

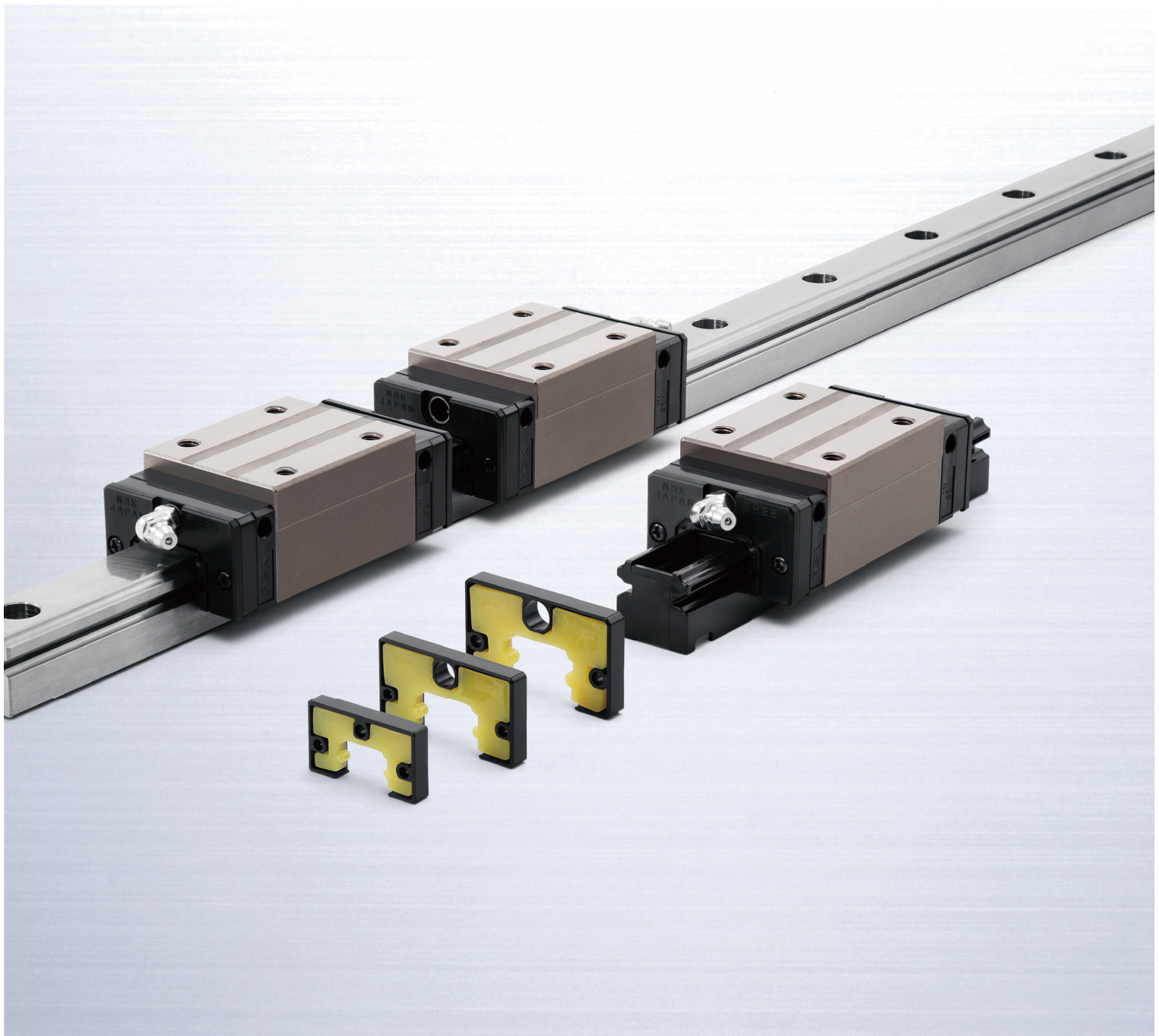
# NSK Linear Guides™

## NSK K1-L Lubrication Unit

Built on 25 years of proven results, the new NSK K1-L unit offers improved lubrication for extended maintenance-free operation.



Patent pending

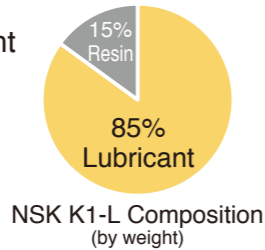


# NSK K1-L™ Lubrication Unit

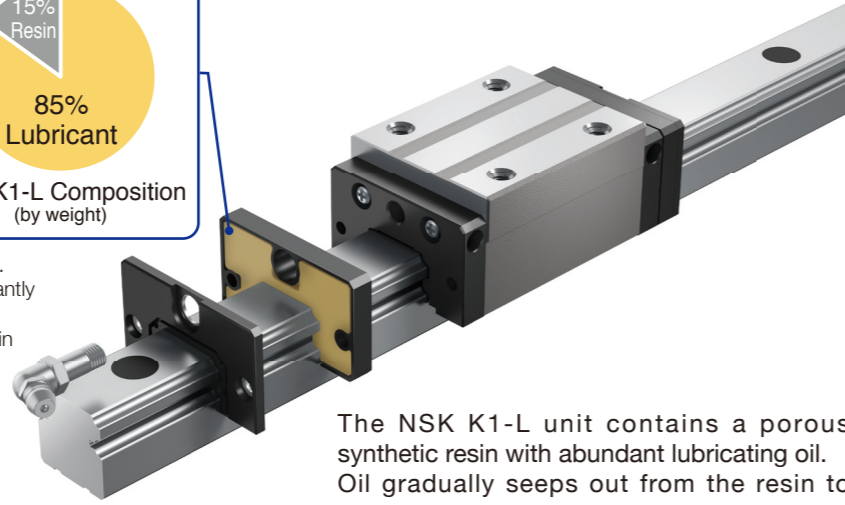
The new NSK K1-L lubrication unit for NSK Linear Guides was developed in response to calls for longer maintenance-free periods and higher machine reliability. With even higher lubricating capabilities than the original revolutionary NSK K1, the new NSK K1-L unit offers extended intervals between equipment maintenance.

## NSK K1-L Lubrication Unit

- About 85% lubricant by weight
- Lubricating oil supply period nearly doubled<sup>1)</sup>



Notes 1) Compared with the conventional NSK K1 unit. Lubrication performance is influenced significantly by the operating environment. There is no guarantee of values/performance in actual equipment.



The NSK K1-L unit contains a porous synthetic resin with abundant lubricating oil. Oil gradually seeps out from the resin to lubricate the linear guide over a long period.

### Compared to NSK K1:

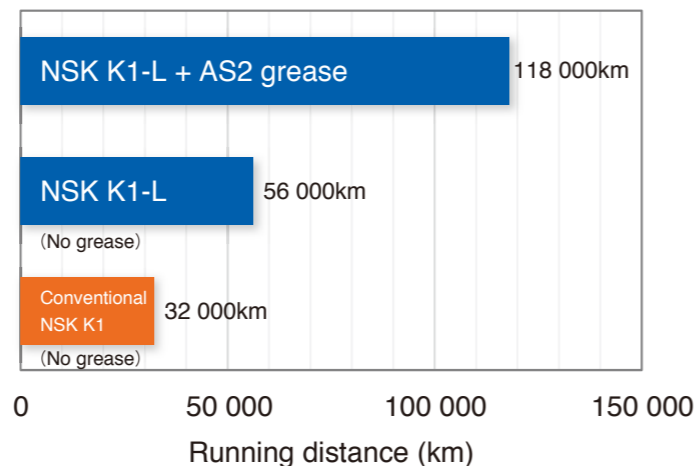
1. NSK K1-L keeps linear guides lubricated for nearly twice as long, extending maintenance intervals.
2. NSK K1-L helps to save energy by reducing dynamic friction force when the slide moves by nearly 20%.
3. The lubricating materials for NSK K1-L are housed in a case to better prevent contaminants from entering the unit.

## Extended maintenance-free operation

The NSK K1-L unit alone achieves a running distance over 50 000 km—nearly double that of the NSK K1. When used with an initial grease fill, the running distance soars to well over 100 000 km—all the while with no need for lubrication maintenance.<sup>2)</sup>

### Endurance test

Model : NH25  
 Preload : Slight preload  
 Feed speed : 3.2 m/s  
 External load : None  
 Lubrication : Lubrication unit (two per slide)



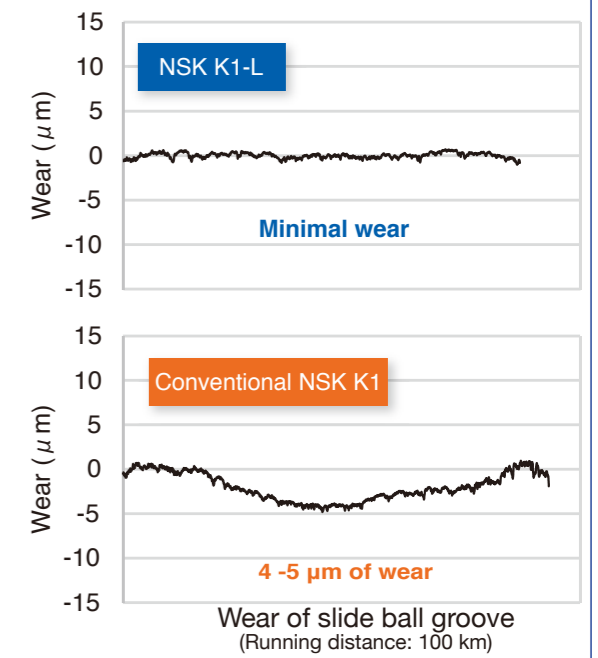
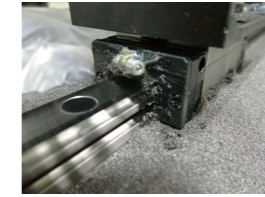
Notes 2) Assuming a light load application in a normal environment. Lubrication performance is influenced significantly by the operating environment. There is no guarantee of values/performance in actual equipment. Note that using a NSK K1-L unit alone (without grease or oil) is not possible in normal operation.

## Longer Life Under Harsh Environments

In environments with harsh contaminants and poor lubrication, ball groove wear can progress extensively. The superior lubricating capabilities of NSK K1-L help to control wear significantly better than the original NSK K1.

### Endurance test under contaminated conditions

Test model : NH25  
 Feed speed : 1 m/s  
 Preload : Slight preload  
 External load : None  
 Lubrication : Lubrication unit (two per slide) + Packed AS2 grease  
 Contamination : Iron powder (particle diameter: 200 -400 μm)  
 Test conditions : Contaminants spread on rail for every 100 full strokes of the slide

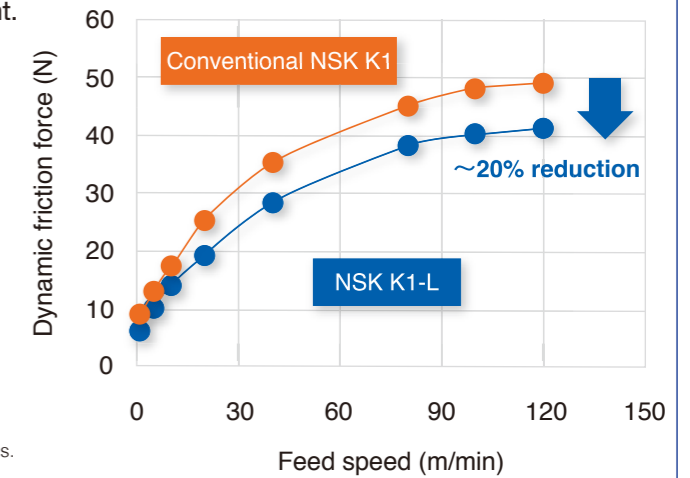


## Reduced dynamic friction while slide moves

The shape of the contact area between the NSK K1-L unit and the rail has been optimized to provide 20% less dynamic friction than NSK K1.<sup>3)</sup> This helps to realize energy savings in the drive equipment.

### Test of measured dynamic friction force

Model : NH25  
 Preload : Slight preload  
 External load : None  
 Lubrication : Lubrication unit (two per slide) + Packed AS2 grease



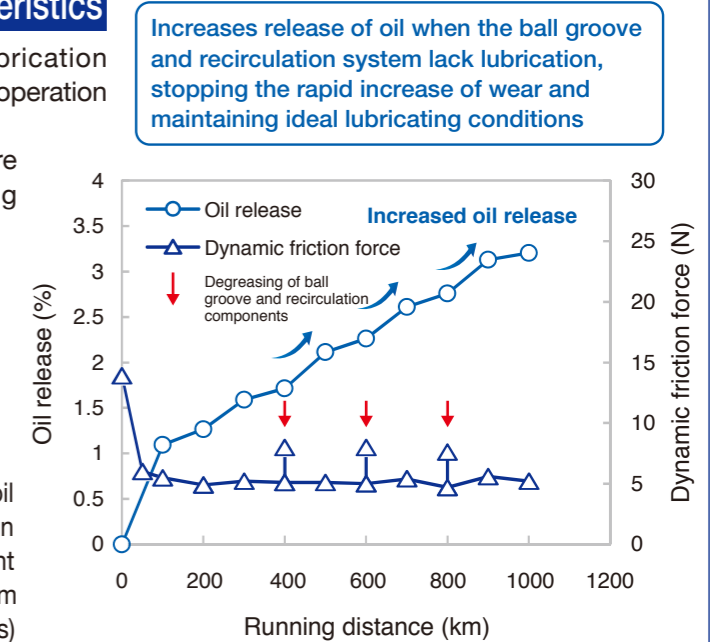
Notes 3) Dynamic friction force is influenced significantly by operating conditions. There is no guarantee of values/performance in actual equipment.

## Excellent oil supply and operating characteristics

The oil released by NSK K1-L increases when lubrication conditions are lacking to maintain smooth and stable operation at all times. By supplying oil as necessary, NSK K1-L helps ensure that linear guides can be used efficiently over a long period.

### Test of measured dynamic friction force

Model : NH25  
 Preload : Slight preload  
 External load : None  
 Lubrication : Lubrication unit (two per slide) + Packed AS2 grease  
 Test conditions : Measurements recorded for amount of oil released and changes in dynamic friction force after repeated removal of lubricant from ball groove and recirculation system (recreation of poor lubrication conditions)



# NSK K1-L Compatibility

NSK K1-L supports general-purpose NH/NS models, highly dust-resistant VH models, high-accuracy HS models, long-life DH/DS, and long-life highly dust-resistant DV models.

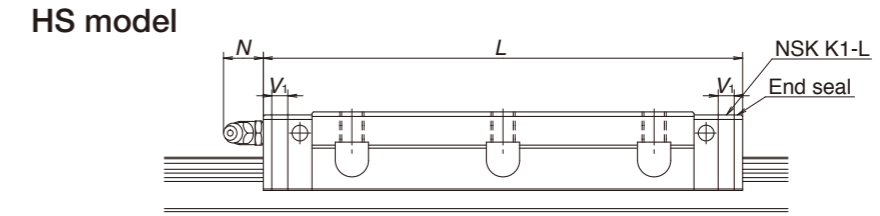
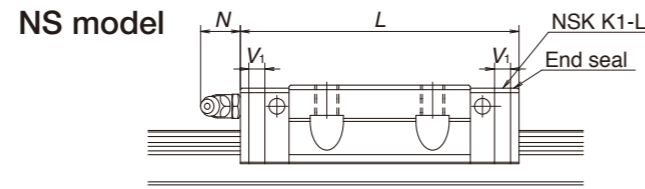
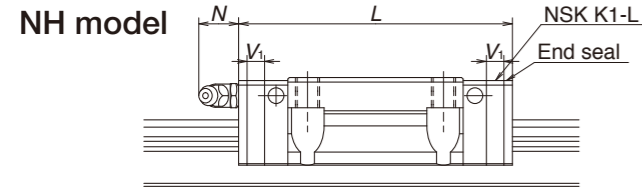


Table 1 General-Purpose Series: NH/NS Model NSK Linear Guides Unit:mm

Model No.	Ball slide shape	Standard ball slide length	Ball slide length with two NSK K1-L units L	Thickness of single NSK K1-L unit V <sub>1</sub>	Protrusion of grease fitting N
NH15	AN, EM	55	65.6	5.3	(5)
	BN, GM	74	84.6		
NH20	AN, EM	69.8	80.4	5.3	(14)
	BN, GM	91.8	102.4		
NH25	AL, AN, EM	79	90.6	5.8	(14)
	BL, BN, GM	107	118.6		
NH30	AL, AN	85.6	97.6	6	(14)
	EM	98.6	110.6		
	BL, BN, GM	124.6	136.6		
NH35	AL, AN, EM	109	122	6.5	(14)
	BL, BN, GM	143	156		
NH45	AL, AN, EM	139	154	7.5	(15)
	BL, BN, GM	171	186		
NH55	AL, AN, EM	163	178	7.5	(15)
	BL, BN, GM	201	216		
NH65	AN, EM	193	211	9	(16)
	BN, GM	253	271		
NS15	AL, EM	56.8	66.4	4.8	(5)
	CL, JM	40.4	50		
NS20	AL, EM	65.2	75.8	5.3	(14)
	CL, JM	47.2	57.8		
NS25	AL, EM	81.6	92.2	5.3	(14)
	CL, JM	59.6	70.2		
NS30	AL, EM	96.4	108.4	6.0	(14)
	CL, JM	67.4	79.4		
NS35	AL, EM	108	121	6.5	(14)
	CL, JM	77	90		

For details about NH/NS model linear guides, refer to the Precision Machine Components catalog (Cat No. E3162).

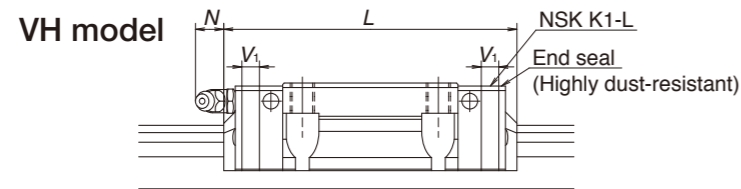


Table 2 General-Purpose Series: Highly dust-resistant VH/VS Model NSK Linear Guides Unit:mm

Model No.	Ball slide shape	Standard ball slide length L (Equipped with two NSK K1-L units)	Thickness of single NSK K1-L unit V <sub>1</sub>	Protrusion of grease fitting N
VH15	AN, EM	70.6	5.3	(1)
	BN, GM	89.6		
VH20	AN, EM	87.4	5.3	(11.1)
	BN, GM	109.4		
VH25	AL, AN, EM	97	5.8	(9.6)
	BL, BN, GM	125		
VH30	AL, AN	104.4	6	(11.4)
	EM	117.4		
	BL, BN, GM	143.4		
VH35	AL, AN, EM	128.8	6.5	(10.9)
	BL, BN, GM	162.8		
VH45	AL, AN, EM	161.4	7.5	(12.5)
	BL, BN, GM	193.4		
VH55	AL, AN, EM	185.4	7.5	(12.5)
	BL, BN, GM	223.4		

VH model linear guides are equipped with NSK K1-L as standard. For details about VH model linear guides, refer to the Precision Machine Components catalog (Cat No. E3162).

Table 3 High-Accuracy Series: HS Model NSK Linear Guides Unit:mm

Model No.	Ball slide shape	Standard ball slide length	Ball slide length with two NSK K1-L units L	Thickness of single NSK K1-L unit V <sub>1</sub>	Protrusion of grease fitting N
HS15	AL, EM	106	115.6	4.8	(5)
HS20	AL, EM	119.7	130.3	5.3	(14)
HS25	AL, EM	148	158.6	5.3	(14)
HS30	AL, EM	176.1	188.1	6	(14)
HS35	AL, EM	203.6	216.6	6.5	(14)

For details about HS model linear guides, refer to the Precision Machine Components catalog (Cat No. E3162).

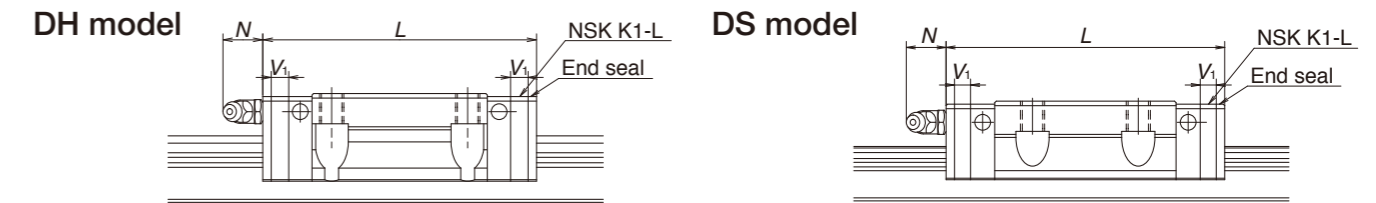


Table 4 Long-Life Series: DH/DS Model NSK Linear Guides Unit:mm

Model No.	Ball slide shape	Standard ball slide length	Ball slide length with two NSK K1-L units L	Thickness of single NSK K1-L unit V <sub>1</sub>	Protrusion of grease fitting N
DH15	AN, EM	55	65.6	5.3	(5)
	BN, GM	74	84.6		
DH20	AN, EM	69.8	80.4	5.3	(14)
	BN, GM	91.8	102.4		
DH25	AL, AN, EM	79	90.6	5.8	(14)
	BL, BN, GM	107	118.6		
DH30	AL, AN	85.6	97.6	6	(14)
	EM	98.6	110.6		
	BL, BN, GM	124.6	136.6		
DH35	AL, AN, EM	109	122	6.5	(14)
	BL, BN, GM	143	156		
DH45	AL, AN, EM	139	154	7.5	(15)
	BL, BN, GM	171	186		
DH55	AL, AN, EM	163	178	7.5	(15)
	BL, BN, GM	201	216		
DH65	AN, EM	193	211	9	(16)
	BN, GM	253	271		
DS15	AL, EM	56.8	66.4	4.8	(5)
	CL, JM	40.4	50		
DS20	AL, EM	65.2	75.8	5.3	(14)
	CL, JM	47.2	57.8		
DS25	AL, EM	81.6	92.2	5.3	(14)
	CL, JM	59.6	70.2		
DS30	AL, EM	96.4	108.4	6.0	(14)
	CL, JM	67.4	79.4		
DS35	AL, EM	108	121	6.5	(14)
	CL, JM	77	90		

For details about DH/DS model linear guides, refer to the Long-Life Series: DH/DS Models catalog (Cat No. E3336).

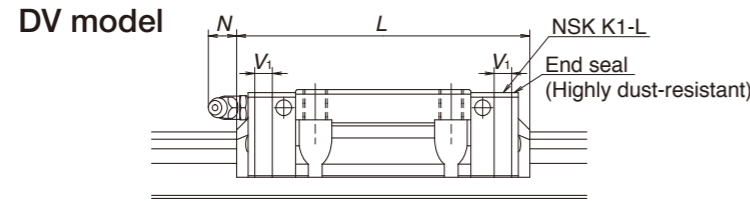


Table 5 Long-Life Series: Highly Dust-Resistant DV Model NSK Linear Guides Unit:mm

Model No.	Ball slide shape	Standard ball slide length L (Equipped with two NSK K1-L units)	Thickness of single NSK K1-L unit V <sub>1</sub>	Protrusion of grease fitting N
DV15	AN, EM	70.6	5.3	(1)
	BN, GM	89.6		
DV20	AN, EM	87.4	5.3	(11.1)
	BN, GM	109.4		
DV25	AL, AN, EM	97	5.8	(9.6)
	BL, BN, GM	125		
DV30	AL, AN	104.4	6	(11.4)
	EM	117.4		
	BL, BN, GM	143.4		
DV35	AL, AN, EM	128.8	6.5	(10.9)
	BL, BN, GM	162.8		
DV45	AL, AN, EM	161.4	7.5	(12.5)
	BL, BN, GM	193.4		
DV55	AL, AN, EM	185.4	7.5	(12.5)
	BL, BN, GM	223.4		

DV model linear guides are equipped with NSK K1-L as standard. For details about DV model linear guides, refer to the Long-Life Series: DH/DS Models catalog (Cat No. E3336).

### Notes on NSK K1-L Units

- Additional NSK K1-L units can be equipped to suit operating conditions and environments. For details, please contact NSK.
- The thickness of a single NSK K1-L unit is equal to the thickness of NSK K1 + the protective cover. However, when multiple NSK K1-L units are equipped, the ball slide length will be longer than with multiple K1 units due to the shape of the case.
- Ball slide length with NSK K1-L = (Standard ball slide length) + (NSK K1-L thickness V<sub>1</sub> × number of units equipped).

### NSK K1-L Specifications

- NSK K1-L units are installed on the inner side of the end seal.
- The inside of the slide is packed with NSK standard grease.
- NSK can install dust-resistant options or apply different grease upon request. Please contact us for details.
- Linear guide accuracy does not affect preload (dynamic friction force will increase slightly with NSK K1-L equipped.)

### Handling Precautions

To maintain the high functionality of NSK K1-L units for a long period, observe the following precautions:

- Operating temperature range: Maximum operating temperature: 50°C (Momentary maximum temperature: 80°C)
- Chemicals to avoid : Do not allow NSK K1-L units to make contact with organic solvents that remove oil, such as hexane and oil thinners. Do not leave NSK K1-L units in white kerosene or rust preventive oils that contain white kerosene.

Note: Water- and oil-based cutting fluid and grease (mineral oil or ester-based) will not cause damage.

### Reference number (Designation)

#### Preloaded assembly

**NH 30 1200 ANC 2 -\*\* L5 3**

NH: NH model NS: NS model  
 VH: VH model HS: HS model  
 DH: DH model DS: DS model  
 DV: DV model

Size 15, 20, 25, 30, 35, 45, 55, 65<sup>4)</sup>

Rail length (mm)

Ball slide shape code AN, BN, AL, BL, EM, GM, CL, JM

Material/surface treatment code<sup>5)</sup>  
 C: Special high carbon steel, K: Stainless steel  
 D: Special high carbon steel + surface treatment, H: Stainless steel + surface treatment

Preload code (refer to Table 7)

Accuracy code (refer to Table 6)

Design serial number

Number of ball slides per rail

Notes 4) Sizes 45 and 55 apply to NH, DH, and VH models only. Size 65 applies to NH and DH models only.  
 5) Stainless steel cannot be selected for DH, DS, or DV models.

#### Slide only (interchangeable type)

**NAH 30 AN S Z -L**

NAH: NH model interchangeable slide  
 VAH: VH model interchangeable slide  
 NAS: NS model interchangeable slide

Size 15, 20, 25, 30, 35, 45, 55, 65<sup>6)</sup>

Ball slide shape code AN, BN, AL, BL, EM, GM, CL, JM

Material code<sup>7)</sup> None: Special high carbon steel, S: Stainless steel

Option code -L: Equipped with NSK K1-L

Preload code  
 None: Fine clearance, Z: Slight preload H: Medium preload

Ref. No. including design serial number **NAH 30 ANC -\*\* LC Z**

NAH: NH model interchangeable slide  
 VAH: VH model interchangeable slide  
 NAS: NS model interchangeable slide

Size 15, 20, 25, 30, 35, 45, 55, 65<sup>6)</sup>

Ball slide shape code AN, BN, AL, BL, EM, GM, CL, JM

Material/surface treatment code<sup>7)</sup>  
 C: Special high carbon steel, K: Stainless steel  
 D: Special high carbon steel + surface treatment, H: Stainless steel + surface treatment

Preload code  
 T: Fine clearance, Z: Slight preload H: Medium preload

Accuracy code LC: Equipped with NSK K1-L

Design serial number

Notes 6) Sizes 45 and 55 apply to NH, VH, and VH models only. Size 65 applies to NH and DH models only.  
 7) Stainless steel can not be selected for interchangeable models with PH or LH accuracy and ZH (medium) preload.

- The design serial number added to the reference number of interchangeable slides may change based on specifications. For details, refer to the Precision Machine Components catalog (Cat No. E3162).
- Special codes different from those above are used in NSK's Quick-Delivery System Click!Speedy™. For details, refer to the Click!Speedy catalog (Cat No. E3191).

Table 6 Accuracy code

	Preloaded assembly					Interchangeable	
	Ultra precision	Super precision	High precision	Precision grade	Normal grade	High precision	Normal grade
Without NSK K1-L	P3	P4	P5	P6	PN	PH	PC
With NSK K1-L	L3	L4	L5	L6	LN	LH	LC

Table 7 Preload code

Preloaded assembly			Interchangeable		
Fine clearance Z0	Slight preload Z1	Medium preload Z3	Fine clearance ZT	Slight preload ZZ	Medium preload ZH
0	1	3	T	Z	H

- Medium preload (Z3) is not available for preloaded assemblies with Normal grade accuracy (PN, LN).
- Fine clearance (ZT) is not available for interchangeable types with High precision accuracy (PH, LH).
- High precision accuracy (PH, LH) is not supported by interchangeable NH, NS, DH, DS, and HS models. PH and LH accuracy is available for preloaded assemblies in these models only.
- HS models support Ultra precision (P3, L3), Super precision (P4, L4), and High precision (P5, L5), accuracy only.

Preloaded assembly : A set accuracy/preload is ensured by the combined rail and slide.

Interchangeable : Rails and slides can be handled separately and freely combined.

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< As of July 2022 >

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