

NSK Linear Guide™

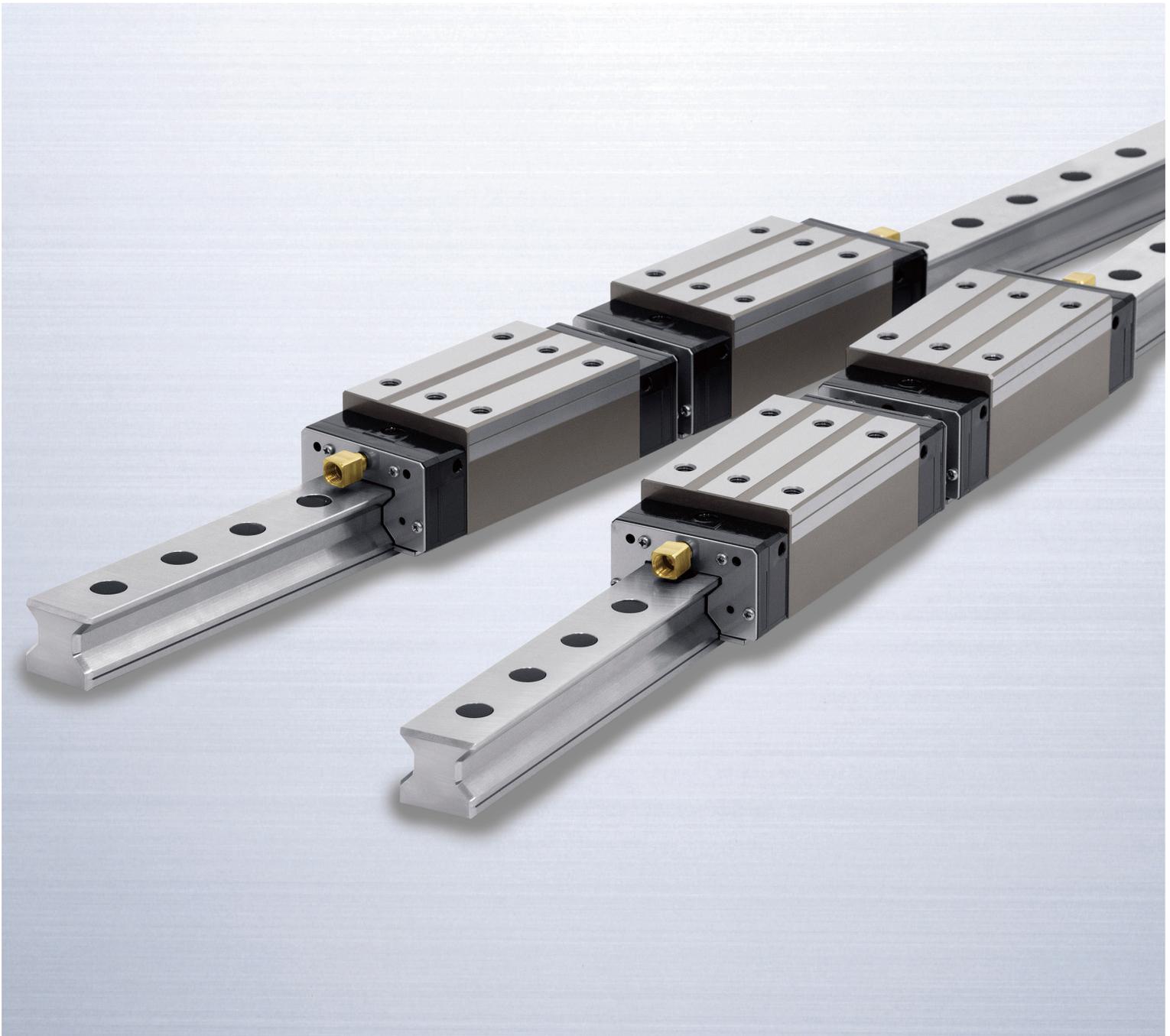
Roller Guides with highly dustproof V1 seals and V1 bottom seals

Equipped with highly dustproof V1 seals and V1 bottom seals which improve dustproof performance of the Roller Guide RA series and, in combination with the lubrication unit NSK K1™, help extend the operating life of machine tools.

Expansion
of the
Series

New!

Patent pending



Roller Guide RA series has built up a solid record in machine tool applications. Now, we have developed a highly dustproof V1 seal and V1 bottom seal to be used with RA Series. Their excellent dustproof performance helps extend the operating life of roller guides in contaminated environments.

Expansion of the Series

Highly dustproof V1 seal (end seal)

For RA25, 30, 35, 45, 55 and 65 (to be installed in place of standard end seal)

Features

■ Highly dustproof performance

Highly dustproof performance and low frictional resistance have been achieved by optimizing the seal lip shape and contact.

■ Maintains highly dustproof performance for a long period

By using a seal material with high abrasion resistance (one-fifth the abrasion of the conventional material in ASTM D1044 taper test), dustproof performance is maintained for a long period of time.

New product

Highly dustproof V1 bottom seal

For RA35, 45, 55 and 65 (to be fitted to the outside of the standard bottom seal)

Features

With the same lip shape as the highly dustproof V1 seal and made with the same material, the V1 bottom seal maintains highly dustproof performance over a long period of time. Foreign matters often enter the slide when it is in certain installation arrangements. By covering the whole bottom base of the slide, the risk of this is substantially reduced. Generally, the V1 bottom seal is used with the highly dustproof V1 seal.

Protector

For RA25, 30, 35, 45, 55 and 65 (to be installed outside the highly dustproof V1 seal)

Features

Steel plate installed to the outside of the highly dustproof V1 seal. Eliminate large foreign matters and protects the V1 seal from hot and hard contaminations.

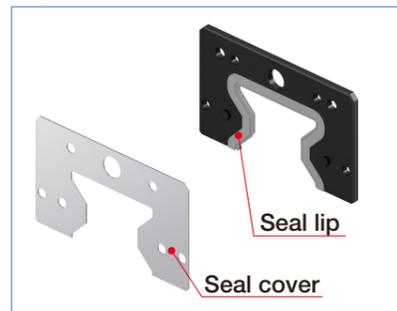
Rail mounting hole cap

For RA25, 30, 35, 45, 55 and 65

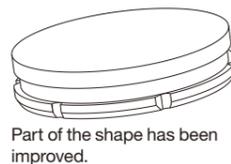
Features

The risk of foreign matter invasion increases when foreign matters accumulate in rail mounting bolt holes. The cap suppresses such accumulations in rail mounting bolt holes, thereby preventing contamination ingress in the slide. The top surface of the rail mounting hole cap is now flatter and more resistant to sinking in response to external force. When a highly dustproof V1 seal is selected, rail mounting hole caps will be supplied with it unless otherwise instructed.

Highly dustproof V1 seal



Rail mounting hole caps



Machine tool covers have become simpler and machined products more diversified. As a result, each component is more prone to exposure to foreign matters. NSK has developed highly dustproof V1 seal and V1 bottom seal for Roller Guide RA series. Combined with other dustproof options (rail mounting hole cap, rail cover, protector) and NSK K1™, roller guides have a longer operating life and enhanced reliability.

NSK K1™ Lubrication unit

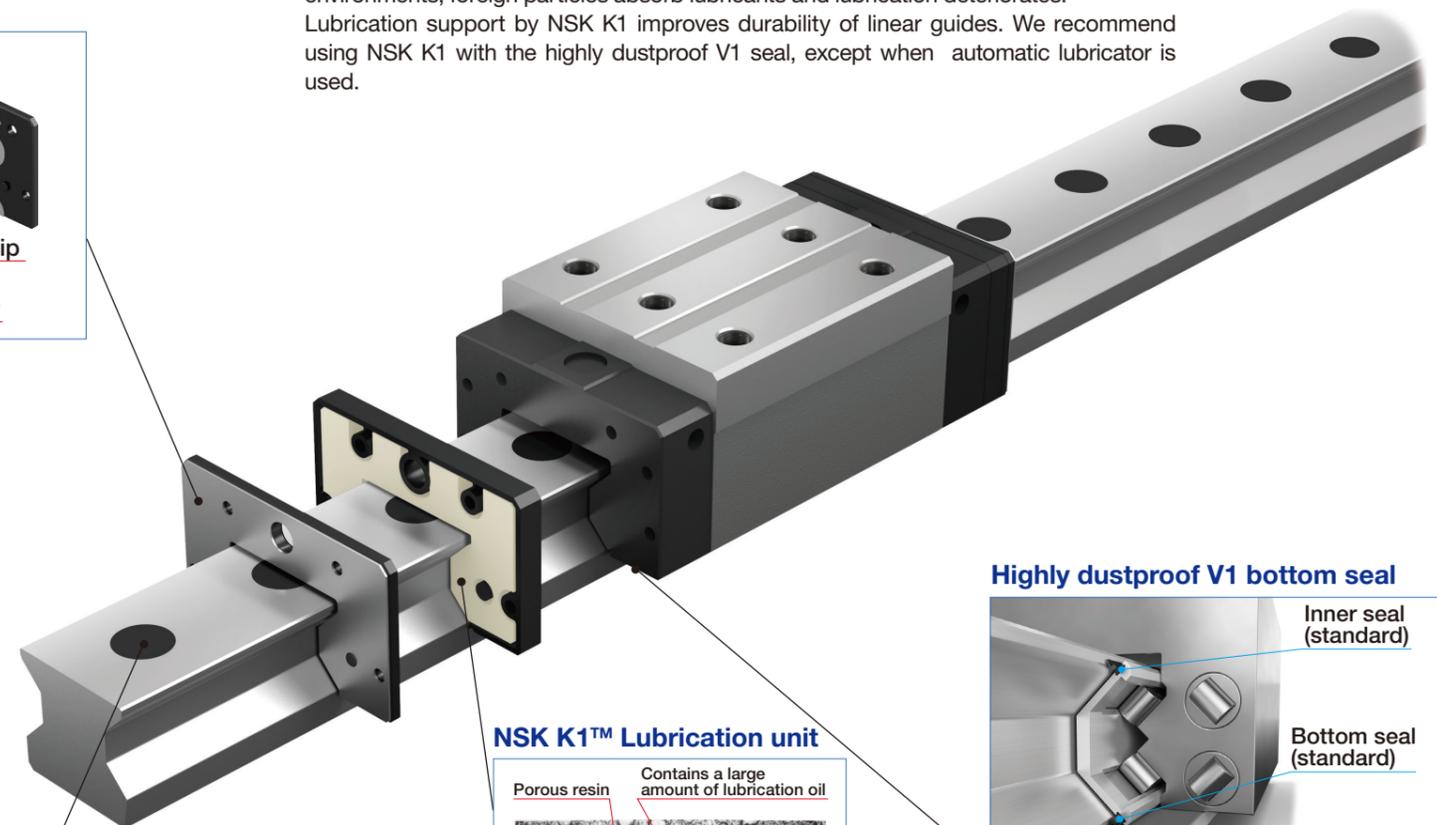
For RA25, 30, 35, 45, 55 and 65

Features

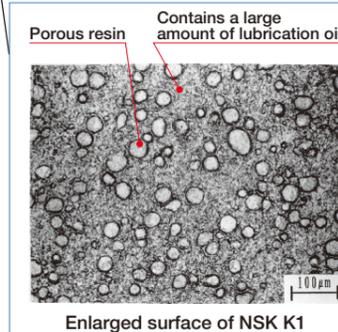
NSK K1 is made of porous resin that contains a large amount of lubrication oil. When moved in contact with the raceway surface, it supplies fresh lubrication oil to the raceway surface.

Replenishing lubricants, such as grease, is vital for linear guides. In contaminated environments, foreign particles absorb lubricants and lubrication deteriorates.

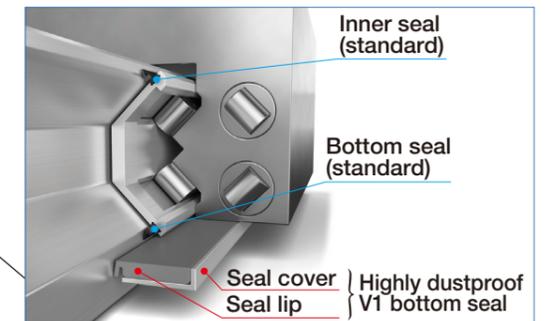
Lubrication support by NSK K1 improves durability of linear guides. We recommend using NSK K1 with the highly dustproof V1 seal, except when automatic lubricator is used.



NSK K1™ Lubrication unit



Highly dustproof V1 bottom seal



Rail cover

For RA25, 30, 35, 45, 55 and 65

Features

A cover for the top surface of rails is available to eliminate foreign matters accumulating in the rail mounting bolt holes. This ensures optimum dustproof performance of the highly dustproof V1 seal.

Rail cover



NSK advanced dustproof technology

The highly dustproof V1 seal and V1 bottom seal prevent foreign matters from getting into the slide, resulting in a longer operating life for roller guides.

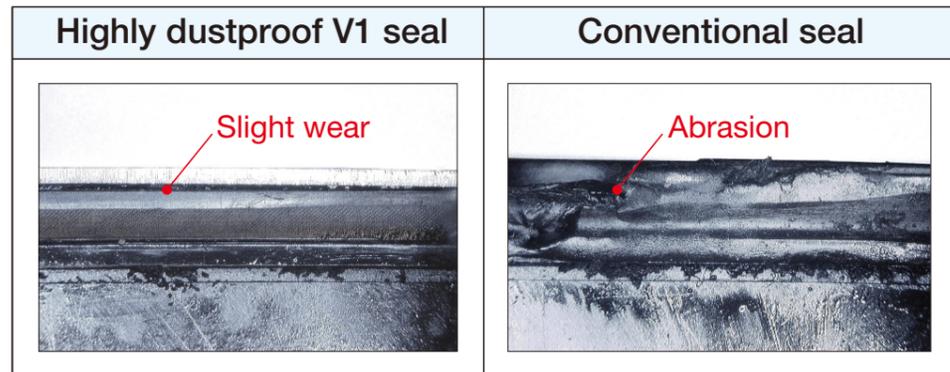
*Acceleration tests shown below were conducted to demonstrate the performance of the seals. Please note that seal performance and durability depends on types of foreign matters and lubrication condition.

Significant durability improvement with new seal lip material

Wear resistance of the seal is important to maintain seal performance. The seal lips of the highly dustproof V1 seal and V1 bottom seal are made with materials with excellent wear resistance.

Wear resistance, together with the optimized shape of the seal lip, greatly improves seal lip durability.

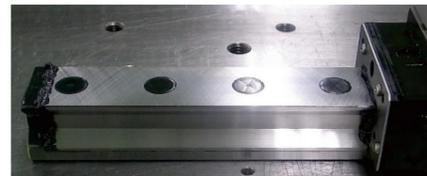
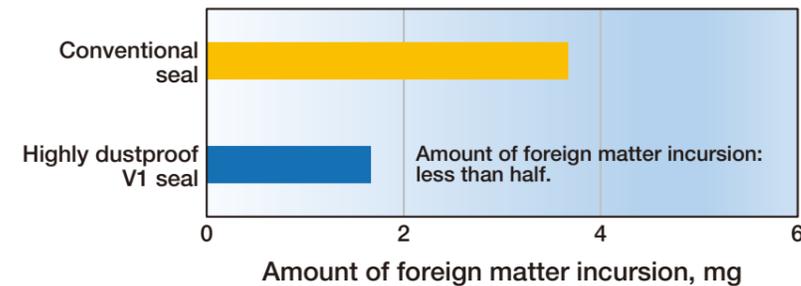
Evaluation method	Check lip condition after a run with unlubricated seal
Sample	RA35 (with a rail cover)
Condition	Travel speed: 30 m/min Travel distance: 40 km
Lubrication	No lubrication (on the seal)



The highly dustproof V1 seal eliminates foreign matters to less than half

Minute foreign matters enter the slide, prevent roller circulation and reduce the operating life of the roller guide. By installing the highly dustproof V1 seal, the amount of foreign matters entering slide has been reduced to less than half.

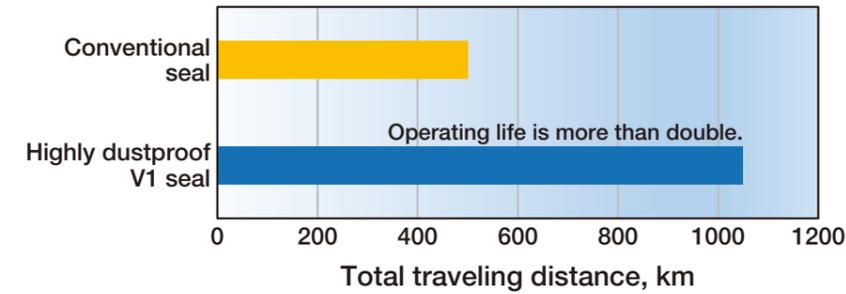
Evaluation method	Apply foreign matters on rail and measure how many of them entered into slide after passing the seal.
Sample	RA35 (with rail mounting hole caps)
Condition	10 cycles at the travel speed of 1 m/min (stroke: 150 mm)
Lubrication	Grease mixed with graphite powder (average grain size: 37 μm) (grease and foreign matter weight ratio: 10:3)



The highly dustproof V1 seal more than doubles the operating life.

Foreign matter such as graphite and wooden chips absorb lubrication oil and thus negatively affect the operating life of roller guides. By installing highly dustproof V1 seal, the operating life of roller guides has more than doubled compared to conventional seals.

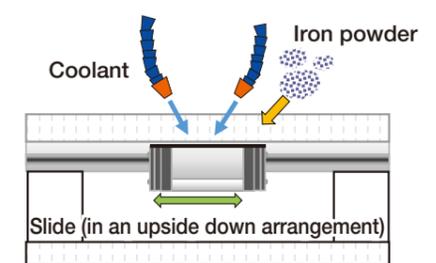
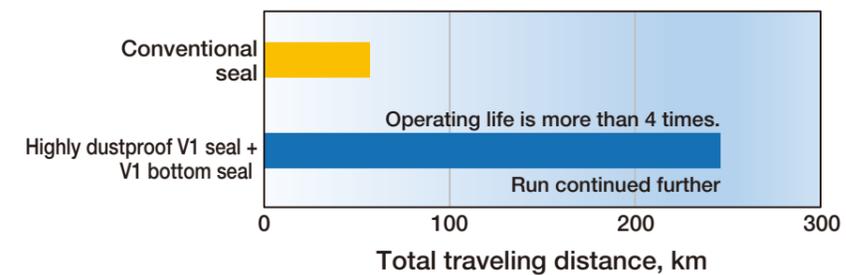
Evaluation method	Install the seal to the roller guide in an environment contaminated with foreign matter, and check the total traveling distance.
Sample	RA35 (with rail mounting hole caps)
Travel speed	60 m/min.
Lubrication	AS2 Grease + NSK K1 lubrication unit
Foreign matter	Graphite powder (average grain size: 37 μm)



Highly dustproof V1 seal and V1 bottom seal have more than 4 times longer life in upside down arrangement

In certain installation arrangements of the roller guides (installing on a ceiling, hanging on a wall), foreign matter can enter from the bottom face of the slide. By installing the highly dustproof V1 seal and V1 bottom seal, foreign matter ingress is substantially reduced and the operating life is more than quadrupled compared to conventional seals.

Evaluation method	Install the seals to the roller guide in an environment contaminated with foreign matter, and check the total traveling distance.
Sample	RA35 (with rail mounting hole caps)
Condition	Travel speed 30 m/min., stroke: 300 mm
Lubrication	AS2 Grease + NSK K1 lubrication unit
Foreign matter	[Coolant 0.2 liter + iron powder/day Iron powder grain size: 150 μm or below At the start of the test, the total amount for one month was added.]



Use of linear guides in a contaminated environment

- (1) Using a linear guide in a contaminated environment has serious effects on lubrication condition and durability of the linear guide. We recommend evaluation tests with your specific application.
- (2) If use in a contaminated environment is expected, fill in the Technical Data Sheet for linear guides in contaminated environments. (Please consult NSK for the details of the Technical Data Sheet.)

Table of dimensions with highly dustproof V1 seal and V1 bottom seal

RA-AN (High-load type/Standard), RA-BN (Super high-load type/Long)
 RA-AL (High-load type/Standard), RA-BL (Super high-load type/Long)

Example of reference number **RA 35 1000 AN P 2 - * * P6 3**

Series	RA	Size	35	Rail length (mm)	1000	Slide code	AN, BN, AL, BL	Seal/Surface treatment code	P: V1 Seal, R: V1 Seal + surface treatment	Preload code 1: Slight preload 3: Medium preload	3
Accuracy code	P3, P4, P5, P6 (without NSK K1) K3, K4, K5, K6 (with NSK K1)		Design serial number (added to the reference number)		* *		Number of slides per rail		2		

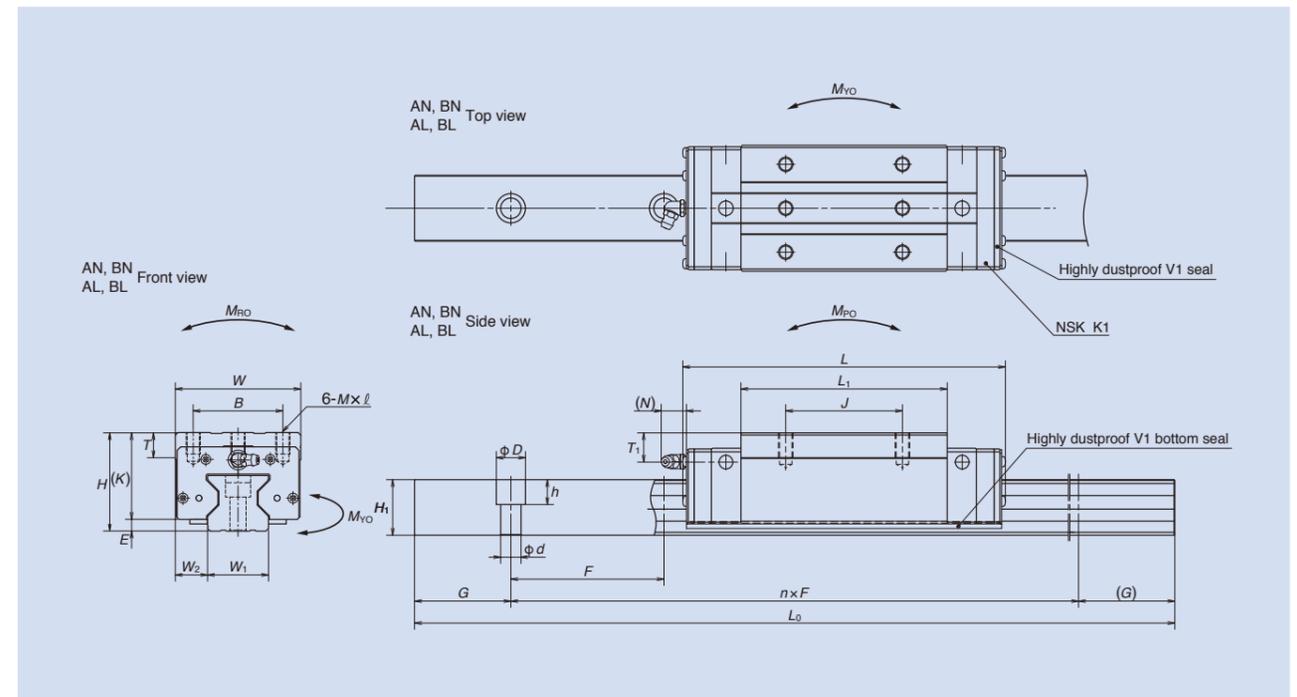
Precautions about highly dustproof V1 bottom seal

Highly dustproof V1 bottom seal is installed on the bottom face of the slide. Pay attention to possible interference with 'shoulder' set up on the machine base.

unit : mm

	RA35	RA45	RA55	RA65
Shoulder height H_{V1}	3	4.5	5.5	9.5
Slide bottom face height E_{V1}	min. 3.7	min. 5.2	min. 6.2	min. 10.2
Slide main body bottom face height E	6.5	8	9	13

Roller guide with highly dustproof V1 seal, V1 bottom seal



Highly dustproof V1 seal and V1 bottom seal are not available as a single item for slides.
 *For details of the RA series, such as accuracy, preload, grease fitting, etc., please refer to NSK Precision Machine Components Catalog CAT. No.E3162 and Roller Guide RA Series Catalog CAT. No. E3328. For any other details, please consult NSK.

unit : mm

Model No.	Assembly				Slide										Grease fitting																																																																																																																																																														
	Height H	E	W_2	Width W	²⁾ Length L			Mounting hole			L_1	K	T	Holesize	T_1	N																																																																																																																																																													
					[Standard]	[V1+K1]	[V1]	B	J	$M \times \text{Pitch} \times \ell$																																																																																																																																																																			
RA25	AN	40	5	12.5	48	97.5	111.3	101.3	35	35	M6x1x9	65.5	35	12	M6x0.75	10	11																																																																																																																																																												
	AL	36																115.5	BN	40	50	35	10	BL	36	31	6	RA30	AN	45	6.5	16	60	110.8	126.8	114.8	40	40	M8x1.25x11	74	38.5	14	M6x0.75	10	11	AL	42	135.4	BN	45	60	38.5	10	BL	42	35.5	7	RA35	AN	55	¹⁾ 6.5	18	70	123.8	140.8	127.8	50	50	M8x1.25x12	83.2	48.5	15	M6x0.75	15	11	AL	48	152	BN	55	72	48.5	8	BL	48	41.5	8	RA45	AN	70	¹⁾ 8	20.5	86	154	173.2	159.2	60	60	M10x1.5x17	105.4	62	17	Rc1/8	20	14	AL	60	190	BN	70	80	62	20	BL	60	52	10	RA55	AN	80	¹⁾ 9	23.5	100	184	203.2	189.2	75	75	M12x1.75x18	128	71	18	Rc1/8	21	14	AL	70	234	BN	80	95	71	11	BL	70	61	11	RA65	AN	90	13	31.5	126	228.4	251.2	236.2	76	70	M16x2x20	155.4	77	22	Rc1/8	19	14	BN	90	302.5	325.3	310.3	120	77	19
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Notes 1) Height of the roller slide bottom face when bottom seal is installed is the dimension of highly dustproof V1 bottom seal when installed. Please refer to the precaution above.
 2) Roller slide length L indicates the following. [V1+K1]: A V1 seal and an NSK K1 on each side of roller slide ends. [V1]: A V1 seal only on each side of roller slide ends.

unit : mm

Rail							Basic load rating								Weight						
Width W_1	Height H_1	Pitch ³⁾ F	Mounting bolt hole $d \times D \times h$	G (Reference)	Max. length L_{0max}	⁴⁾ Dynamic	Static				Slide (kg)	Rail (kg/m)									
							[50km]		[100km]				C_0 (N)	Static moment (N·m)							
						C_{50} (N)	C_{100} (N)	M_{Po} (N)	M_{Po}		M_{Yo}										
									One slide	Two slides		One slide	Two slides								
23	24	30 (60)	7x11x9	20	3 900	36 000	29 200	72 700		970	760		4 850	760	4 850	0.60	3.4				
						43 500	35 400		92 900			1 240				1 240		7 200	1 240	7 200	0.45
28	28	40 (80)	9x14x12	20	3 900	47 800	38 900	93 500	1 670	1 140	7 100	1 140	7 100	1.0	4.9						
						58 500	47 600							121 000		2 170	1 950	11 500	1 950	11 500	0.85
						82 900	67 400							175 000		3 810	3 250	17 800	3 250	17 800	1.3
34	31	40 (80)	9x14x12	20	3 900	65 500	53 300	129 000	2 810	1 800	11 000	1 800	11 000	1.6	6.8						
						82 900	67 400							175 000		3 810	3 250	17 800	3 250	17 800	1.7
45	38	52.5 (105)	14x20x17	22.5	3 650	114 000	92 800	229 000	6 180	4 080	24 000	4 080	24 000	3.0	10.9						
						143 000	116 000							305 000		8 240	7 150	39 000	7 150	39 000	2.5
53	43.5	60 (120)	16x23x20	30	3 600	159 000	129 000	330 000	10 200	7 060	41 000	7 060	41 000	4.9	14.6						
						207 000	168 000							462 000		14 300	13 600	72 000	13 600	72 000	4.1
63	55	75 (150)	18x26x22	35	3 600	259 000	210 000	504 000	19 200	12 700	78 500	12 700	78 500	9.3	22.0						
						355 000	288 000							756 000		28 700	28 600	153 000	28 600	153 000	5.7

3) Pitch of rail mounting bolt hole F has standard dimensions (without parentheses) and semi-standard dimensions (with parentheses). Please select one of them. If no selection is made, standard dimension is applied.
 4) The basic load rating complies with ISO standards (ISO 14728-1, 14728-2). C_{50} : the basic dynamic load rating for 50 km rated fatigue life C_{100} : the basic dynamic load rating for 100 km rated fatigue life

Table of dimensions with highly dustproof V1 seal and V1 bottom seal

Roller guide with highly dustproof V1 seal, V1 bottom seal

RA-EM (High-load type/Standard), RA-GM (Super high-load type/Long)

Example of reference number **RA 35 1000 EM P 2 - ** P6 3**

Series: RA
 Size: 35
 Rail length (mm): 1000
 Slide code: EM, GM
 Seal/Surface treatment code: P: V1 Seal, R: V1 Seal + surface treatment

Preload code 1: Slight preload 1
 3: Medium preload 3

Accuracy code
 P3, P4, P5, P6 (without NSK K1)
 K3, K4, K5, K6 (with NSK K1)

Design serial number (added to the reference number)

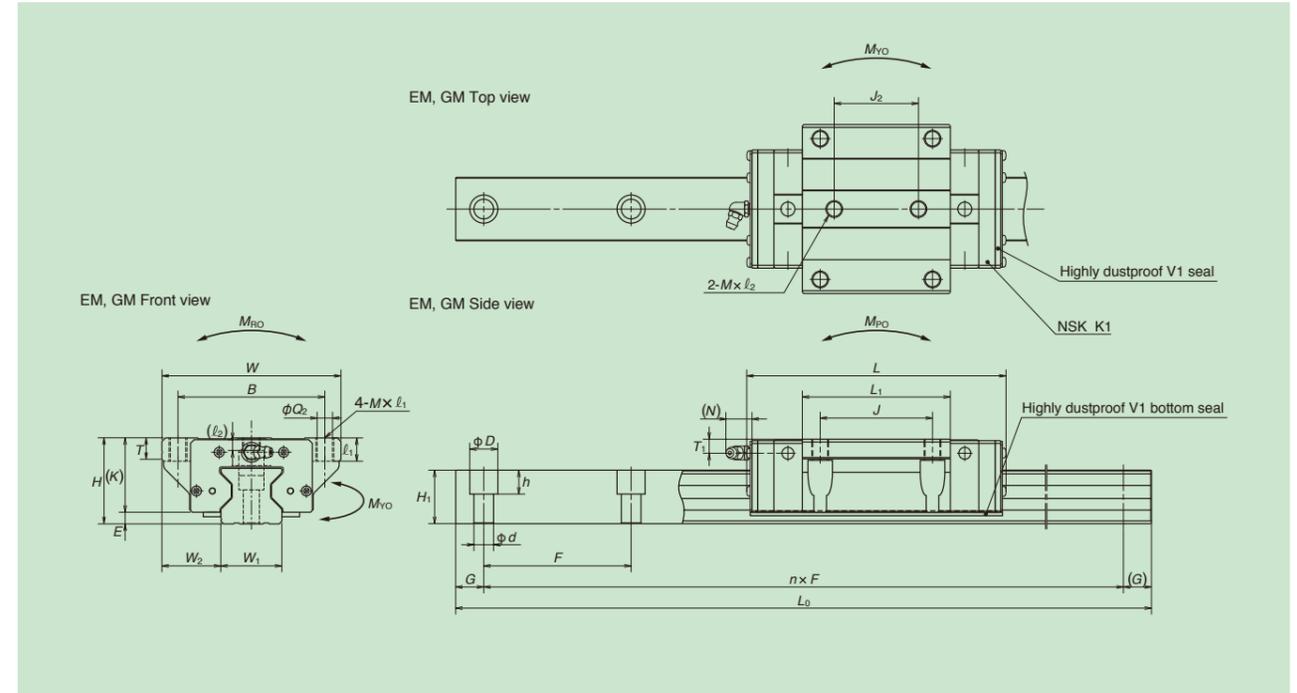
Number of slides per rail

Precautions about highly dustproof V1 bottom seal

Highly dustproof V1 bottom seal is installed on the bottom face of the slide. Pay attention to possible interference with 'shoulder' set up on the machine base.

unit : mm

	RA35	RA45	RA55	RA65
Shoulder height H_{V1}	3	4.5	5.5	9.5
Slide bottom face height E_{V1}	min. 3.7	min. 5.2	min. 6.2	min. 10.2
Slide main body bottom face height E	6.5	8	9	13



Highly dustproof V1 seal and V1 bottom seal are not available as a single item for slides.
 *For details of the RA series, such as accuracy, preload, grease fitting, etc., refer to NSK Precision Machine Components Catalog CAT. No.E3162 and Roller Guide RA Series Catalog CAT. No. E3328. For any other details, please consult NSK.

Model No.	Assembly			Slide															
	Height H	E	W_2	Width W	Length L			Mounting hole						Grease fitting					
					[Standard]	[V1+K1]	[V1]	B	J	J_2	$M \times Pitch \times \ell_1 (\ell_2)$	Q_2	L_1	K	T	Holesize	T_1	N	
RA25	EM	36	5	23.5	70	97.5	111.3	101.3	57	45	40	M8x1.25x10(11)	6.8	65.5	31	11	M6x0.75	6	11
	GM					115.5	129.3	119.3						83.5					
RA30	EM	42	6.5	31	90	110.8	126.8	114.8	72	52	44	M10x1.5x12(12.5)	8.6	74	35.5	11	M6x0.75	7	11
	GM					135.4	151.4	139.4						98.6					
RA35	EM	48	¹⁾ 6.5	33	100	123.8	140.8	127.8	82	62	52	M10x1.5x13(7)	8.6	83.2	41.5	12	M6x0.75	8	11
	GM					152	169	156						111.4					
RA45	EM	60	¹⁾ 8	37.5	120	154	173.2	159.2	100	80	60	M12x1.75x15(10.5)	10.5	105.4	52	13	Rc1/8	10	14
	GM					190	209.2	195.2						141.4					
RA55	EM	70	¹⁾ 9	43.5	140	184	203.2	189.2	116	95	70	M14x2x18(13)	12.5	128	61	15	Rc1/8	11	14
	GM					234	253.2	239.2						178					
RA65	EM	90	13	53.5	170	228.4	251.2	236.2	142	110	82	M16x2x24(18.5)	14.6	155.4	77	22	Rc1/8	19	14
	GM					302.5	325.3	310.3						229.5					

Notes 1) Height of the roller slide bottom face when bottom seal is installed is the dimension of highly dustproof V1 bottom seal when installed. Please refer to the precaution above.
 2) Roller slide length L indicates the following. [V1+K1]: A V1 seal and an NSK K1 on each side of roller slide ends. [V1]: A V1 seal only on each side of roller slide ends.

Rail		Basic load rating										Weight			
Width W_1	Height H_1	Pitch ³⁾ F	Mounting bolt hole $d \times D \times h$	G (Reference)	Max. length L_{0max}	⁴⁾ Dynamic		Static C_0 (N)	M_{RO}	Static moment (N·m)				Slide (kg)	Rail (kg/m)
						[50km] C_{50} (N)	[100km] C_{100} (N)			M_{PO}		M_{VO}			
										One slide	Two slides	One slide	Two slides		
23	24	30 (60)	7x11x9	20	3 900	36 000	29 200	72 700	970	760	4 850	760	4 850	0.80	3.4
						43 500	35 400	92 900	1 240	1 240	7 200	1 240	7 200	1.1	
28	28	40 (80)	9x14x12	20	3 900	47 800	38 900	93 500	1 670	1 140	7 100	1 140	7 100	1.3	4.9
						58 500	47 600	121 000	2 170	1 950	11 500	1 950	11 500	1.7	
34	31	40 (80)	9x14x12	20	3 900	65 500	53 300	129 000	2 810	1 800	11 000	1 800	11 000	1.7	6.8
						82 900	67 400	175 000	3 810	3 250	17 800	3 250	17 800	2.3	
45	38	52.5 (105)	14x20x17	22.5	3 650	114 000	92 800	229 000	6 180	4 080	24 000	4 080	24 000	3.2	10.9
						143 000	116 000	305 000	8 240	7 150	39 000	7 150	39 000	4.3	
53	43.5	60 (120)	16x23x20	30	3 600	159 000	129 000	330 000	10 200	7 060	41 000	7 060	41 000	5.4	14.6
						207 000	168 000	462 000	14 300	13 600	72 000	13 600	72 000	7.5	
63	55	75 (150)	18x26x22	35	3 600	259 000	210 000	504 000	19 200	12 700	78 500	12 700	78 500	12.2	22.0
						355 000	288 000	756 000	28 700	28 600	153 000	28 600	153 000	16.5	

3) Pitch of rail mounting bolt hole F has standard dimensions (without parentheses) and semi-standard dimensions (with parentheses). Please select one of them. If no selection is made, standard dimension is applied.
 4) The basic load rating complies with ISO standards (ISO 14728-1, 14728-2). C_{50} : the basic dynamic load rating for 50 km rated fatigue life C_{100} : the basic dynamic load rating for 100 km rated fatigue life

Dimensions when highly dustproof V1 seal, NSK K1™ lubrication unit and protector are installed

In order to further improve dustproof performance, highly dustproof V1 seal, NSK K1 can be fitted on each end of the slide. The table on the right shows increase of slide length with such additions. Note that friction force also increases.

When a protector is fitted on the outside of a highly dustproof V1 seal, the slide length increases by 1.6 mm (RA25 to RA65) for each protector.

Increase in slide length with dustproof options Unit: mm

Model	NSK K1	Highly dustproof V1 seal	Protector
RA25	2.4	5	1.6
RA30	2.4	6	1.6
RA35	2.4	6.5	1.6
RA45	3	7	1.6
RA55	3	7	1.6
RA65	4	7.5	1.6

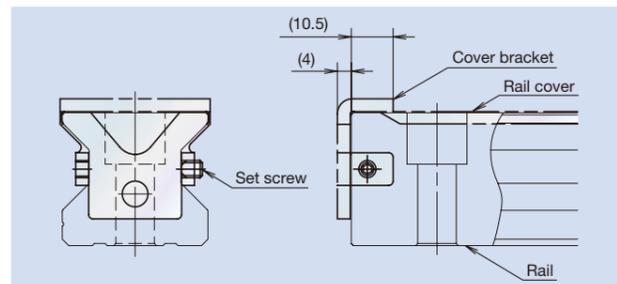
*Dimensional increase by additional sheet of NSK K1 lubrication unit or highly dustproof V1 seal or protector.

Dimensions when rail cover is used

Rail covers are available as optional parts for extreme usage conditions.

The table on the right shows rail height with rail cover

Please consult NSK on the installation method of rail covers.



The end of the rail when rail cover is used

Rail height with rail cover Unit: mm

Model	Standard height H_1	With rail cover
RA25	24	24.2
RA30	28	28.2
RA35	31	31.25
RA45	38	38.3
RA55	43.5	43.8
RA65	55	55.3

Dynamic friction force of seals and NSK K1™ lubrication unit

• The table below shows indications of dynamic friction force per slide in roller guide.

• Dynamic friction force of standard item is based on the assumption of actual use conditions; the standard specifications of the slide (2 end seals with an inner seal and a bottom seal) and the standard grease (AS2 grease) packed into the slide.

• When optional parts are used, dynamic friction force of each part should be added to the dynamic friction force of the standard item (difference with the standard end seal for highly dustproof V1 seal).

Dynamic friction force

Unit: N

Model	Dynamic friction force of standard item (with AS2 grease packed in)	For standard seal friction force	Highly dustproof V1 seal	Highly dustproof V1 bottom seal	NSK K1	
RA25	AN, AL, EM	27	5	6	—	4
	BN, BL, GM	34				
RA30	AN, AL, EM	33	5	8	—	4
	BN, BL, GM	42				
RA35	AN, AL, EM	42	6	10	17	5
	BN, BL, GM	53		21		
RA45	AN, AL, EM	56	8	15	21	7
	BN, BL, GM	69		26		
RA55	AN, AL, EM	80	8	20	25	8
	BN, BL, GM	95		32		
RA65	AN, EM	120	14	25	31	8
	BN, GM	138		41		

*The table shows increase in the dynamic friction force when two items of each optional part are fitted per slide.

Precautions in handling

- ① Maximum operating temperature for roller guide with highly dustproof V1 Seal is 50°C (momentary maximum temperature: 80°C). Do not put it in contact with an organic solvent that removes oil, such as hexane. Do not leave it in kerosene or rust preventive oil that contains kerosene.
- ② In order to insert the cap in to rail mounting bolt hole, use a flat dolly block. Pound the cap gradually until its height become flush with rail top surface. Keeping the rail in a high temperature environment after inserting the caps may cause the caps to sink. Please pay attention.
- ③ Fitting slides to the rail or removing slides from the rail
 - In assembly, please avoid removing the slides from the rail wherever possible.
 - When removing the slides from the rail, or assembling the slides onto the rail, use the provisional rail supplied as an accessory. This will prevent dents, scratches or falling out as a result of excessive power applied to the slides and seal lips.
 - When removing the slides from the rail, or assembling the slides onto the rail using the provisional rail, align the rail and provisional rail in the bottom and side faces, press the end face of the provisional rail against the end face of the rail and move the slides.
 - Please use a clean provisional rail. Do not use an provisional rail which has dust or other types of lubricant



With rail cover



With highly dustproof V1 seal

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