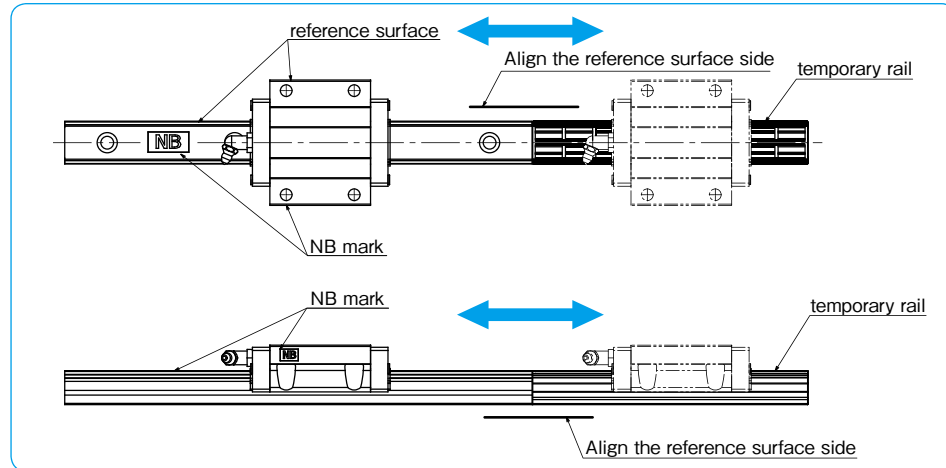


NOTES ON HANDLING AND USE

NB Slide Guides are accurately tuned precision components. Please pay special attention to the following notes.

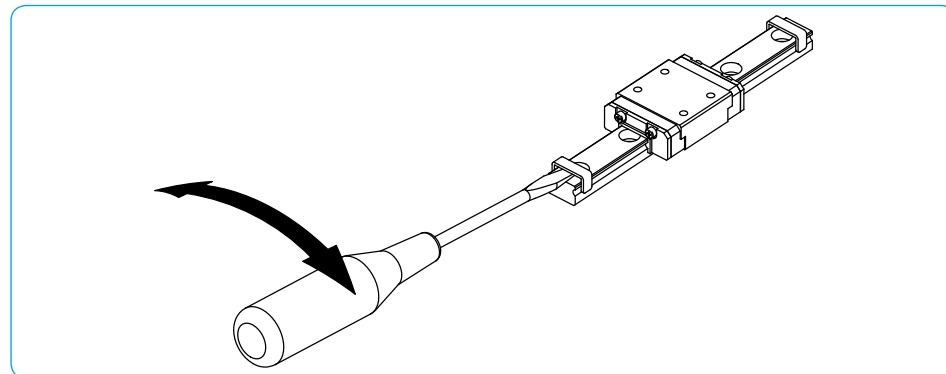
- Please install the Slide Guide as a set. It is not recommended to remove the block for installation.
- When block removal is necessary, please use a temporary (plastic dummy) rail to prevent balls from dropping out.
- To put a guide block on the rail, as the pictures below show, align the reference surface and the height between the rail and a temporary rail. It is very important to maintain the original combination of block(s) and rail.

Figure A-20 How to Put Guide Block on



- Please do not turn around a block on the rail to change the grease-fitting orientation. Relocate fitting to the opposite end by removing red plug, and re-insert red plug to where fitting was originally.
- Never try to disassemble the block. This will most assuredly void warranty of the product.
- Please remove burrs, dust, or any other debris from the base and table before installation.
- Slide Guides are pre-lubricated for immediate use. Please relubricate with a similar type of grease regularly. Special lubricants must be matched with the same type of grease to prevent contamination.
- The SEB(S) and SER(S) Slide Guides have metal clip stoppers (picture below) to avoid a block fall-out during shipment and assembly. Please remove the stoppers only after installation is finished with a screwdriver as these clips should not be used as 'mechanical' stoppers.

Figure A-21 How to Take Off Metal Clip



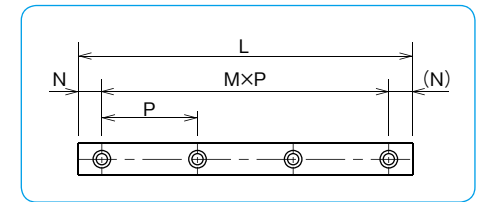
RAIL LENGTH

Guide Rail Length

Please refer to the maximum rail length for each type and size on the dimension table. Unless otherwise specified, the distance from one end of the rail to the first hole center (referred to as dimension "N") is within the range specified in the N dimension tables, satisfying the following equation. Please specify the N dimensions when out of the range.

$$L = M \cdot P + 2N$$

Figure A-22 Rail



L: length (mm) P: hole pitch (mm)
N: distance from the end of the rail to the first hole center (mm)
M: number of pitches.

JOINT RAILS

Rails can be joined together to obtain a length which exceeds the maximum length. There are two ways to do this.

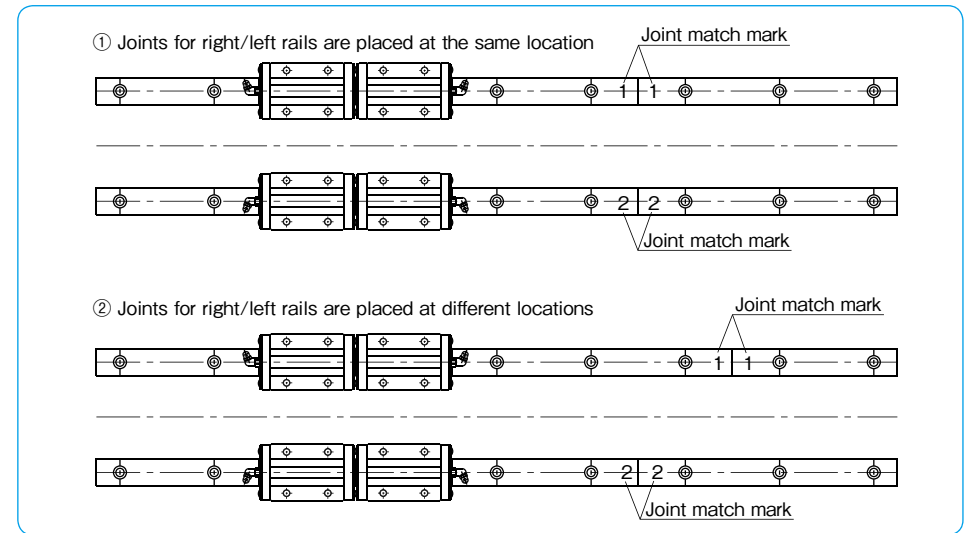
- Place the joints at the same location for the right and left rails so as to make the design and maintenance simple (Figure A-23 ①).
- Place the joints for the right and left rails at different locations so that the block does not move over the two joints at the same time so as to minimize the effect of the joint on accuracy (Figure A-23 ②).

Please keep the following points in mind when using joint rails.

- To avoid dislocation at joints due to shock loading, provide a shoulder at the joint on the installation side.
- If a shoulder cannot be provided, make sure that any excess load does not change the rail position.
- Use the joint marks provided for installation.
- Tightly butt the rails to be joined so that there is no gap between them.
- Make sure the reference surface side of the joint rails to be aligned.

Note: Joined rails are available for SGL and SGW series with standard grade, high grade, and with standard preload. For joined rails on SEB series, please contact NB. Joined rails are not available for SER series.

Figure A-23 Examples of Joined Guide Rails



DUST PREVENTION

Seals

Side-Seal

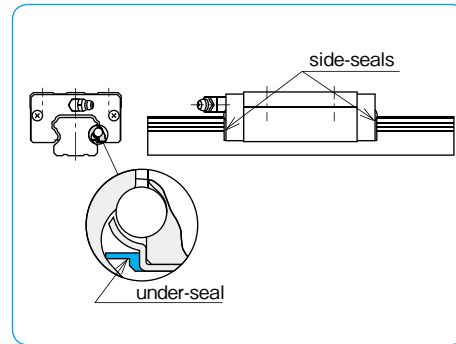
(Series: SEB, SER, SGL, and SGW)

The side-seals prevent foreign particles and dust from entering the guide block in order to retain the motion accuracy, resulting in a long life time.

Under-Seal (Series: SGL and SGW)

Slide guides with side and under-seals are used in harsh environments or to prevent dust entering from below.

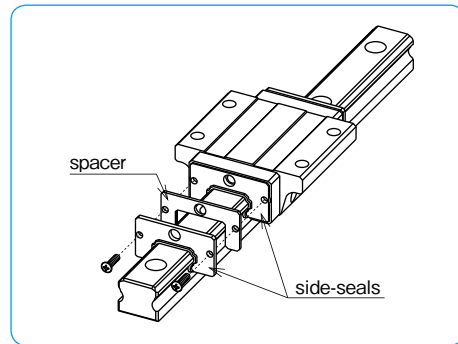
Figure A-24 Side-Seal and Under-Seal



Double Side-Seal Option (Series: SGL)

With this option, the prevention against dust is greatly improved. Ideal for use in applications where bellows or covers are not able to be fitted over the slide guide system.

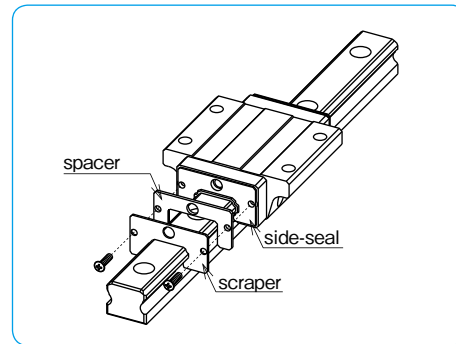
Figure A-25 Double Side-Seal



Scraper Option (Series: SGL)

When the application environment has unfavorable foreign matter or debris such as welding splatter or cutting debris, the scraper option provides an effective protective measure for the slide guide system.

Figure A-26 Scraper



No Side-Seal (Series: SEB and SER)

When the presence of dust or debris is extremely low and only minor motion resistance is desired, a no side-seal option is available. Be aware that, with this option, dust prevention can not be expected.

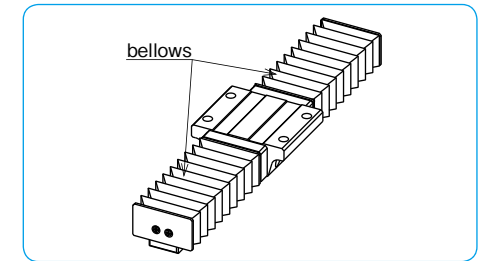
Double Side-Seal + Scraper Option (Series: SGL)

Double side-seal plus scraper is also optional. Please contact NB for details.

Bellows Option (Series: SGL)

This option fully covers the guide rail preventing dust, debris, and other foreign particles from disrupting the smooth linear motion. (Refer to page A-18 for further details)

Figure A-27 Bellows



Special Cap

For SGL and SGW guides, special rail mounting caps are available to prevent dust from entering the mounting holes.

These caps are installed, after the rail is fixed to the base, by using a jig and slowly inserting them into the holes until their top surface is flush with the rail surface.

Figure A-28 Special Cap

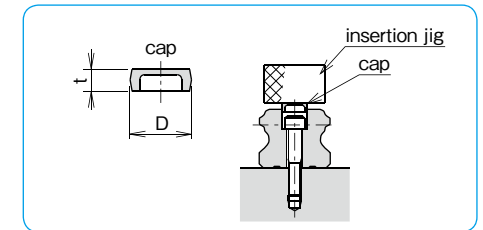


Table A-3 Special Cap

part number	dimensions		applicable part number		
	D mm	t mm	SGL-F,E, TF,TE	SGL-HTF,HYF HTE,HYE,HTEX	SGW
F 3	6.1	1.3	15	—	—
F 4	7.6	1.1	15D	15	17,21,27
F 5	9.7	2.5	20	20	—
F 6	11.2	2.7	25,30	25	35
F 8	14.3	3.65	35	30,35	—
F12	20.3	4.65	—	45	—

ANTI-CORROSION

For anti-corrosion, the SEB/SER series and SGL-F/TF types are available in stainless steel material. Low temperature black chrome treatment can be specified for the SGL and SGW series. This treatment (LB) is suitable for applications where corrosion resistance is a requirement.

LUBRICATION

Lithium soap based grease is applied to NB slide guides prior to shipment for immediate use. Please relubricate with a similar type of grease periodically depending on the operating conditions.

The **Fiber Sheet** and Reverse-Seal are available which significantly extends relubrication period (refer to page A-16, A-17).

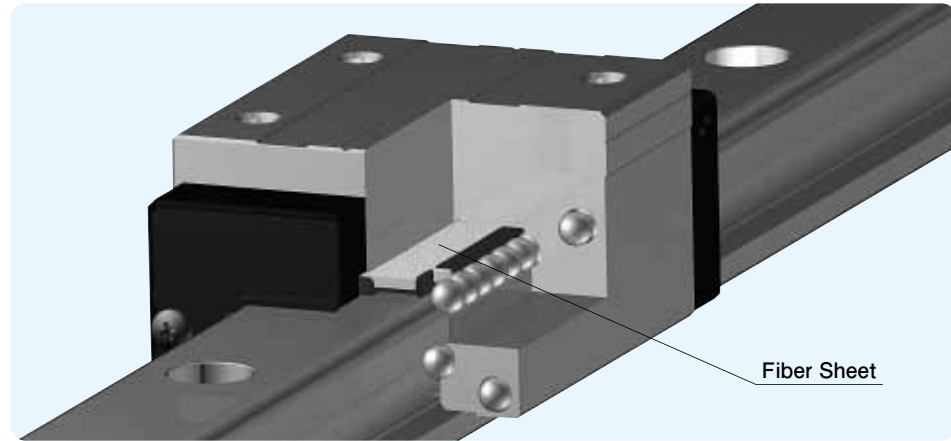
For use in clean rooms or vacuum environments, slide guides without grease or slide guides with customer specified grease are also available. Please contact NB.

NB also provides low dust generation grease. Please refer to page Eng-39 for details.

FIBER SHEET

The Fiber Sheet for the SGL and SGW types, significantly extends lubricant replenishment intervals and has an excellent durability even under harsh conditions with dust and debris that absorb lubricant. Embedded in a block body, as shown in Figure A-29, it does not change the length of the block. In addition, the Fiber Sheet does not require any change in mounting dimensions, which allows replacement with existing products without a design change.

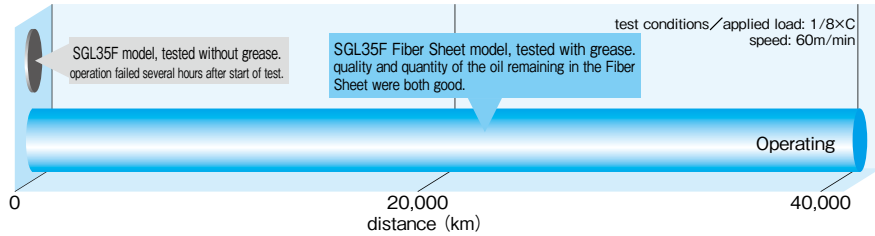
Figure A-29 Magnified View of the Fiber Sheet



Simplified Lubrication Management

NB's Fiber Sheet is a fiber material with a porous structure containing the lubricant oil. The oil is supplied to the ball elements at the proper time and with the proper amount by the principle of capillarity, greatly increasing the relubrication period.

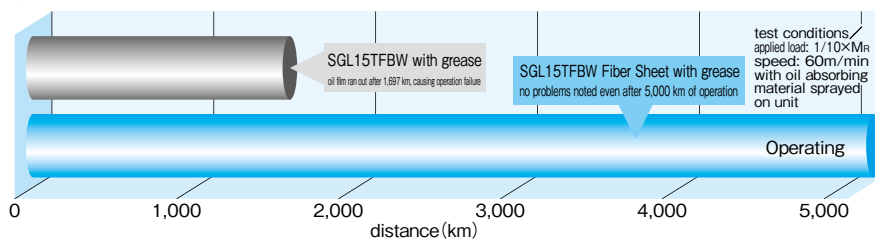
Figure A-30 Durability Test



Outstanding Durability Even Under Poor Operating Conditions

An acceleration test was performed with oil absorbing material sprayed on the units to validate the SGL type's lubrication performance and durability even under poor operating conditions.

Figure A-31 Lubrication Acceleration Test

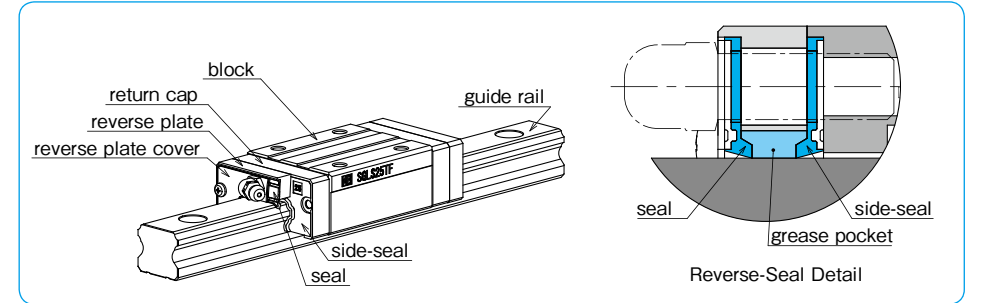


REVERSE-SEAL

NB's Reverse-Seal is a seal unit that consists of reverse plate, seal, and cover.

This seal unit has another side-seal in the reverse orientation to the block, which achieves maintenance free by reducing grease loss.

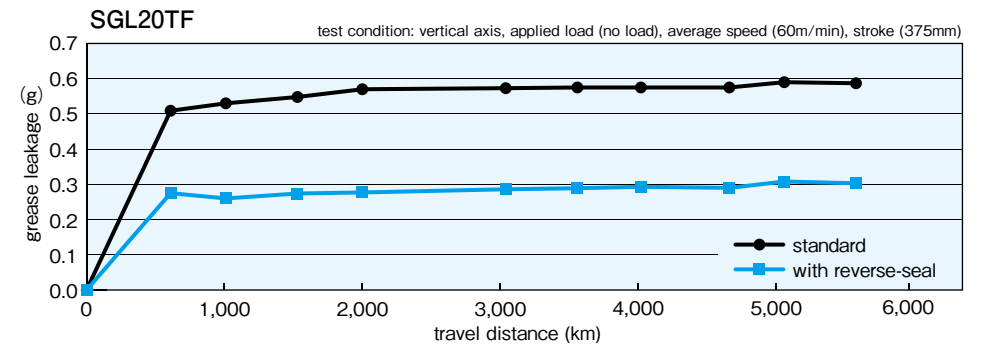
Figure A-32 Reverse-Seal



Reducing Grease Leakage

The space between two seals holds grease to minimize a grease leakage from the block.

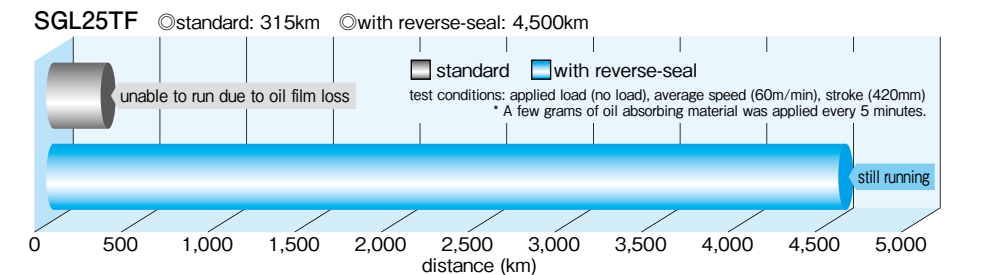
Figure A-33 Grease-leak Test Data



Maintenance Free

Reverse-seal makes a "Grease Pocket" between two seals that realizes maintenance free by reducing grease leakage and loss.

Figure A-34 Grease Dry-up Test Data



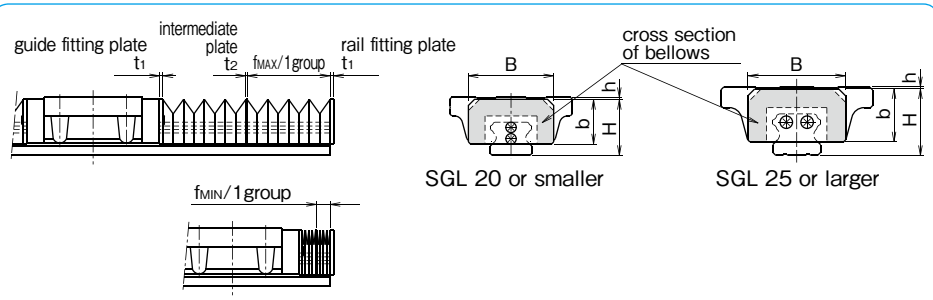
Applicable Part Number

Reverse-Seal (BR option) is available on SGL15,20, and 25.

BELLOWS

By protecting the entire length of the guide rail, the dust prevention is greatly enhanced. Please refer to Figure A-35 for dimensions. External dimensions and the stroke length of slide guide will change with use of bellows.

Figure A-35 Dimensions of Slide Guide with Bellows



Note: Please do not unfasten the guide fitting plate screws. The slide guide becomes unfunctional if the guide fitting plate is removed.

part number	B	H	h	b	t1	t2	fMAX/1group	fMIN/1group
SGL15F/TF/E/TE	33	23	1	19	1.5	1.0	32	6.5
SGL15HTE/HYE/HTEX			5					
SGL15HTF/HYF			3					
SGL20F/TF/E/TE	41	27	1	21.5				
SGL20HTF/HYF/HTE/HYE/HTEX			3					
SGL25F/TF/E/TE			1					
SGL25HTF/HYF	47	32	8	25.5				
SGL25HTE/HYE/HTEX			4					
SGL30F/TF/E/TE			2					
SGL30HTE/HYE/HTEX	5							
SGL30HTF/HYF	2	37						
SGL35F/TF/E/TE	9							
SGL35HTE/HYE/HTEX	1		50					
SGL35HTF/HYF	11							
SGL45HTE/HYE/HTEX	84	59		1				
SGL45HTF/HYF			11					

Note: 1 group indicates the minimum unit of bellows. Please specify the required stroke length.
 When bellows are fitted to the guide block, the grease fitting cannot be installed.
 The allowable temperature is up to 60°C if the system has a bellows option.
 Please contact NB for details on the installation of bellows, as well as for special application usage.

Calculation Method of Length of Bellows and Slide Guide Rail

Example: In this case, one(1) piece of SGL15TE guide block is mounted on a rail with bellows; the required stroke is 440mm.

Number of groups required for a stroke of 440mm is calculated as follows.

$$\frac{\text{Stroke}}{f_{\text{MAX}} - f_{\text{MIN}}} = \frac{440}{32 - 6.5} = 17.2 \approx 18 \text{ groups (round up)}$$

When 18 groups of bellows are fitted, the maximum length f_1 is calculated:
 $f_1 = \text{guide fitting plate} + 1\text{group } f_{\text{MAX}} \times \text{number of groups} + \text{Intermediate plate} \times (\text{number of groups} - 1)$
 $= 1.5 + 32 \times 18 + 1.0 \times (18 - 1) = 594.5$

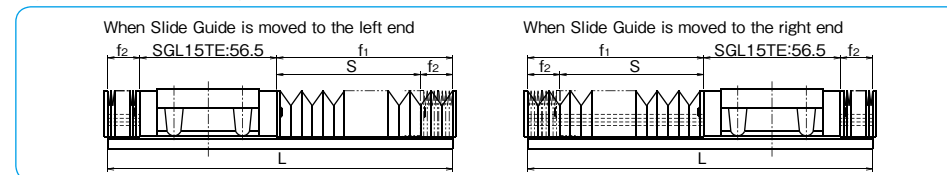
When 18 groups of bellows are fitted, the minimum length f_2 is calculated:
 $f_2 = \text{guide fitting plate} + 1\text{group } f_{\text{MIN}} \times \text{number of groups} + \text{intermediate plate} \times (\text{number of groups} - 1)$
 $= 1.5 + 6.5 \times 18 + 1.0 \times (18 - 1) = 135.5$

With these calculation results, stroke limit (S) and length of the guide rail needed (L) are obtained as follows:

$$S = f_1 - f_2 = 594.5 - 135.5 = 459$$

$$L = f_1 + f_2 + \text{SGL15TE block} = 594.5 + 135.5 + 56.5 = 786.5 \approx 787 \text{ (round up)}$$

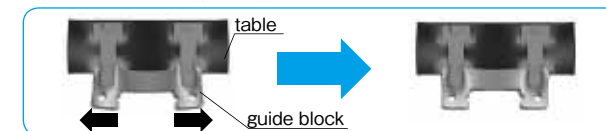
Figure A-36 External Diagram of Slide Guide with Bellows Attached



SEB TYPE AD PROFILE (Anti-Deforming)

The AD profile guide block can dissipate possible deformation by improved installation plane profile.

Figure A-37 SEB type AD profile



Note:

- When NB's unique AD Profile type miniature guide block is selected, the following precautions should be taken into consideration to perform to its utmost advantage.
- To obtain maximum AD (Anti-Deforming) effect, flatness of the mounting surface should be finished the same as motion accuracy of the slide guide.
- When the table is designed with one guide block on one guide rail, the utmost AD effect is anticipated.
- All screws on the slide guide block should be tightened to the equal torque value.
- The AD profile type guide block is available only with standard preload.
- AD profile type guide blocks are available only with following part numbers of slide guide block.

Applicable Part Number

Table A-4 AD profile Applicable Part Number

part number			
SEBS 7B	SEBS 7BM	—	SEBS 7A
SEBS 7BY	SEBS 7BYM		SEBS 7AY
SEBS 9B	SEBS 9BM	SEB 9A	SEBS 9A
SEBS 9BY	SEBS 9BYM	SEB 9AY	SEBS 9AY
SEBS12B	SEBS12BM	SEB12A	SEBS12A
SEBS12BY	SEBS12BYM	SEB12AY	SEBS12AY
SEBS15B	SEBS15BM	SEB15A	SEBS15A
SEBS15BY	SEBS15BYM	SEB15AY	SEBS15AY
SEBS20B	SEBS20BM	SEB20A	SEBS20A
SEBS20BY	SEBS20BYM	SEB20AY	SEBS20AY

part number structure

SEBS 15B UU 2-589 N P AD

AD profile

※Please contact NB for details.

SLIDE GUIDE Miniature SER Type

The NB slide guide SER type is a linear motion bearing utilizing the rotational motion of precision rollers placed in two rows. Despite its compactness, it can be used in various applications requiring high load capacity.

STRUCTURE AND ADVANTAGES

The SER type slide guide consists of a rail with two precision-machined raceway grooves and a block assembly. The block assembly consists of the main body, rollers, and bottom retainers. All of these components are made of metallic materials.

High Load Capacity and Long Life

Since roller elements are used, the contact surface is large which provides a high load capacity and a long travel life.

Compactness

Since a cross roller method is utilized, only two raceway grooves are necessary and presents a very compact package.

Moment Resistant Type

The wide block design (WA type) has an extremely high moment loading capacity. This will allow for single guide designs in the most demanding and compact applications.

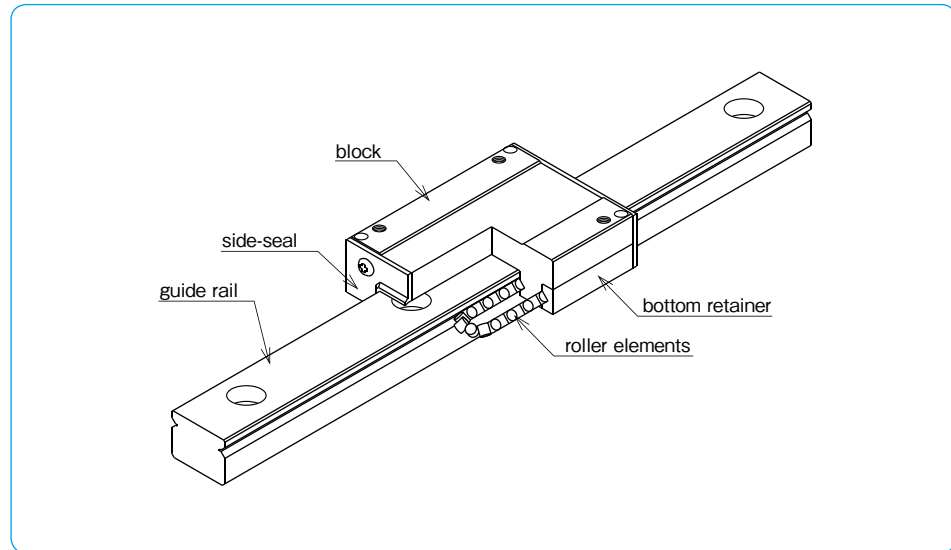
Tapped Hole Rail Type

For the SER rails, counterbore (standard) and optional tapped hole (N) types are available enabling various installation methods.

All Stainless Steel Type

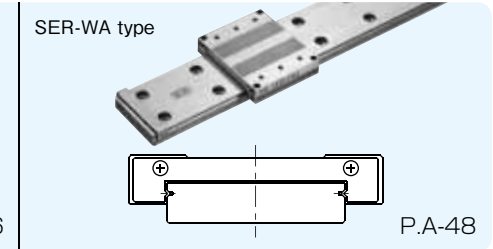
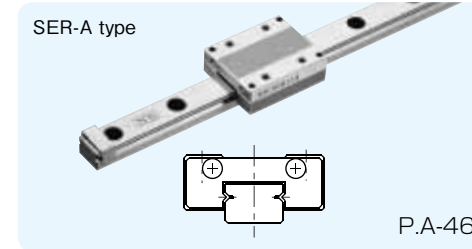
The SERS type slide guide is made of all stainless steel components, making it ideal for high temperature, clean room or vacuum applications.

Figure A-47 Structure of SER type Slide Guide



TYPES

The SER type slide guides are available with a standard block or a wide block (WA) configuration. Each type can be selected with standard rails of counterbore holes or the optional N-Type rails of tapped holes. For anti-corrosion, all stainless steel type is also available with all stainless steel components.



ACCURACY

The SER-type slide guides are available with high grade accuracy (blank) or precision grade accuracy (P).

	unit / mm	
accuracy grade	high	precision
accuracy symbol	blank	P
allowable dimensional difference in height H	±0.015	±0.008
paired difference for height H	0.015	0.007
allowable dimensional difference in width W	±0.020	±0.010
paired difference for width W	0.020	0.010
Running parallelism of surface C to surface A	refer to Figure A-48,49	
Running parallelism of surface D to surface B	refer to Figure A-48,49	

Figure A-48 Accuracy

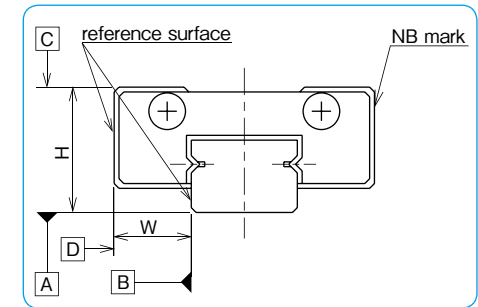
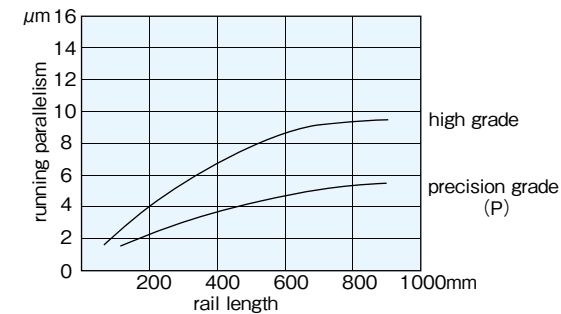


Figure A-49 Motion Accuracy



PRELOAD

The SER(S) type slide guides are available only with a standard (0 to minimal preload) preload.

RAIL LENGTH

Slide guides with most commonly used lengths are available as standard. For slide guides with a non-standard length, unless otherwise specified, the distance from one end of the rail to the first hole center (N) will be within the ranges listed in Tables A-17 and A-18, satisfying the following equation.

$$L = M \cdot P + 2N$$

L: length (mm)
N: distance from the end of the rail to the first hole center (mm)
P: hole pitch (mm) M: number of pitches

Table A-17 N Dimension (standard type) unit/mm

part number		N and over	N less than	L max.
standard	anti-corrosion			
SER 9A	SERS 9A	4	14	275
SER12A	SERS12A		16.5	470
SER15A	SERS15A		24	670
SER20A	SERS20A	6	36	880

Figure A-50 Rail

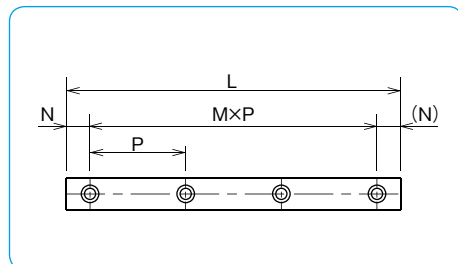


Table A-18 N Dimension (wide type) unit/mm

part number		N and over	N less than	L max.
standard	anti-corrosion			
SER 9WA	SERS 9WA	4	19	290
SER12WA	SERS12WA	5	25	470
SER15WA	SERS15WA			670

MOUNTING

Mounting Surface Profile

Slide guides are mounted by pushing the reference surface of the rail and the block against the shoulder provided on the mounting surface. An undercut or a radius corner should be provided at the corner of the shoulder, as shown in Figures A-51 and A-52, to prevent interference. The recommended shoulder height and corner radius are shown in Table A-19 and Table A-20 respectively.

Figure A-51 Mounting Reference Surface Profile-1

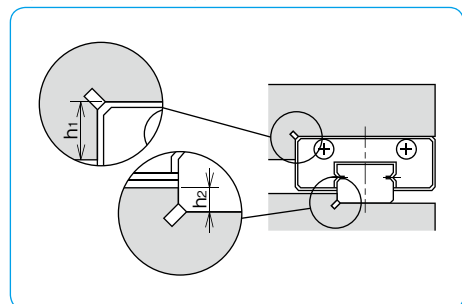
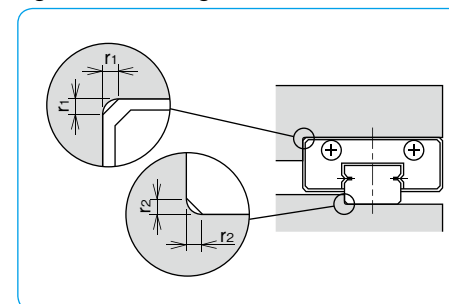


Table A-19 Shoulder Height Dimensions unit/mm

part number	shoulder height on the block side h1	shoulder height on the rail side h2
SER 9A	3	1.5
SER12A	4	2
SER15A	5	3.5
SER20A		5
SER 9WA	3	2.5
SER12WA	4	
SER15WA	5	

Figure A-52 Mounting Reference Surface Profile-2



Recommended Torque Values

The screws to fasten the rail should be tightened to an equal torque using a torque wrench in order to secure the motion accuracy. The recommended torque values are given in Table A-21. Please adjust the torque depending on the operating conditions.

Table A-20 Maximum Corner Radius Values unit/mm

part number	block mounting part r1	rail mounting part r2
SER 9A	0.3	0.1
SER12A		0.3
SER15A		
SER20A		0.5
SER 9WA		0.3
SER12WA		
SER15WA		

Table A-21 Recommended Torque unit/N·m

size	M2	M3	M4	M5	M6
recommended torque	0.3	1.0	2.3	4.7	8.0

(for stainless steel screw A2-70)

MOUNTING SCREW

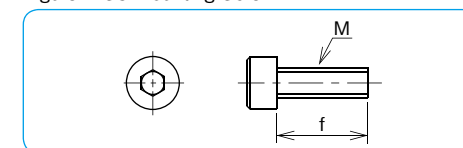
Small screws for the SER(S) type slide guide are available from NB.

Table A-22 unit/mm

size	pitch	length f	application
M2	0.4	4,5,6,8,10	SER 9A

(stainless steel)

Figure A-53 Mounting Screw

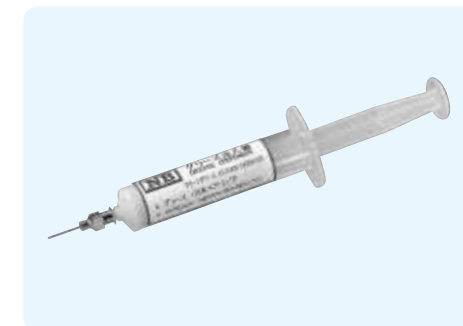


LUBRICATION

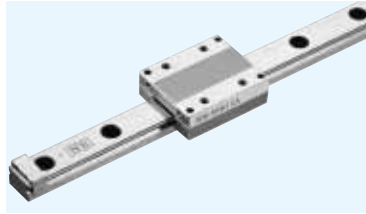
A high grade lithium soap based grease is applied to the NB slide guides prior to shipment for immediate use. Please relubricate with a similar type of grease periodically depending on the operating conditions. For use in clean rooms or vacuum environments, NB slide guides without grease are available upon request. Please contact NB for customer specified grease types.

Please refer to page Eng-39 for details on the low dust generation grease.

A special syringe lubricant dispenser is available from NB as an option (refer to page Eng-42).



SER-A TYPE



part number structure

example **SERS 15A UU 2 - 589 N P / W2**

specification SER: standard SERS: anti-corrosion	size	seal blank: without side-seal UU: with side-seals	number of blocks attached to one rail	symbol for number of axes* blank: single axis W2: 2 parallel axes W3: 3 parallel axes	accuracy grade blank: high P: precision	rail mounting hole blank: counterbore N: tapped hole	total length of rail
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* The symbol for the number of axes does not mean the number of rails ordered.

part number		assembly dimensions		block dimensions							
standard	anti-corrosion	H	W	B	L ₁	L ₂	P ₁	P ₂	S ₁	f	b
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
SER 9A	SERS 9A	10	5.7	20	28	32	15	13	M2	2.5	7.8
SER12A	SERS12A	13	8	27	32	36	20	15	M3	3	10.5
SER15A	SERS15A	16	8.5	32	40	44	25	20		4	11.5
SER20A	SERS20A	25	13	46	60	66	38	38	M4	6	17.5

part number		standard rail length						maximum length
standard	anti-corrosion	L						mm
mm	mm	mm	mm	mm	mm	mm	mm	
SER 9A	SERS 9A	55	75	95	115	155	195	275
SER12A	SERS12A	120	170	220	270	320	370	470
SER15A	SERS15A	150	230	310	430	550	670	670
SER20A	SERS20A	220	280	340	460	640	880	880

M: number of pitches

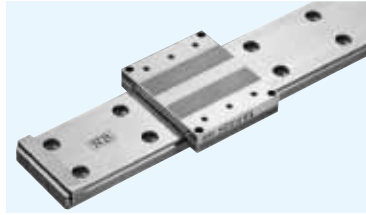
※Please refer to page A-43 for accuracy.

part number		guide rail dimensions				basic load rating		allowable static moment			mass		block size
H ₁	C	S ₂	d×G×h	N	P	dynamic C	static Co	M _P	M _Y	M _R	block g	guide rail g/100mm	block size
mm	mm	mm	mm	mm	mm	kN	kN	N·m	N·m	N·m	g	g/100mm	
5.5	8.6	M4	2.6×4.5×3	7.5	20	2.65	2.94	11.8	13.7	19.6	25	35	9A
7.5	11			10	25	3.43	3.92	15.7	17.6	29.4	51	55	12A
9.5	15	M5	3.5×6×4.5	15	40	4.70	5.78	29.0	32.3	54.9	82	100	15A
15	20	M6		6×9.5×8.5	20	60	8.82	9.80	59.0	66.6	151	280	230

1kN≒102kgf 1N·m≒0.102kgf·m

SER-WA TYPE

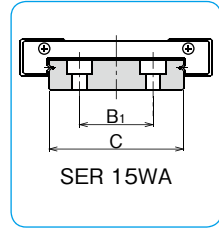
– Wide Type –



part number structure

example **SERS 15WA UU 2 -589 N P /W2**

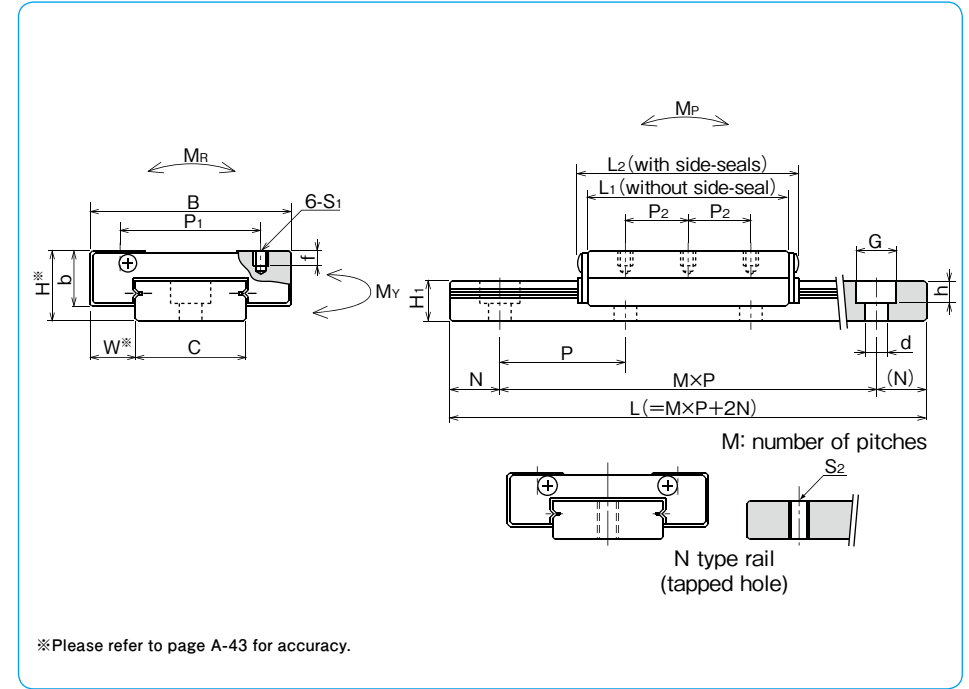
specification SERS: standard SERS: anti-corrosion	size	seal blank: without side-seal UU: with side-seals	number of blocks attached to one rail	symbol for number of axes* blank: single axis W2: 2 parallel axes W3: 3 parallel axes	accuracy grade blank: high P: precision	rail mounting hole blank: counterbore N: tapped hole	total length of rail
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* The symbol for the number of axes does not mean the number of rails ordered.

part number		assembly dimensions		block dimensions							
standard	anti-corrosion	H	W	B	L ₁	L ₂	P ₁	P ₂	S ₁	f	b
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
SER 9WA	SERS 9WA	12	6.5	30	35	39	21	10	M3	3	8.8
SER 12WA	SERS 12WA	14	9	40	40	44	28	12.5			11
SER 15WA	SERS 15WA	16		60	50	54	45	15			M4

part number		standard rail length							maximum length
standard	anti-corrosion	L							mm
mm	mm	mm	mm	mm	mm	mm	mm	mm	
SER 9WA	SERS 9WA	80	110	140	170	200	260	290	290
SER 12WA	SERS 12WA	110	150	190	230	310	390	470	470
SER 15WA	SERS 15WA	150	230	310	430	550	670		670



guide rail dimensions		basic load rating		allowable static moment			mass		block size		
H ₁	C	B ₁	S ₂	dynamic	static	M _P	M _Y	M _R	block	guide rail	block size
mm	mm	mm	mm	C	Co	N·m	N·m	N·m	g	g/100mm	mm
7.5	17	—	M4	3.43	3.72	24.5	27.4	51.9	46	90	9WA
8	22	—	M5	4.41	5.00	35.3	39.2	85.3	92	122	12WA
9.5	42	23		7.35	8.92	55.9	61.7	215.0	165	280	15WA

1kN≒102kgf 1N·m≒0.102kgf·m