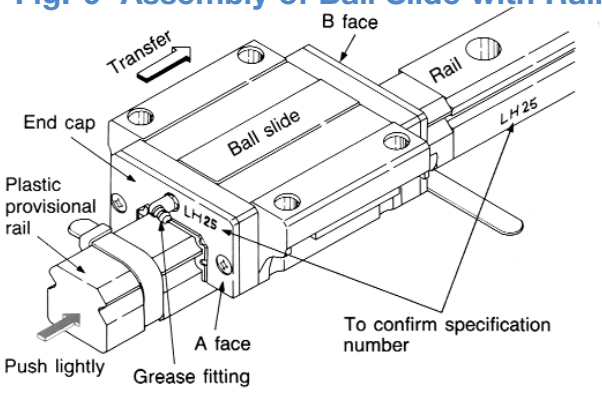
Assembly

Interchangeable ball slides are shipped on (disposable) plastic provisional rails as shown in Fig.-9.

1. Wipe off anticorrosive oil from the rail.
2. Since Alvania (AS2) grease is packed in the ball slide, you can use it as delivered.
3. Align the rail with bottom and side faces of provisional rail and while pushing the provisional rail lightly against the rail, slide the ball slide on to the rail (Fig.-9).

Fig.-9 Assembly of Ball Slide with Rail



Mounting Method

Shoulder Height and Corner Shape at Mounting Face

When utilizing the reference surface to secure rail or ball slides to machine components the components must have the mounting face height (H', H") and corner chamfer (r) dimensions as listed in Table 6 and illustrated in Figs. 10 and 11, to avoid interference.

Table 6 Shoulder height and corner shape at mounting face (LH, LS Series) Unit : mm

Product No.	Radius of corner r (max.)	Shoulder Height of Rail H'	Shoulder Height of Ball Slide H"
15	0.5	4.0	4.5
20	0.5	4.5	5.0
25	0.5	5.0	5.0
30	0.5	6.0	6.0
35	0.5	6.0	6.0
45	0.7	8.0	8.0
55	0.7	10.0	10.0
65	1.0	11.0	11.0

Fig.-10 Rail Datum Face Mounting Part

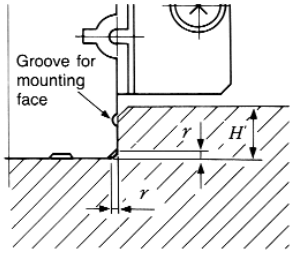
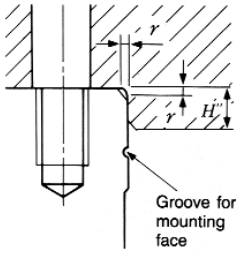


Fig.-11 Ball Slide Datum Face Mounting Part



Mounting Procedure

For cases where datum surface exists on the bed

1. Lightly tighten the rail mounting bolts and then use the shoulder plate to secure rail datum surface against bed mounting surface (See Fig. 12).
2. Tighten rail mounting bolts to their recommended torques (Table 7). Tighten the bolts in an order which enables the wrench to help push the rail against the mounting surface (see Fig. 13 for example).

Fig.-12 Positioning of Rail

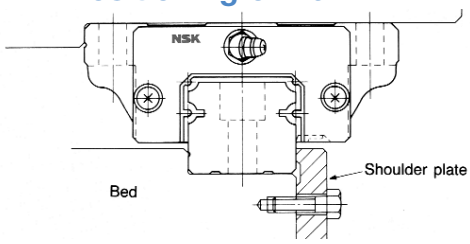
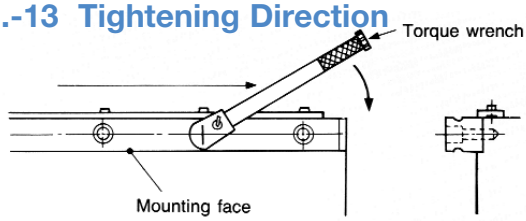


Table 7 Recommended Torque for Rail Mounting Bolt
(case of thermally refined bolt) Unit : kgf•cm

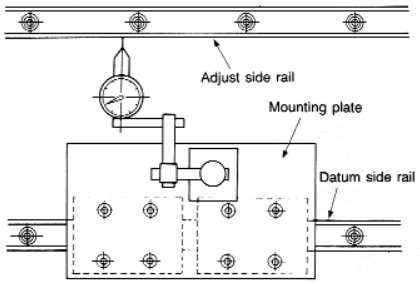
Bolt Nominal No.	Torque	Bolt Nominal No.	Torque
M3	10.8	M10	440
M4	25.0	M12	770
M5	52.0	M14	1240
M6	88.0	M16	2000
M8	220.0	[1 kg•cm=0.8681 Lb in]	

Fig.-13 Tightening Direction



3. Mount the adjust side rail, as shown in Fig.-14, while checking rail parallelism. For the jig shown in Fig.-14, stability will be improved by mounting it on 2 ball slide.

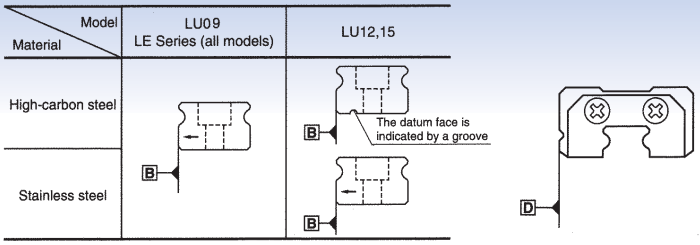
Fig.-14 Parallelism Measurement with Jigs



4. If dowel pins are being used they should be installed at this step.
5. Position the ball slides at specified intervals and mount the table gently.
6. Tighten ball slide mounting bolts of datum side while pushing the table so that the table and ball slide mounting reference surfaces are in contact.

Indication of Installed Standard Side

The datum face of each rail is indicated by a groove in the datum face or by an arrow mark on the end or top surface of the rail.



Lubrication

Grease Lubrication

NSK linear guides are packed with Alvania (AS2) Grease and can be used as delivered. The replenishment frequency is recommended to be once a year, but adjust the interval depending on the operation conditions.

(1) To Change Direction of Grease Fitting

1. Remove the grease fitting with a wrench.
2. Wind some sealing tape on the thread of the fitting, then insert it and tighten. Be careful not to over torque when tightening into the side of the plastic bearing end cap.

(2) Change of Fitting Position in Front/Back Direction

1. Remove the plug from the grease fitting mounting hole face B shown in Fig.-9 with a hexagonal wrench.
2. Remove the grease fitting from face A and screw into hole face B.
3. In place of the removed fitting, insert the plug into the hole in the face A.

(3) Change Grease Fitting Position to Side Surface

To mount the grease fitting on the end cap side face, or on the ball slide face, please consult NSK.

Oil Lubrication

Oil piping can be connected to the tapped hole from where the grease fitting was removed. Piping joints are listed on page 13 and page 21. The recommended lubrication oil supply quantity per ball slide per hour Q is given by the following formula, where N is the rail width number.

$$Q = N \frac{(ml/hr)}{150} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

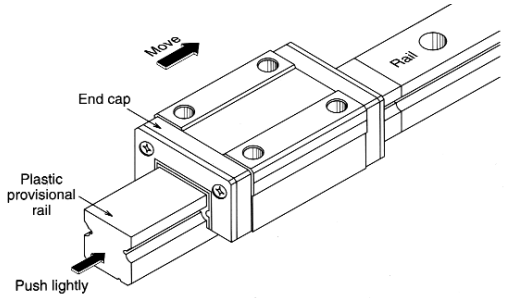
Using LH45 as an example, N=45, and

$$Q = \frac{45}{150} = 0.3(ml/hr)$$

Notes on Usage

Separately packaged ball slide is mounted on a plastic temporary axis (disposable) as shown at left.

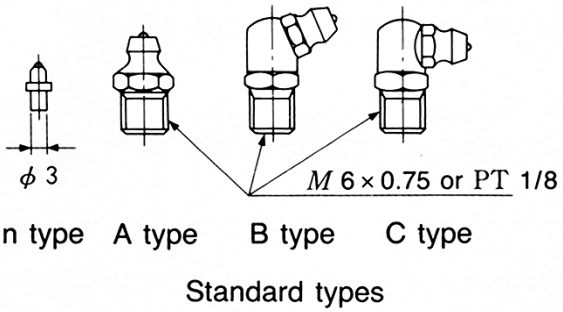
1. Wipe anti-rust oil from the rail.
2. Product is ready for use as is, since Alvania (AS2) Grease is sealed inside the ball slide.
3. Note the groove mark which identifies the datum faces of ball slide and rail above.
4. Move the ball slide, matching and slightly pushing the base and the side of provisional rail to the rail as in drawing at left.



Grease Fittings for NSK Ball Slides

Type	Linear Guide Model #	Grease Fitting Part #	Thread Spec.
Drive	LH15, LS15, LW17	L50010000-301	Dia. 3mm
A	LH,LS 20,25,30,35	L50000000-001	M6X0.75MM
B	Same	L50100000-001	M6X0.75MM
C	Same plus LW21, 27, 35	L50200000-001	M6X0.75MM
A	LH 45, 55, 65	L50003000-001	PT 1/8
B	Same	L50103000-001	PT 1/8
C	Same plus LW50	L50203000-001	PT 1/8

Fig.-15 Shape of Grease Fitting



(1) Applies only to model No. LH15, LS15 and LW17.

NSK Grease Unit

Replenish grease to NSK linear guides and ball screws by a manual type hand grease pump. Install the grease in bellows tube to the pump. Several types of grease (80 g) are available.

Grease in a bellows tube

(1) Composition of NSK Grease Unit

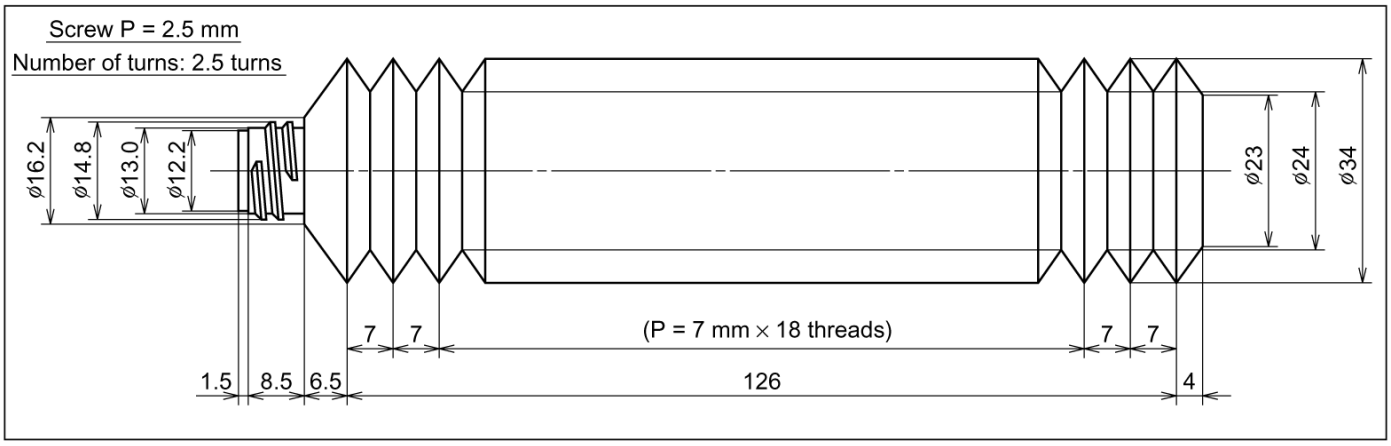
Components and grease types are shown below.

NSK Grease Unit

	Name	(tube type)	Reference number
NSK Grease (80 g in a bellows tube)	NSK Grease AS2	(Brown)	NSK GRS AS2
	NSK Grease PS2	(Orange)	NSK GRS PS2
	NSK Grease LR3	(Green)	NSK GRS LR3
	NSK Grease LG2	(Blue)	NSK GRS LG2
NSK Hand Grease Pump Unit			
NSK Hand Grease Pump (Straight nozzle NSK HGP NZ1 -- One nozzle is provided with the hand pump.)			NSK HGP
Grease nozzle (used with the hand grease pump)			
	NSK straight nozzle		NSK HGP NZ1
	NSK chuck nozzle		NSK HGP NZ2
	NSK drive fitting nozzle		NSK HGP NZ3
	NSK point nozzle		NSK HGP NZ4
	NSK flexible nozzle		NSK HGP NZ5
	NSK flexible extension pipe		NSK HGP NZ6
	NSK straight extension pipe		NSK HGP NZ7

(2) NSK Greases (80 g in a bellows tube)

Bellows tube



(3) NSK manual Grease Pump Unit

1. NSK Hand Grease Pump Unit (Reference number: NSK HGP)

• Features

- Light-weight . . . . . .Can be operated by one hand, yet there is no worry to making a mistake.
- Inserting by high pressure . . .Insert at 15 Mpa.
- No leaking . . . . . .Does not leak when held upside down.
- Easy to change grease . . . . .Simply attach the grease in bellows tube.
- Remaining grease . . . . . .Can be confirmed through slit on the tube.
- Several nozzles . . . . . .Five types of nozzles to choose from.

• Specifications

- Spout volume . . . . . .0.35 g/stroke
- Mass of main body . . . . . .393 g
- Overall length . . . . . .About 200 mm
- Overall width . . . . . .About 200 mm
- Grease tube outer diameter .ø38.1
- Accessory . . . . . .Several nozzles for a unique application can be attached

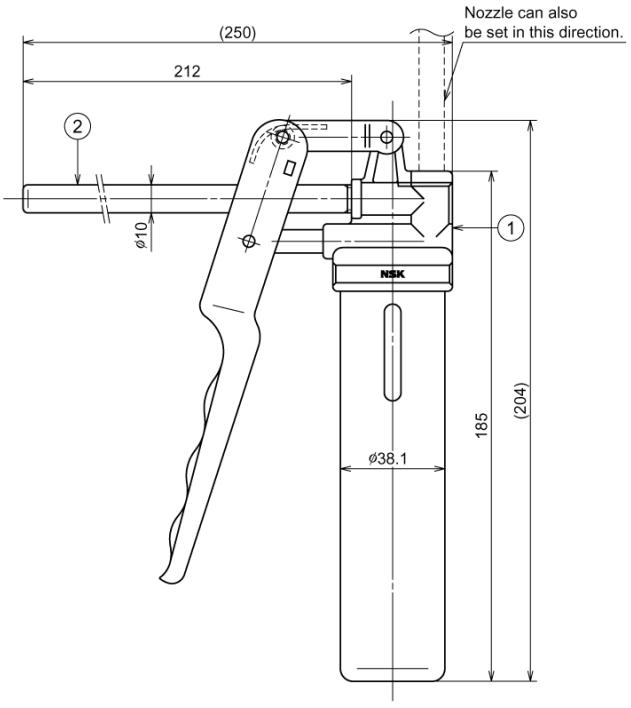
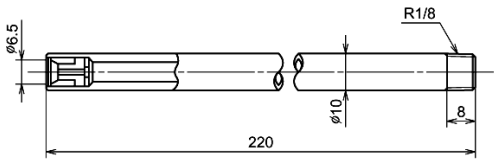
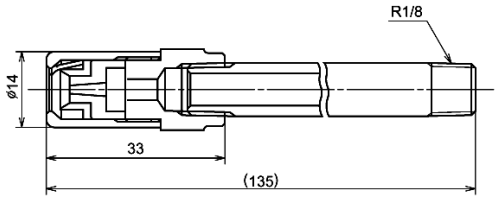
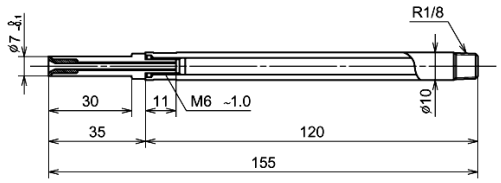
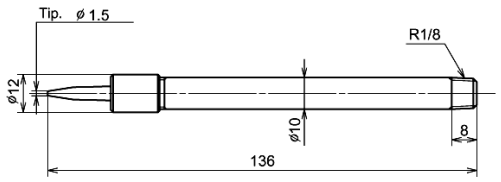
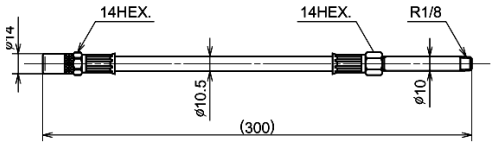
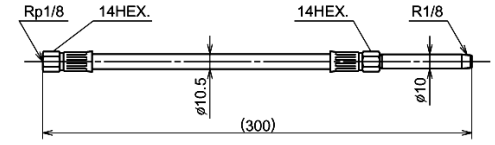
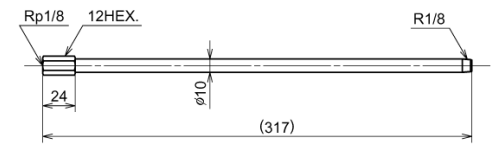


Fig. 2-3 NSK Hand Grease Pump with NSK straight nozzle

(2) Nozzles

Nozzles that can be attached to NSK Hand Grease Pump

Name	Designation code	Use	Dimensions
NSK straight nozzle	NSK HGP NZ1	Can be used with grease fitting A, B, and C under JIS B1575 standard.	
NSK chuck nozzle	NSK HGP NZ2	Same as above. However, there is no need to press the hand pump because the grease fitting and the nozzle come to contact due to the chucking mechanism at the tip.	
NSK fitting nozzle	NSK HGP NZ3	Dedicated for the - f3 drive-in grease fitting.	
NSK point nozzle	NSK HGP NZ4	Used for linear guides and ball screws which do not have grease fitting. Supplies grease directly to the ball grooves, or through the opening of ball slide or ball slide to inside.	
NSK flexible nozzle	NSK HGP NZ5	The tip of the flexible nozzle is chuck nozzle. Used to supply grease to the area where hand cannot reach.	
NSK flexible extension pipe	NSK HGP NZ6	Flexible extension pipe connects the grease pump and the nozzle.	
NSK straight extension pipe	NSK HGP NZ7	Straight extension pipe connects the grease pump and the nozzle.	

Grease lubricant for linear guides and ball screws

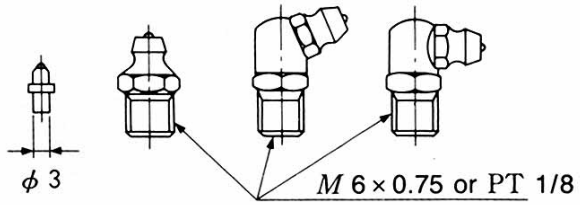
Type	Thickener	Base oil	Base oil kinematic viscosity cSt (40°C)	Range of use temperature (°C)	Purpose
AS2	Lithium type	Mineral oil	130	–10~110	For ball screws and linear guides for general use at high load.
PS2	Lithium type	Synthetic oil + mineral oil	15	–50~110	For ball screws and linear guides for low temperature and high frequency operation.
LR3	Lithium type	Synthetic oil	30	–30~130	For ball screws at high speed, medium load.
LG2	Lithium type	Synthetic oil + synthetic hydrocarbon oil	30	–10~80	For ball screws and linear guides for clean environment.
NF2	Urea composite type	Synthetic oil + mineral oil	27	–40~100	For fretting resistant ball screws and linear guides.

Table Grease nozzle used for NSK linear guide

Linear guide model	Tap hole for grease fitting	Standard grease fitting	Straight nozzle NZ1	Chuck nozzles (two) NZ	Drive-in nipple nozzle NZ3	Point nozzle NZ4	Flexible nozzle NZ5
LS15	ø 3	Drive-in type			o		
LS20 ~35	M6 x 0.75	B type	o	o			o
LH15	ø 3	Drive-in type			o		
LH20 ~35	M6 x 0.75	B type	o	o			o
LH45 ~85	PT1 / 8	B type	o	o			o
LW17	ø 3	Drive-in type			o		
LW21 ~35	M6 x 0.75	B type	o	o			o
LW50	PT/18	B type	o	o			o
LU09 ~15	-	None *1)				o*2)	
LE09 ~15	-	None *1)				o*2)	

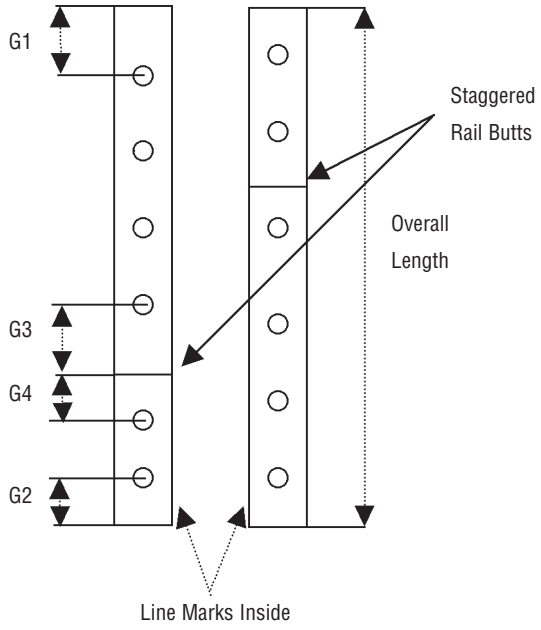
*1) LU and LE Series: Apply grease directly to ball groove, etc. using a point nozzle.
*2) LS20, LS25, LH20: Use straight nozzle. (Point nozzle tip cannot be used because it interferes with the rail top surface.)

Figures of Grease fittings



(1) Drive-in type A type B type C type

Application Sheet
Linear Guide – Rail Butting



In order to determine rail butting configuration, please photocopy and complete this form from our catalogue and fax back to NSK.

Quantity Rail Number:

_____

G1 Dimension: _____ mm G2 Dimension: _____ mm

Note 1: For butting rails only.

Note 2: Make sure line marks are inside for Rail Butting.

Consists of _____ G1=_____ G3=_____

_____ G2=_____ G4=_____

_____

Company: _____

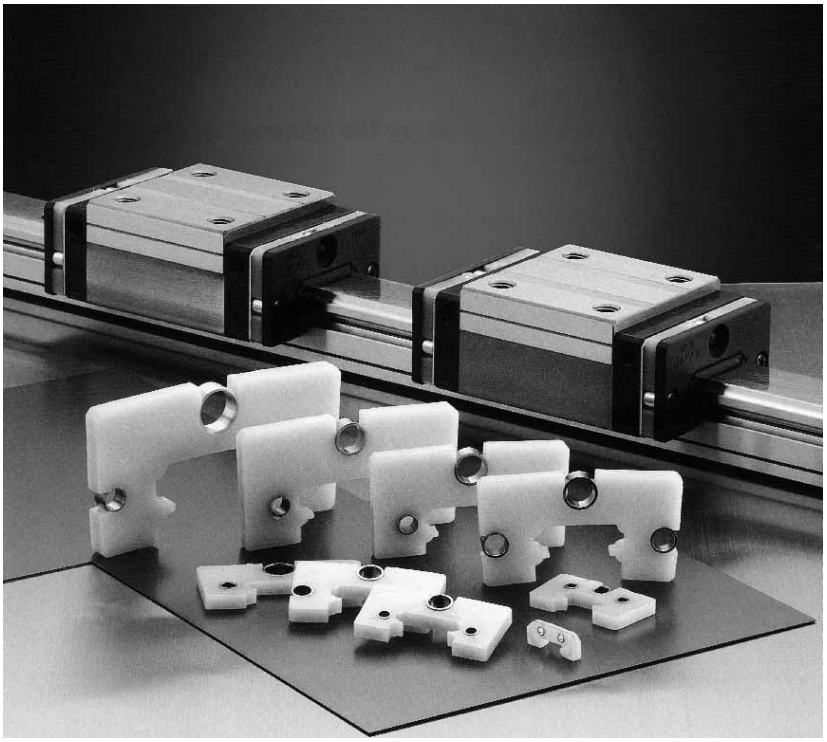
Contact Name: _____

Telephone:_____ Fax: _____

Date: _____ E-Mail: _____

Remarks: _____

K1 Maintenance-Free Lubrication System



The NSK K1's distinctive capabilities as a compact and efficient oil-impregnated lubrication unit as well as a seal, greatly increases the performance of the Linear Guide. The K1 Lubrication Unit is available in two types, one for industrial applications and one for food and medical devices where cleanliness and safety are paramount.

Features:

1. Long-term, maintenance-free usage.

In mechanical environments where lubrication is difficult to apply, long-term running efficiency is maintained by using the NSK K1 in combination with grease.

2. Prevention of oil-related environmental pollution.

In locations where oil greatly affects the environment, or in mechanisms with severe hygiene restrictions, sufficient lubrication is provided using the NSK K1 in combination with grease.

3. Effective in environments where the lubricant is washed away.

In facilities where mechanisms are washed down with water, or subject to severe weather conditions, long service life is ensured by using the NSK K1 in combination with grease. Especially effective under hygienic conditions where oil must not be dispersed.

4. Maintains efficiency in dusty environments.

In environments where oil and grease-absorbing dust is produced, long-term efficiency is maintained by using the NSK K1 in combination with grease.

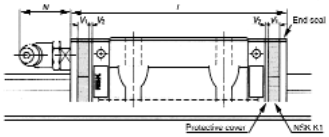
K1 Identification Number

Refer to the following numbering system when ordering.

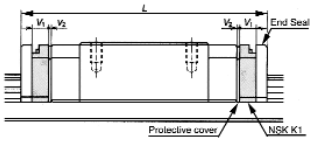
Example: LA H 30 AN Z - K

- LA — Interchangeable Ball Slide
- H — Series Code
- 30 — Size Number
- AN — Ball Slide Shape Code
- Z — (Z: in case of a light preload) Preload Code
- K — NSK K1 Equipped

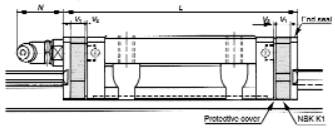
LH, LS Series



LU, LE Series



LW Series



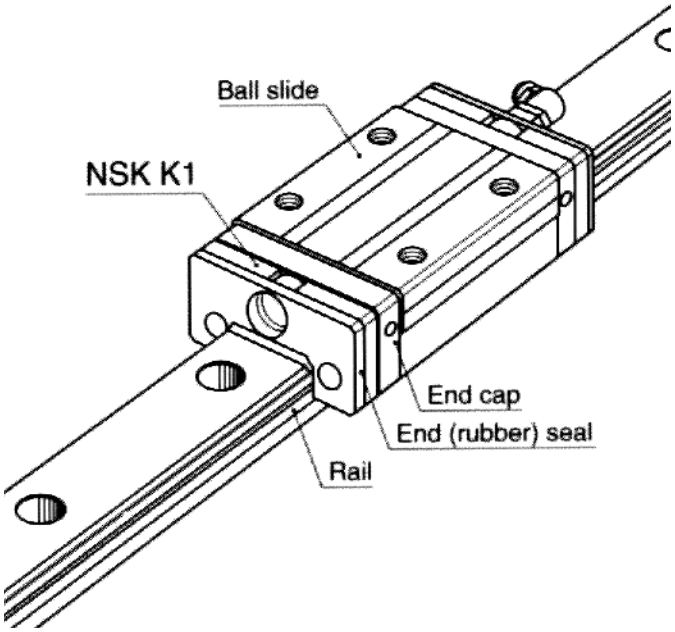
Note: For more bearing seal options see page 4.

Interchangeable Linear Guide Dimensions – LH, LS, LW, LU, LE Series Unit: mm

Interchangeable Ball Slide size code	Ball slide form			Standard Ball Slide length	Ball slide length with two NSK K1 L	Thickness of NSK K1 V_1	Thickness of protective cover V_2	Grease fitting projection N (mm)
LAH15	AN	EM GM		55 74	65.6 84.6	4.5	0.8	5
LAH20	AN BN	EM GM		69.8 91.8	80.4 102.4	4.5	0.8	14
LAH25	AN/AL BN/BL	EM GM		79 107	90.6 118.6	5.0	0.8	14
LAH30	AN/AL BN/BL	EM GM		85.6 98.6 124.6	97.6 110.6 136.6	5.0	1.0	14
LAH35	AN/AL BN/BL	EM GM		109 143	122 156	5.5	1.0	14
LAH45	AN BN	EM GM		139 171	154 186	6.5	1.0	15
LAH55	AN BN	EM GM		163 201	178 216	6.5	1.0	15
LAH65**	AN BN	EM GM		193 253	211 271	8.0	1.0	16
LAS15	AL CL	EL	FL KL	56.8 40.4	66.4 50	4.0	0.8	5
LAS20	AL CL	EL	FL KL	65.2 47.2	75.8 57.8	4.5	0.8	14
LAS25	AL CL	EL	FL KL	81.4 59.4	92 70	4.5	0.8	14
LAS30	AL CL	EL	FL KL	96.4 67.4	108.4 79.4	5.0	1.0	14
LAS35	AL CL	EL	FL KL	108 77	121 90	5.5	1.0	14
LAW17	EL			51.4	61.6	4.5	0.6	5
LAW21	EL			58.8	71.4	5.5	0.8	13
LAW27	EL			74	86.6	5.5	0.8	13
LAW35	EL			108	123	6.5	1.0	13
LAW50	EL			140.6	155.6	6.5	1.0	14
LAU09	AR	TR		30	36.4	2.7	0.5	–
LAU12	AR	TR		35.2	42.2	3.0	0.5	–
LAU15			AL	43.6	51.8	3.5	0.6	–
LAE09	AR	TR		39.8	46.8	3.0	0.5	–
LAE12	AR			45	53	3.5	0.5	–
LAE15	AR			56.6	66.2	4.0	0.8	–

* For Protector and Double Seal Information for LH Series please see page 13.
* For Protector and Double Seal Information for LS Series please see page 21.

K1 Lubrication Unit Handling and Assembly Instructions



Handling Instructions

To maintain the NSK K1 Seal's high efficiency over a long period of time, please follow these instructions.

1. Permissible temperature range

Max. operating temperature: 50°C (122°F)

Max. peak temperature: 80°C (176°F)

If not installed immediately, they should be kept refrigerated.

Avoid storage in direct sunlight.

2. Never leave the linear guide in close proximity to grease-removing organic solvents such as hexane, thinners, etc.

Never immerse the linear guide in kerosene or rust preventative oils which contain kerosene.

Note

Other oils such as: water-based cutting oil, oil-based cutting oil, grease (mineral oil-AS2, ester-PS2) present no problems to the K1 lubricating units performance.

Assembly Instructions for the K1 Lubricating Unit for Linear Guides

1. Slide linear bearing on to the linear rail, using the plastic provisional rail supplied.
2. Remove the grease fitting from the end of the bearing.
3. Remove the Phillips screws (2 pieces).
4. Remove the end seal from end of bearing.
5. Install threaded plug from K1 kit (or see option 9 and 10 depending on application).
6. Install the cover plate from the K1 kit, to the end of bearing, against the end cap.
7. Install K1 lubricating unit without fixing rings, so it can be expanded over the rail.
8. Put the three (3) fixing rings in position on the K1 lubricating unit.
9. Replace the end seal, in front of the K1 lubricating unit.
10. Install connector screw for grease fitting.
11. Replace the grease fitting in connector screw.
12. Install the **extension** Phillips screws (2 pieces, supplied with the K1 seal kit).

Note* The K1 lubricating unit has a shelf life. They should be installed immediately upon receipt. It is important to avoid direct sunlight and extreme heat conditions.

Worldwide Sales Offices

NSK Ltd.–Headquarters, Tokyo, Japan **www.nsk.com**
Americas & Europe Department tel: 03-3779-7120
Asia Marketing & Sales Department tel: 03-3779-7121

Africa

South Africa:
NSK South Africa (Pty) Ltd.
Johannesburg tel: (011) 458 3600

Asia and Oceania

Australia: **www.nskaustralia.com.au**
NSK Australia Pty. Ltd.
Melbourne tel: (03) 9764-8302

China:
NSK Hong Kong Ltd.
Hong Kong tel: 2739-9933
Kunshan NSK Co., Ltd.
Kunshan tel: 0520-7305654
Guizhou HS NSK Bearings Co., Ltd.
Anshun tel: 0853-3521505
NSK (Shanghai) Trading Co., Ltd.
Shanghai tel: 021-62099051
NSK representative office
Beijing tel: 010-6590-8161
NSK representative office
Shanghai tel: 21-6209-9051
NSK representative office
Guangzhou tel: 020-8732-0583
NSK representative office
Anshun tel: 0853-3522522

India:
Rane NASTECH Ltd.
Chennai tel: 04114-65313, 65314, 65365, 66002
NSK representative office
Chennai tel: 044-4334732

Indonesia:
P.T. NSK Bearings Manufacturing Indonesia
Jakarta tel: 021-898-0155

Korea:
NSK Korea Co., Ltd.
Seoul tel: 02-3287-0300
NSK Korea Co., Ltd., Changwon Plant
Changwon tel: 0551-287-6001

Malaysia:
NSK Bearings (Malaysia) Sdn. Bhd.
Kuala Lumpur tel: 03-7958-4396
NSK Micro Precision (M) Sdn. Bhd.
Kuala Lumpur tel: 03-961-6288

New Zealand: **www.nsk-rhp.co.nz**
NSK New Zealand Ltd.
Auckland tel: (09) 276-4992

Philippines:
NSK representative office
Manila tel: 02-759-6246

Singapore:
NSK International (Singapore) Pte Ltd.
Singapore tel: (65) 273 0357
NSK Singapore (Pte) Ltd.
Singapore tel: (65) 278 1711

Taiwan:
Taiwan NSK Precision Co., Ltd.
Taipei tel: 02-2591-0656

Thailand:
NSK Bearings (Thailand) Co., Ltd.
Bangkok tel: 02-6412150~58
NSK Safety Technology (Thailand) Co., Ltd.
Chonburi tel: (038) 214-317-8
Siam NASTECH Co., Ltd.
Chachoengsao tel: (038) 522-343~350

Europe

NSK Europe Ltd.
(European Headquarters) **www.eu.nsk.com**
Maidenhead, England tel: 0162-850-9800

France:
NSK France S.A.
Paris tel: 01 30 57 39 39

Germany:
NSK Deutschland Gmbh
Düsseldorf tel: 02102-481-0
NSK Steering Systems Europe Ltd.
Stuttgart tel: 0771-79082-277
Neuweg Fertigung Gmbh
Munderkingen tel: 07393-540

Italy:
NSK Italia S.P.A.
Milano tel: 02-995-191

Poland:
NSK Europe Ltd. Warsaw Liaison Office
Warsaw tel: 48-22-645-1525, 1526
NSK Iskra S.A.
Kielce tel: 48-41-366-6111

Spain:
NSK Spain S.A.
Barcelona tel: 93-575-4041

Switzerland:
Waelzlager Industriewerke Bulle AG (W.I.B.)
Bulle tel: 026-9191100

Turkey:
NSK Bearings Middle East Trading Co., Ltd.
Istanbul tel: 90-216-442-7106

United Kingdom:
NSK Bearings Europe Ltd.
Peterlee, England tel: 0191-586-6111
NSK European Technology Co., Ltd.
Ruddington, England tel: 0115-940-5409
NSK UK Ltd.
Newark, England tel: 0163-660-5123
NSK Steering Systems Europe Ltd.
Coventry, England tel: 024-76-588588

North and South America

NSK Americas, Inc. (American Headquarters)
Ann Arbor, Michigan, U.S.A. tel: 734-913-7500

Argentina:
NSK Argentina SRL
Buenos Aires tel: 011-4762-6556

Brazil: **www.br.nsk.com**
NSK Brasil Ltda.
São Paulo tel: 011-3269-4700

Canada: **www.ca.nsk.com**
NSK Canada Inc.
Toronto tel: 905-890-0740

Mexico:
NSK Rodamientos Mexicana, S.A. de C.V.
Mexico City tel: 5-301-2741

United States of America: **www.us.nsk.com**
NSK Corporation
Ann Arbor, Michigan tel: 734-913-7500
Sales Offices:
Ann Arbor, Michigan tel: 734-913-7500
Cerritos, California tel: 562-926-2975
NSK American Technical Center
Ann Arbor, Michigan tel: 734-913-7500
NSK Precision America, Inc. **www.npa.nsk.com**
Addison, Illinois tel: 630-620-8500
NASTECH
Bennington, Vermont tel: 802-442-5448
NSK Latin America Inc. **www.la.nsk.com**
Miami, Florida tel: (305) 477-0605

CAT LG0304 C 2004 Printed in Canada