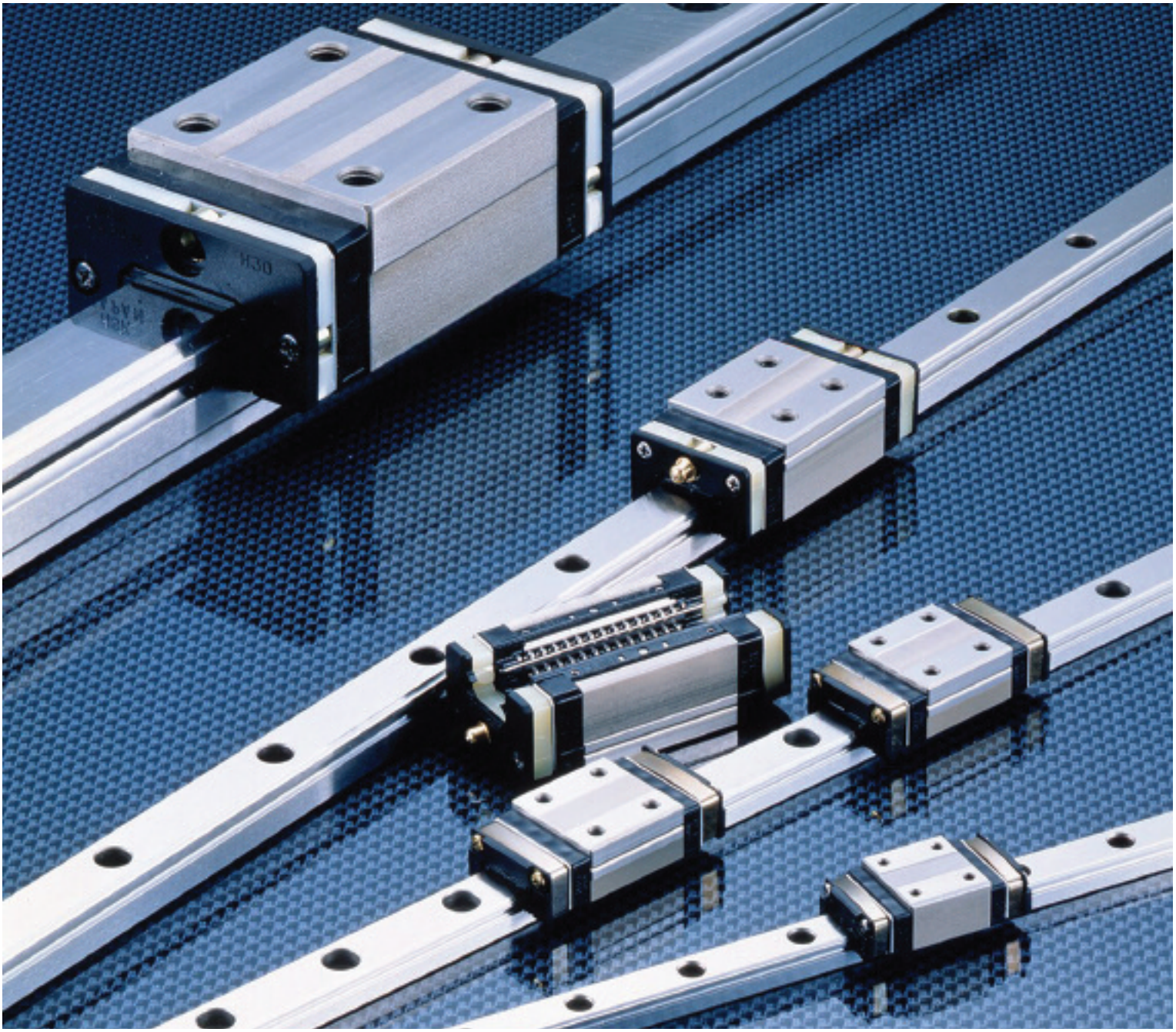
MOTION & CONTROL

NSK

NSK Linear Guides

Interchangeable Series for Automotive Assembly Equipment

Ball slides and rails are sold separately for maximum flexibility.
Standard stock ensures short delivery time.



- **LH Series for High Load Capacity Applications**
- **Interchangeable Rails and Ball Slides**
- **Universal Flanged Sliders for Flexible Mounting Options**
- **Large Inventory for Prompt Delivery**

CONTENTS

CAD DRAWING DATA

For 2D DXF files, go to NSK Precision America's website by visiting www.nskprecision.com.

Click on "Downloads" in the left-hand navigation bar to access 2D DXF files.

PART SOLUTIONS

To obtain 3D file downloads for components shown in this catalog, NSK Precision America, Inc. offers these products in native and natural 3D CAD formats utilizing the latest technology from PARTsolutions. Downloading NSK's native files via the web saves time by allowing our components to be placed directly into your designs quickly and easily. Through PARTsolutions' PARTserver, you can add accessories to either assemblies or the interchangeable components and generate custom-configured drawings as well as the actual part number for the final products.

To access NSK linear guides on PARTsolutions, click on the "Powered by PARTsolutions" logo from our website.

FEATURES and BENEFITS

Interchangeability of Rail and Ball Slide

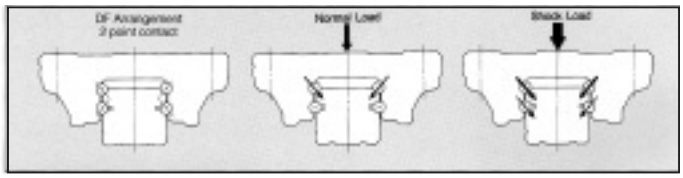
One important feature of the Gothic arch is its ability to make high accuracy measurements on both the ball slide and rail, allowing for their interchangeability. This means that replacement ball slides and/or rail can be purchased individually or as assemblies.

High Load Capacity and Long Life

NSK has developed an infinite ball recirculating type linear guide with the largest load capacity available (comparing equal size ball slides). This high load capability helps to ensure long life.

Shock Resistant Design

Another design feature of the Gothic arch is its ability to absorb vertical shock loads from above using four-row groove configuration. This design is favorable in case of unexpected accidents during installation, or the operation of equipment. The ball groove is designed to avoid edge loading under extreme loads, extending the life of the unit.



Normal load is carried on the top two grooves.
Shock load is carried by all four grooves.

Universal Sliders EM and GM

NSK has incorporated both through and tapped holes into one flanged slider for a combination of mounting applications. EM sliders are flanged standard length blocks, and the GM sliders are flanged long blocks.

Ability to Butt Rails

Tolerance of ball grooves on the ball slides and rails are controlled to allow for butting, giving you the flexibility of unlimited lengths. We can offer a stocked linear guide rail with versatility in assembling preloaded or clearance type ball slides.

Maximum Rail Length in one section available up to 4,000 mm.

Maintenance Free K1™ Lubrication Units System

NSK's patented Maintenance Free K1 Lubrication Units are available with our interchangeable linear guides. Maintenance Free K1 Lubrication Units are available from stock and provide long-term maintenance free operation. For lubrication intense applications, multiple Maintenance Free K1 Lubrication Units can be added for extended maintenance free operation. Contact NSK for details.

High Performance (HP) Seal for improved dust-proofing and enhanced durability

NSK's new triple-lip seal dramatically reduces contaminants from entering the slider and ensures higher grease retention. In conjunction with our Maintenance Free K1 Lubrication Unit, the HP seal reduces contamination to less than 1/10 of standard linear guide side seals.

Short Delivery Time

We can ship from our large inventory, both standard and custom cut-to-length linear rails. NSK Precision America also produces linear guides at our ISO9002 manufacturing facility in Franklin, Indiana.

Armoloy Corrosion-Resistant Coatings

NSK uses industry acceptable Armoloy coatings upon request. Please contact NSK Precision America for details.

Rail Modifications

NSK can modify rail ends to your specifications for bellows clip attachment.

Dowel Holes

NSK can modify rails and/or sliders with locating dowel holes to industry specifications.

Scrapers

NSK sliders can be custom configured to include an optional scraper to remove debris like weld flash from the rail and prevent contamination from entering the slider.

Rail Caps

NSK offers plastic or brass rail caps to prevent debris build-up in the rail mounting holes.

NSK LH Series Linear Guides now in the GM Standards Library.

LH Series Slider Types AN/BN
EM/GM

Fig.-1 LH-AN, LH-BN TYPE

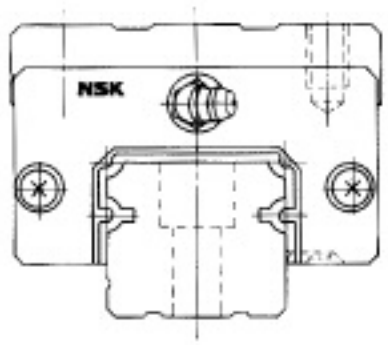
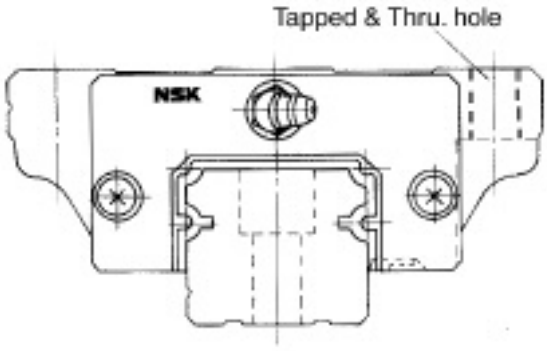


Fig.-2 LH-EM, LH-GM TYPE



Internal Clearance and Preload

The following table shows the maximum allowable clearance and preload amounts in microns for the corresponding LH sizes.

Table 1 **Unit: μm**

LH Size	#15	#20 #25	#30 #35 #45	#55 #65
Clearance	15~−4	15~−5		
Preloaded	0~−4	0~−5	0~−7	0~−9

Accuracy Standard

The accuracy standard of the NSK “High Load Capacity LH-Series” is shown in Table 1. With high-accuracy control of individual rail size and interchangeability, the accuracy of Table 1 can be maintained sufficiently even after addition or replacement of the ball slide.

Table 1 Tolerances (For Clearance Preload Type) **Unit : μm**

Tolerances (See Fig. 4 for Symbols)	Model No. LH	
	15, 20, 25, 30, 35	45,55,65
Mounting Height, *H*	±20	±30
Variation of Mounting Height, *H*	15 (1) 30 (2)	20 (1) 35 (2)
Mounting Width, W_2 or W_2	±30	±30
Variation of Mounting Width, W_2 or W_2	±25	±30
Running Parallelism of Face C to Face A Running Parallelism of Face D to Face B	Refer to Fig. 3	

W_2 is applicable to the reference side only. Note: during installation the reference side is indicated by a line provided on the side of ball slide and rail. (See Fig. 4)
1. Variation on the same rail.
2. Variation on multiple rails.

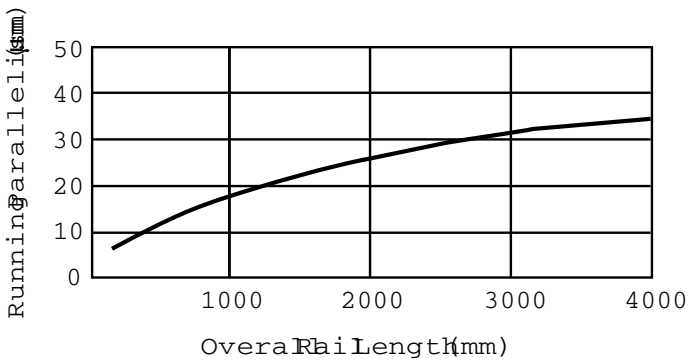


Fig. 3 Running Parallelism

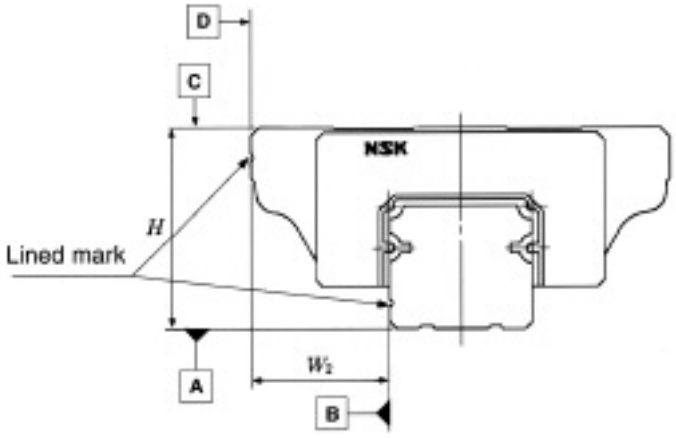


Fig. 4 Accuracy Standard

Load Rating and Life

Load ratings shown for LH-Series assume vertical radial loads. The following table demonstrates how to factor lateral loading.

Table 2 Basic Load Rating Correction for Direction

Load Direction	Basic Dynamic Load Rating	Basic Static Load Rating
Downward	C	C_0
Upward	C	$0.75C_0$
Laterally	0.88C	$0.63C_0$

Estimate the life of linear guides using the equation below.

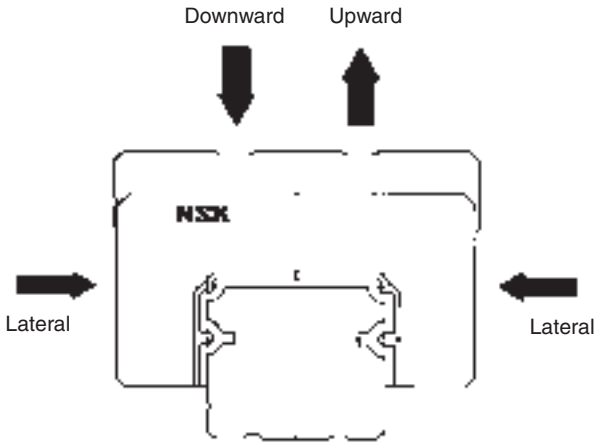


Fig. 5

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

where, L : Rated fatigue life(km)

C : Basic dynamic load rating (N)

F : Load to a ball slide (N)
(Dynamic equivalent load)

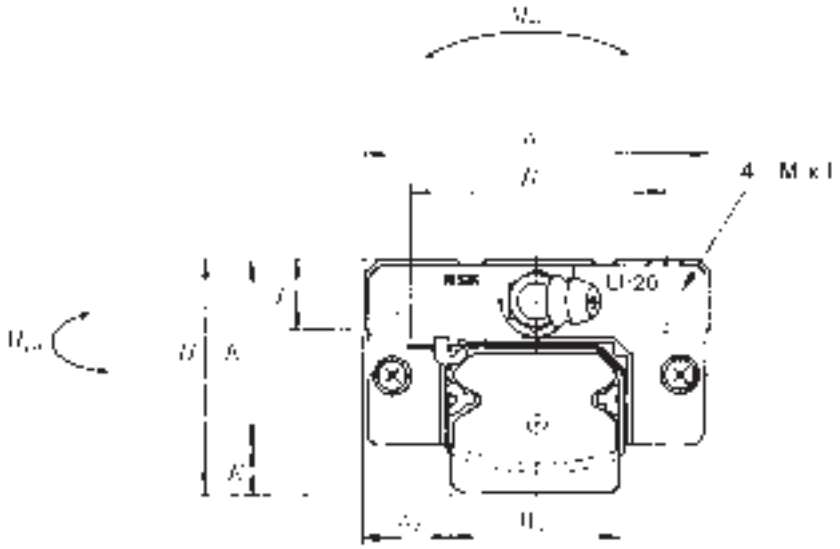
f_W : Load factor
f_W =1.0 ~ 1.2 (Smooth condition)
f_W =1.2 ~ 1.5 (Normal condition)
f_W =1.5 ~ 3.0 (With shock or vibration)

LH Series Ball Slide Dimension Table

REFER TO PAGES 13 TO 15 REGARDING TECHNICAL INFORMATION FOR THE MAINTENANCE FREE K1 LUBRICATION UNITS

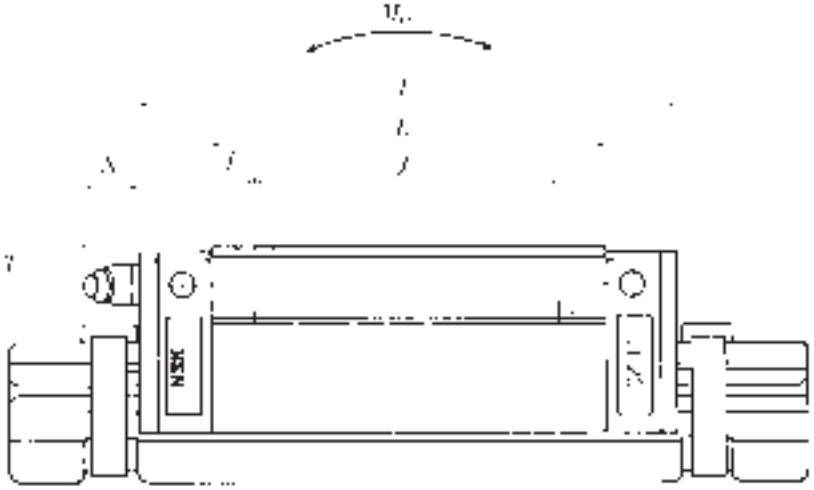
Square Type

LAH-AN (Clearance), LAH-ANZ (Preload) Standard Length
LAH-BN (Clearance), LAH-BNZ (Preload) Long Block



Model No.	Ass'y Dimensions			Ball Slide Dimensions								
	H	*E*	W_2	*W*	*B*	*L*	L_1	*J*	J_1	*K*	*T*	*M* x *l*
LAH15 AN/ANZ **LAH15 BN/BNZ**	28	4.6	9.5	34	26	55 74	39 58	26	6.5 16	23.4	8	M 4 x 6
LAH20 AN/ANZ **LAH20 BN/BNZ**	30	5	12	44	32	69.8 91.8	50 72	36 50	7 11	25	12	M 5 x 6
LAH25 AN/ANZ **LAH25 BN/BNZ**	40	7	12.5	48	35	79 107	58 86	35 50	11.5 18	33	12	M 6 x 9
LAH30 AN/ANZ **LAH30 BN/BNZ**	45	9	16	60	40	85.6 124.6	59 98	40 60	9.5 19	36	14	M 8 x 10
LAH35 AN/ANZ **LAH35 BN/BNZ**	55	9.5	18	70	50	109 143	80 114	50 72	15 21	45.5	15	M 8 x 12
LAH45 AN/ANZ **LAH45 BN/BNZ**	70	14	20.5	86	60	139 171	105 137	60 80	22.5 28.5	56	17	M10 x 17
LAH55 AN/ANZ **LAH55 BN/BNZ**	80	15	23.5	100	75	163 201	126 164	75 95	25.5 34.5	65	18	M12 x 18
LAH65 AN/ANZ **LAH65 BN/BNZ**	90	16	31.5	126	76	193 253	147 207	70 120	38.5 48.5	74	23	M16 x 20

Note: W_1 rail dimensions are on Page 10.



Unit : mm

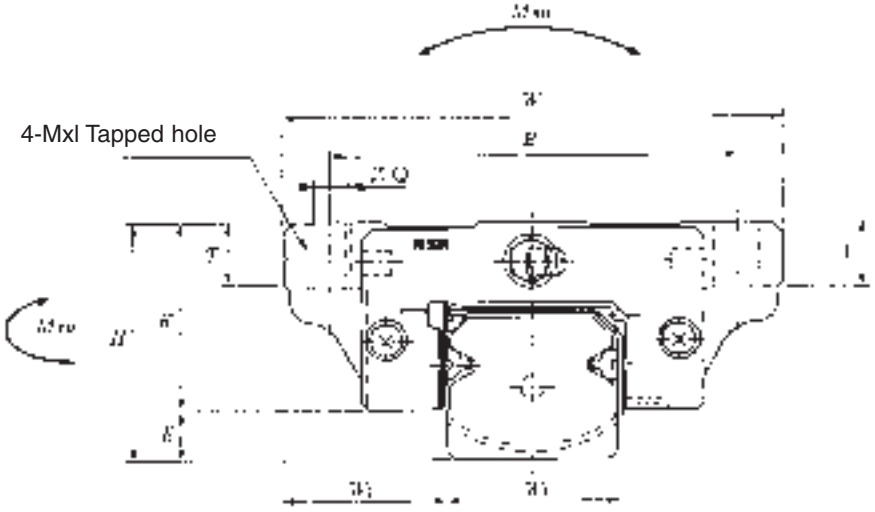
Grease Fitting			Basic Load Ratings					Weight (kg)	Model No.
Mounting Hole Thread Spec.	T_1	N	*Dynamic* C (N)	*Static* C_0 (N)	*Static Moment (N-m)* M_{RO}	M_{PO}	M_{YO}		
Ø3 (thru hole)	8.5	3.3	10800 14600	20700 32000	108 166	95 216	80 181	0.18 0.26	**LAH15 AN/ANZ** **LAH15 BN/BNZ**
M6x0.75	5	11	17400 23500	32500 50500	219 340	185 420	155 355	0.33 0.48	**LAH20 AN/ANZ** **LAH20 BN/BNZ**
M6x0.75	10	11	25600 34500	46000 71000	360 555	320 725	267 610	0.55 0.82	**LAH25 AN/ANZ** **LAH25 BN/BNZ**
M6x0.75	10	11	31000 46000	51500 91500	490 870	350 1030	292 865	0.77 1.3	**LAH30 AN/ANZ** **LAH30 BN/BNZ**
M6x0.75	15	11	47500 61500	80500 117000	950 1380	755 1530	630 1280	1.5 2.1	**LAH35 AN/ANZ** **LAH35 BN/BNZ**
PT1/8	20	13	81000 99000	140000 187000	2140 2860	1740 3000	1460 2520	3 3.9	**LAH45 AN/ANZ** **LAH45 BN/BNZ**
PT1/8	21	13	119000 146000	198000 264000	3600 4850	3000 5150	2510 4350	4.7 6.1	**LAH55 AN/ANZ** **LAH55 BN/BNZ**
PT1/8	19	13	181000 235000	281000 410000	6150 8950	4950 10100	4150 8450	7.7 10.8	**LAH65 AN/ANZ** **LAH65 BN/BNZ**

LH Series Ball Slide Dimension Table

REFER TO PAGES 13 TO 15 REGARDING TECHNICAL INFORMATION FOR THE MAINTENANCE FREE K1 LUBRICATION UNITS

Universal Block Flange Type

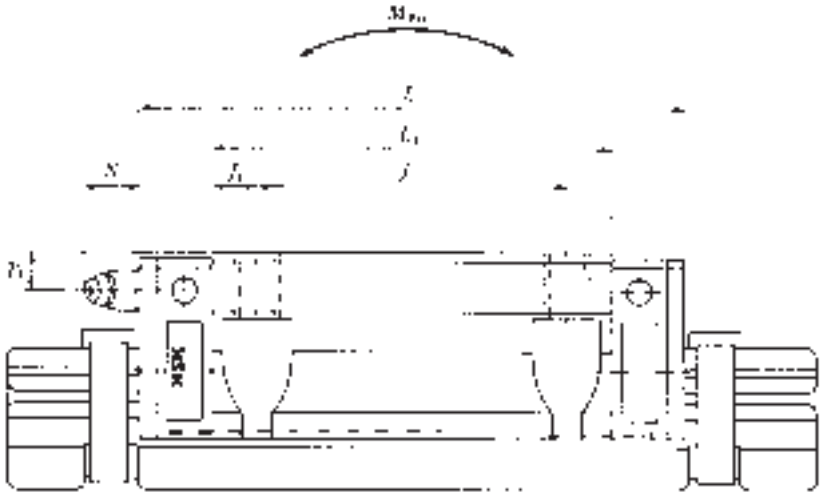
LAH-EM (Clearance), LAH-EMZ (Preload) Standard Length
(formerly LAH-EL-90, LAH-ELZ-90)
LAH-GM (Clearance), LAH-GMZ (Preload) Long Block
(formerly LAH-GL-90, LAH-GLZ-90)



Note: *EM/EMZ and GM/GMZ is a combination of Tapped hole and Thru hole.*

Model No.		Ass'y Dimensions			Ball Slide Dimensions									
		H	*E*	W_2	*W*	*B X J*	*L*	L_1	J_1	*K*	*T*	*M x l*	*Ø Q x l*	Bolt Size Thru Hole Q
LAH15	**EM/EMZ GM/GMZ**	24	4.6	16	47	38 x 30	55 74	39 58	4.5 14	19.4	8	M5 x 8	Ø4.4 x 8	M4
LAH20	**EM/EMZ GM/GMZ**	30	5	21.5	63	53 x 40	69.8 91.8	50 72	5 16	25	10	M6 x 10	Ø5.3 x 10	M5
LAH25	**EM/EMZ GM/GMZ**	36	7	23.5	70	57 x 45	79 107	58 86	6.5 20.5	29	11	M8 x 10	Ø6.8 x 10	M6
LAH30	**EM/EMZ GM/GMZ**	42	9	31	90	72 x 52	98.6 124.6	72 98	10 23	33	11	M10 x 12	Ø8.6 x 12	M8
LAH35	**EM/EMZ GM/GMZ**	48	9.5	33	100	82 x 62	109 143	80 114	9 26	38.5	12	M10 x 13	Ø8.6 x 13	M8
LAH45	**EM/EMZ GM/GMZ**	60	14	37.5	120	100 x 80	139 171	105 137	12.5 28.5	46	13	M12 x 15	Ø10.5 x 15	M10
LAH55	**EM/EMZ GM/GMZ**	70	15	43.5	140	116 x 95	163 201	126 164	15.5 34.5	55	15	M14 x 18	Ø12.5 x 18	M12
LAH65	**EM/EMZ GM/GMZ**	90	16	53.5	170	142 x 110	193 253	147 207	18.5 48.5	74	23	M16 x 24	Ø14.6 x 24	M14

Note : W_1 rail dimensions are on Page 10.



Unit : mm

Grease Fitting			Basic Load Ratings					Weight (kg)	Model No.	
Mounting Hole Thread Spec.	T_1	*N*	*Dynamic* C (N)	*Static* C_0 (N)	*Static Moment (N-m)*					
					M_{RO}	M_{PO}	M_{YO}			
Ø3 (thru hole)	4.5	3.3	10800 14600	20700 32000	108 166	95 216	80 181	0.17 0.25	**LAH15**	**EM/EMZ** **GM/GMZ**
M6x0.75	5	11	17400 23500	32500 50500	219 340	185 420	155 355	0.45 0.65	**LAH20**	**EM/EMZ** **GM/GMZ**
M6x0.75	6	11	25600 34500	46000 71000	360 555	320 725	267 610	0.63 0.93	**LAH25**	**EM/EMZ** **GM/GMZ**
M6x0.75	7	11	35500 46000	63000 91500	600 870	350 1030	292 865	1.2 1.6	**LAH30**	**EM/EMZ** **GM/GMZ**
M6x0.75	8	11.5	47500 61500	80500 117000	950 1380	755 1530	630 1280	1.7 2.4	**LAH35**	**EM/EMZ** **GM/GMZ**
PT1/8	10	13	81000 99000	140000 187000	2140 2860	1740 3000	1460 2520	3 3.9	**LAH45**	**EM/EMZ** **GM/GMZ**
PT1/8	11	13	119000 146000	198000 264000	3600 4850	3000 5150	2510 4350	5 6.5	**LAH55**	**EM/EMZ** **GM/GMZ**
PT1/8	19	13	181000 235000	281000 410000	6150 8950	4950 10100	4150 8450	10 14.1	**LAH65**	**EM/EMZ** **GM/GMZ**

LH Series Rail Dimension Table

Separately Sold Rail for NSK Linear Guide

LH series Standard Rail
L1H-Z: Preloaded Interchangeable Type

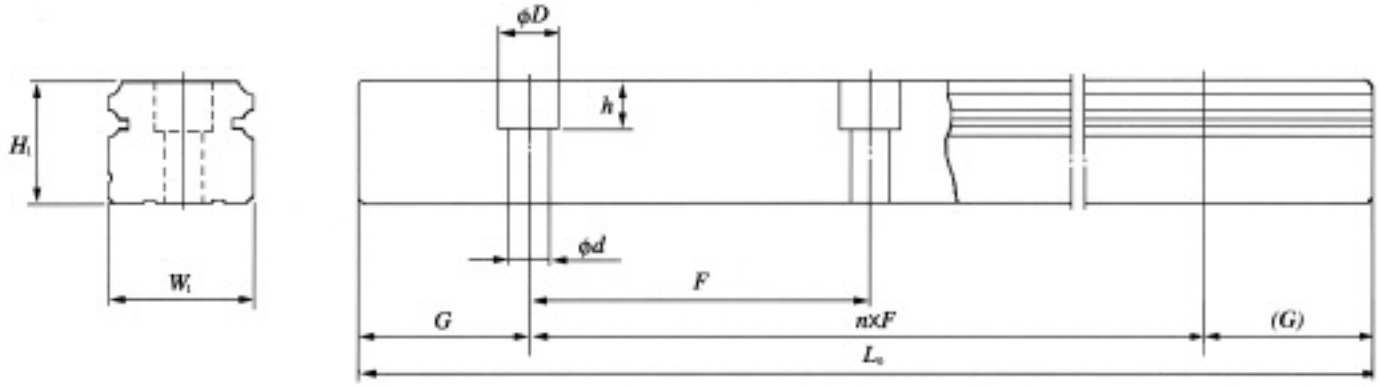
LH series Butting Rail
L1H-01Z: Preloaded Interchangeable Type

LH series butting rail features higher precision tolerances for L_0 and G dimensions.

See page 20 for rail part numbering.

L1H 25 1200 - 01 Z

- Rail Type
- Size No.
- Rail Length (mm)
- Z: Preloaded Type
- No Code: Standard
- 01: Butting Rail



Rail Dimensions Table Unit: mm

Model No.		Max. rail length L_0 max. ( ) indicates Stainless Steel	W_1	H_1	F	d x D x h	Rail Butting $G_{-0.5}^{0}$	G in mm	Rail Weight (kg/m)
Standard	Butting								
L1H15-Z	**L1H15-01Z**	2000 (1800)	15	15	60	4.5 x 7.5 x 5.3	30	Specify	1.6
L1H20-Z	**L1H20-01Z**	3960 (3500)	20	18	60	6 x 9.5 x 8.5	30	Specify	2.6
L1H25-Z	**L1H25-01Z**	3960 (3500)	23	22	60	7 x 11 x 9	30	Specify	3.6
L1H30-Z	**L1H30-01Z**	4000 (3500)	28	26	80	9 x 14 x 12	40	Specify	5.2
L1H35-Z	**L1H35-01Z**	4000	34	29	80	9 x 14 x 12	40	Specify	7.2
L1H45-Z	**L1H45-01Z**	3990	45	38	105	14 x 20 x 17	52.5	Specify	12.3
L1H55-Z	**L1H55-01Z**	3960	53	44	120	16 x 23 x 20	60	Specify	16.9
L1H65-Z	**L1H65-01Z**	3900	63	53	150	18 x 26 x 22	75	Specify	24.3

Cut to length rails G = F/2 ($^{+0}_{-4mm}$)

LH Series Accessories (Use Part Numbers listed below only if ordering separately)

Scraper and Double Seal (Specify in Slider Part Number by following pages 19 or 21)

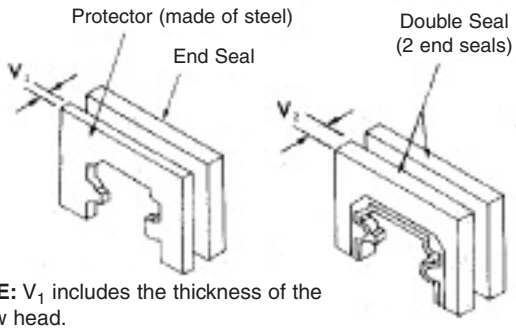
Travel length is reduced by the thickness of the end seal on the ball slide. Consider the value of *V* in the table below when calculating the travel length.

Scraper/Protector Unit : mm

Linear Guide Model No.	Protector No. Plug End	Protector No. Grease Fitting End	Increased Thickness V1
LH15	LH15PT-01	LH15PTC-01	2.7
LH20	LH20PT-01	LH20PTC-01	2.9
LH25	LH25PT-01	LH25PTC-01	3.2
LH30	LH30PT-01	LH30PTC-01	4.2
LH35	LH35PT-01	LH35PTC-01	4.2
LH45	LH45PT-01	LH45PTC-01	4.9
LH55	LH55PT-01	LH55PTC-01	4.9
LH65	LH65PT-01	LH65PTC-01	5.5

One of each PT and PTC is required to do one linear bearing.

Fig. 8 Protector and Double Seal



NOTE: V_1 includes the thickness of the screw head.

Double Seal Unit : mm

Linear Guide Model No.	Double Seal No. Plug End	Double Seal No. Grease Fitting End	Increased Thickness V2
LH15	LH15WS-01	LH15WSC-01	2.5
LH20	LH20WS-01	LH20WSC-01	2.5
LH25	LH25WS-01	LH25WSC-01	2.8
LH30	LH30WS-01	LH30WSC-01	3.6
LH35	LH35WS-01	LH35WSC-01	3.6
LH45	LH45WS-01	LH45WSC-01	4.3
LH55	LH55WS-01	LH55WSC-01	4.3
LH65	LH65WS-01	LH65WSC-01	4.9

One of each WS and WSC is required to do one linear bearing.

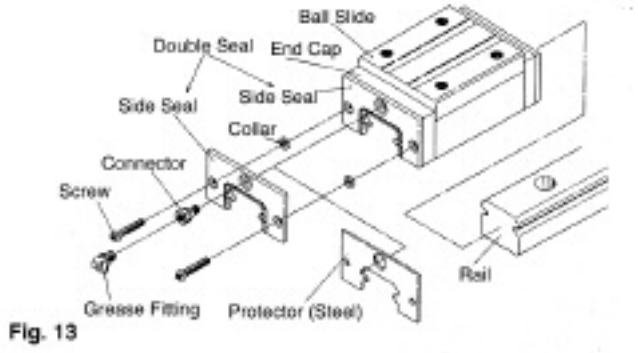


Fig. 13

***NOTE:** - The protector (steel) is always ahead of the side or double seal.

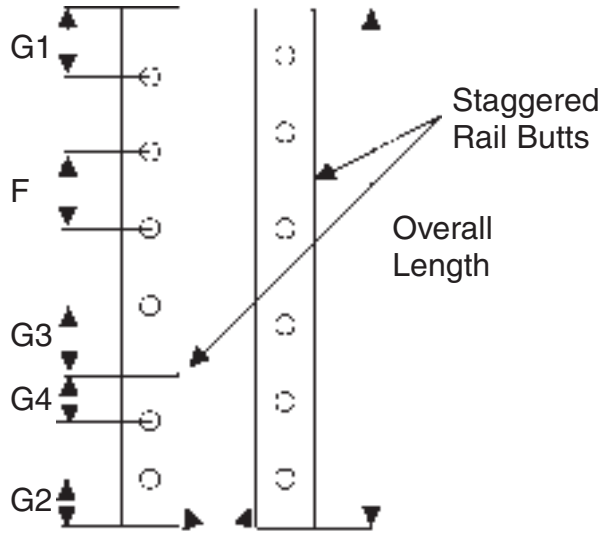
Plastic Cap for Rail Mounting Hole

Linear Guide Model No.	Rail Mounting Bolt Size	Cap. No. for Rail Mounting Hole
LH15	M4	L45800004-003
LH20	M5	L45800005-003
LH25	M6	L45800006-003
LH30	M8	L45800008-003
LH35		
LH45	M12	L45800012-003
LH55	M14	L45800014-003
LH65	M16	L45800016-003

Brass Cap for Rail Mounting Hole

Linear Guide Model No.	Rail Mounting Bolt Size	Cap. No. for Rail Mounting Hole
LH20	M5	L45800005-004
LH25	M6	L45800006-004
LH30	M8	L45800008-004
LH35		
LH45	M12	L45800012-004

Application Sheet
Linear Guides – Rail Butting



Line Marks Inside

In order to determine rail butting configuration, please photocopy and complete this form from our catalog and fax back to NSK customer service at 317-738-5050.

Quantity _____ Rail Number: _____

_____

G1 Dimension: _____ mm G2 Dimension: _____ mm

F Dimension: _____ mm (F dimension is fixed per series. See page 10.)

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

Consists of _____ G1= _____ G3= _____

_____ G2= _____ G4= _____

_____

Company: _____

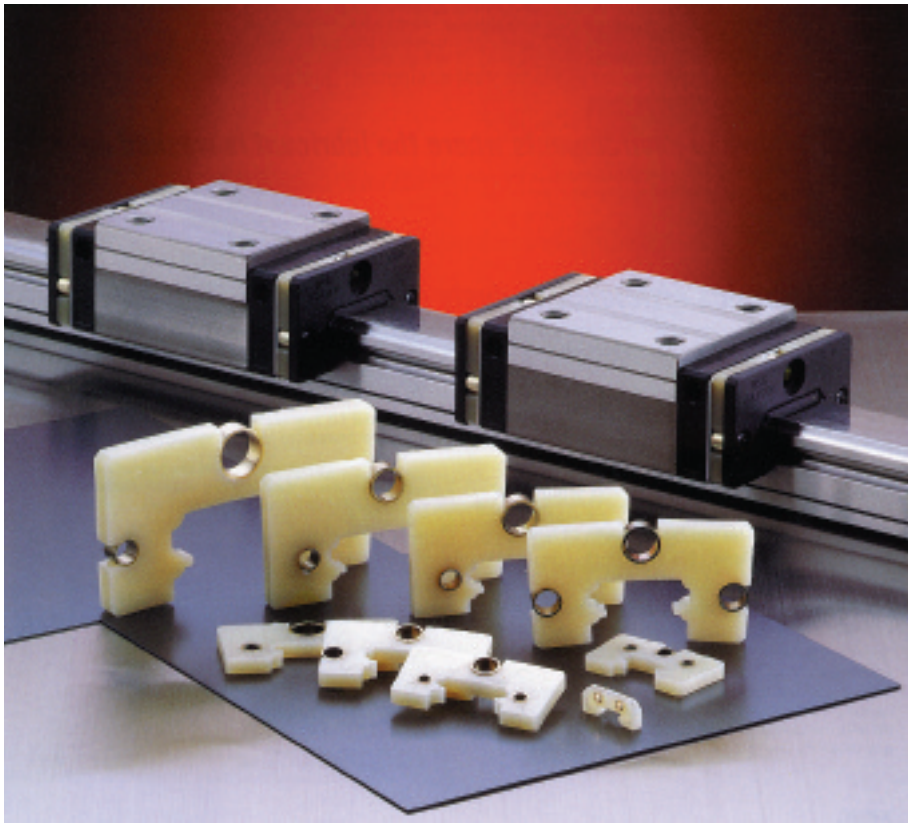
Contact Name: _____

Telephone: _____ Fax: _____

Date: _____ E-Mail: _____

Remarks: _____

Maintenance Free K1 Lubrication Units



The NSK Maintenance Free K1 Lubrication Unit'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 Maintenance Free 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 Maintenance Free K1 Lubrication Unit in combination with grease. Linear guides with NSK Maintenance Free K1 Lubrication Units will not require operational maintenance for five (5) years or 10,000 km.

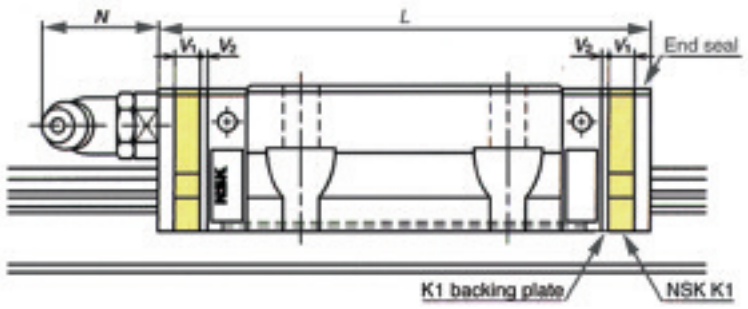
2: PREVENTION OF OIL-RELATED ENVIRONMENTAL POLLUTION.
In locations where oil greatly affects the environment, or in mechanisms with severe hygiene restrictions, sufficient lubrication is provided using the NSK Maintenance Free K1 Lubrication Unit in combination with grease.

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 Maintenance Free K1 Lubrication Unit in combination with grease.

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 Maintenance Free K1 Lubrication Unit in combination with grease.

Maintenance Free K1 Lubrication Unit Dimensions

(grease fitting optional)



Interchangeable Linear Guide Dimensions – LH 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 K1 backing plate V_2	Grease fitting projection N (mm)
LAH15	AN BN	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 BN	EM GM	79 107	90.6 118.6	5.0	0.8	(14)
LAH30	AN BN	 EM GM	85.6 98.6 124.6	97.6 110.6 136.6	5.0	1.0	(14)
LAH35	AN BN	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)

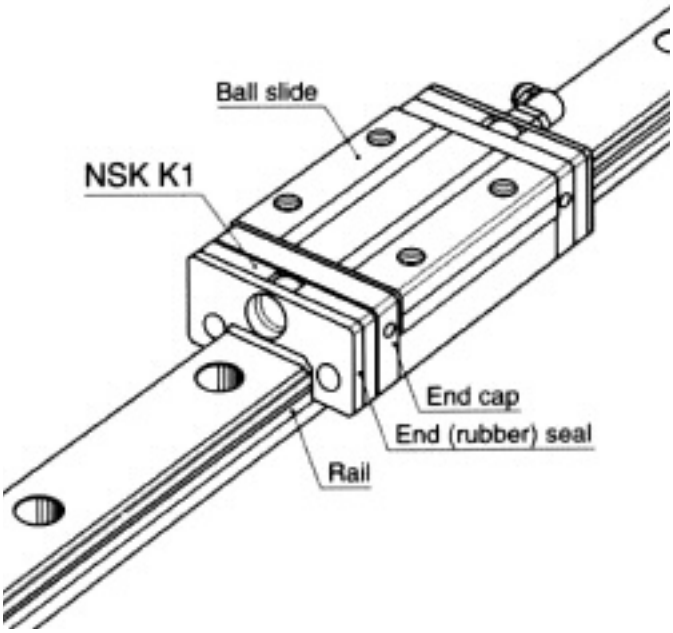
A grease fitting is shown in the above drawing but is removed and replaced by a plug when NSK's Maintenance Free K1 Lubrication Units are added to the linear guide sliders. The grease fitting is still shipped for user preference.

NSK Maintenance Free K1 Lubrication Units provide long life and maintenance free operation. When added to our linear guides, operational maintenance will not be required for five (5) years or 25,000 km. Another substantial benefit of NSK Maintenance Free K1 Lubrication Units is the elimination of lubrication system costs including system design, parts (pipes and lubrication equipment), system installation time, materials and grease, maintenance personnel and industrial waste disposal.

* For Scraper and Double Seal Information for LH Series please see page 11.

**Contact NSK for information on assembly instructions.

Maintenance Free K1 Lubrication Unit Handling and Assembly Instructions



Handling Instructions

To maintain the NSK Maintenance Free K1 Lubrication Unit 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) (1 hour or less)
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-AV2 or AS2, ester-PS2) present no problems to the Maintenance Free K1 Lubrication Units performance.

Please Note: A grease fitting is shown in the above drawing but is removed and replaced by a plug when NSK's Maintenance Free K1 Lubrication Units are added to the linear guide sliders. The grease fitting is still shipped for user preference.

Assembly Instructions for the Maintenance Free K1 Lubrication Units for Linear Guides

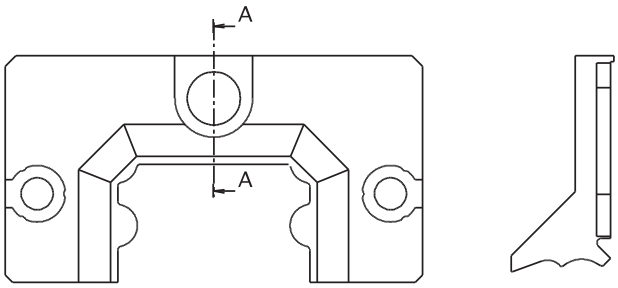
1. Using the plastic provisional rail supplied, slide linear bearing on to the linear rail.
2. Remove the grease fitting from the end of the bearing.
3. Remove the Phillips screws (2 pieces).
4. Remove the end seal from end of bearing.
5. Install threaded plug from Maintenance Free K1 Lubrication Unit kit (or see option 9 and 10 depending on application).
6. Install the cover plate from the Maintenance Free K1 Lubrication Unit kit, to the end of bearing, against the end cap.
7. Install Maintenance Free K1 Lubrication Unit without fixing rings, so it can be expanded over the rail.
8. Put the three (3) fixing rings in position on the Maintenance Free K1 Lubrication Unit.
9. Replace the end seal, in front of the Maintenance Free K1 Lubrication 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 Maintenance Free K1 Lubrication Unit seal kit).

Note* The Maintenance Free K1 Lubrication Unit has a shelf life. They should be installed immediately upon receipt. It is important to avoid direct sun light and extreme heat conditions.

Linear Guides Equipped with High Performance Seal

Overview and Features

- The configuration of the new High Performance Seal substantially improves dust-proofing performance by preventing contaminants from entering the ball slide and ensuring higher grease retention.
- Standard specifications for the NSK Maintenance Free K1™ Lubrication Unit, in conjunction with the High Performance Seal, achieve advanced sealing performance and durability.



High Dust-Proofing Performance

- The new seal configuration reduces the entry of contaminants to less than 1/10 that of conventional standard, single-side seals. (Fig. 1)

Enhanced Durability

- High dust-proofing performance enhances durability of linear guides under highly contaminated conditions.
- Durability testing in a severe environment of rubber fragments demonstrates durability more than five times that of standard, single-side seals. (Fig. 2)

Linear Guides Equipped with High Performance Seal

Fig. 1 Decreases contamination volume to less than 1/10

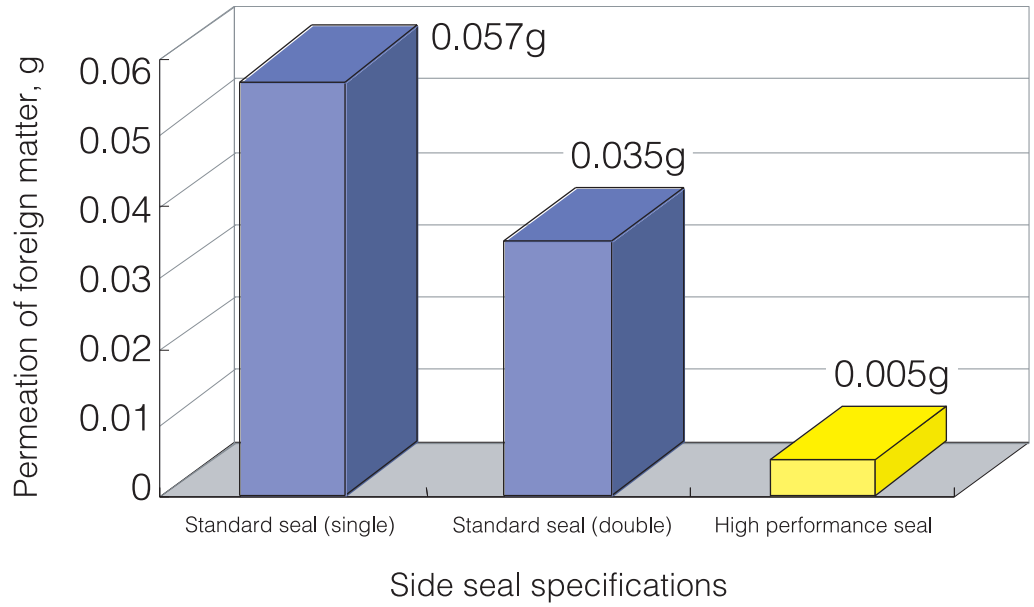
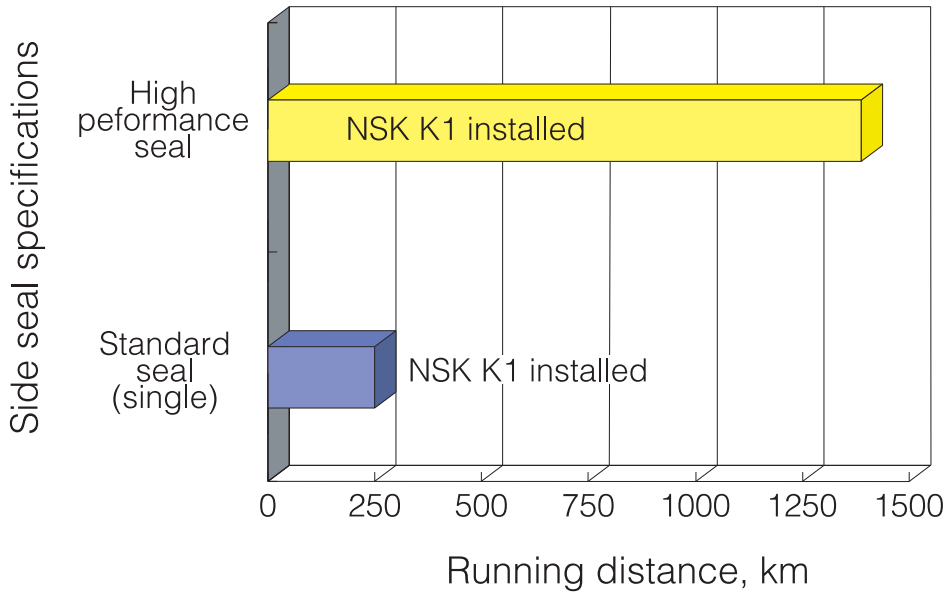


Fig. 2 Fivefold increase in durability



Linear Guide Interchange

Linear Guide Series

NSK	THK	Thomson
LH	HSR	CG

Linear Guide Sizes

NSK	THK	Thomson
LH15	HSR15	
LH20	HSR20	CG20
LH25	HSR25	CG25
LH30	HSR30	CG30
LH35	HSR35	CG35
LH45	HSR45	CG45
LH55	HSR55	CG55
LH65	HSR65	

Linear Guide Slider Styles

Slider Shape	Slider Length	NSK	THK	Thomson*
Square	Standard	**LAH##AN**	HSR##TR/TRX/CR/R	CG##CE
Square	Long Block	**LAH##BN**	HSR##HTR/HR/LR	CG##DE
Flanged	Standard	**LAH##EM**	HSR##TA/CA/A HSR##TB/CB/B	CG##AA
Flanged	Long Block	**LAH##GM**	HSR##HTA/HA/LA HSR##HTB/HB/LB	CG##BA

##refers to the appropriate Linear Guide Size

***Thomson not dimensionally equivalent and may require shims

Linear Guide Rail Length in mm

NSK	THK	Thomson
L1H##XXXX	HSR##+XXXXL	RG##NLXXXX

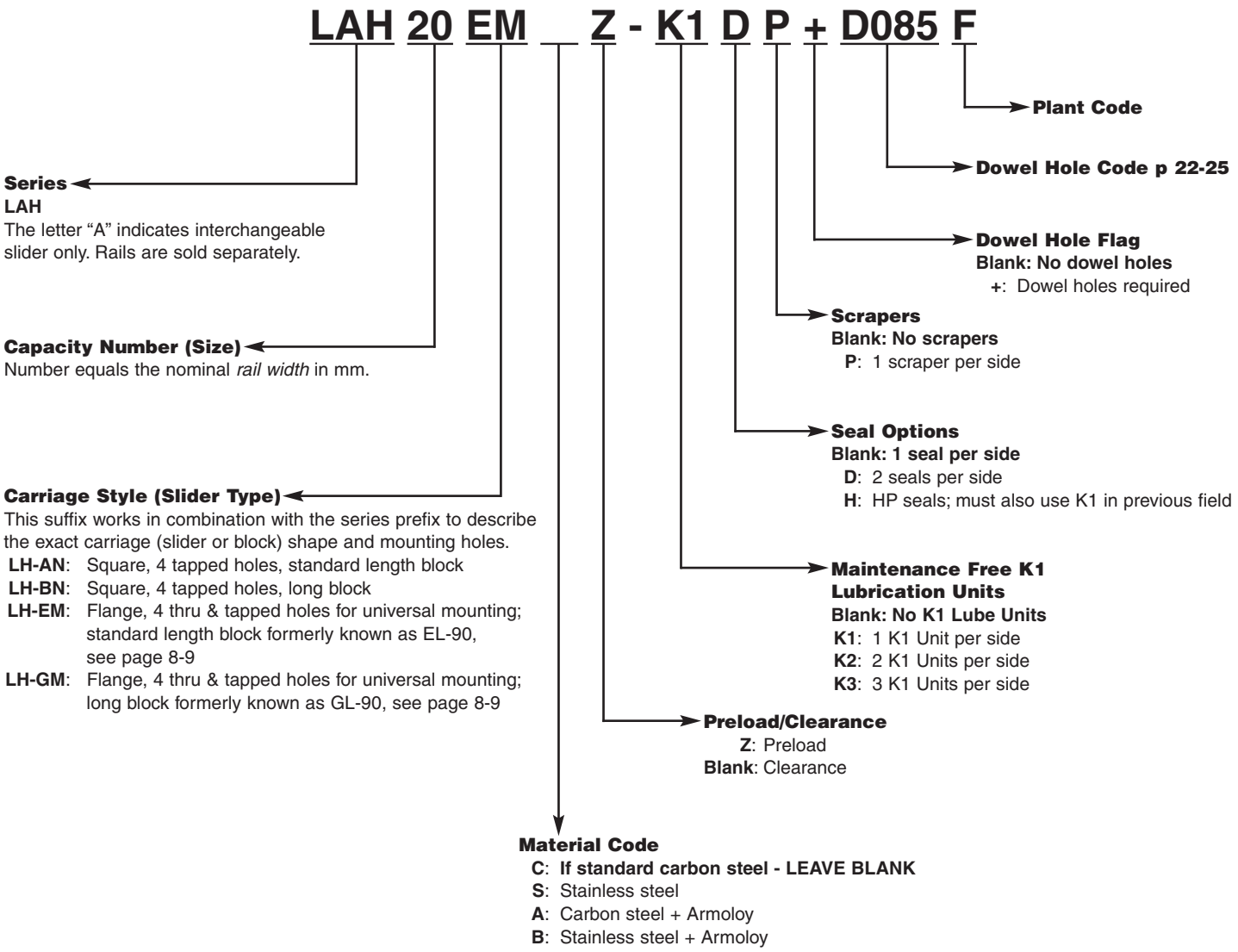
##refers to the appropriate Linear Guide Size

XXXX refers to rail length in mm

Linear Guide Accuracy Class, Preload, Seals & Scrapers

	NSK	THK	Thomson
Interchangeable Accuracy	**PC**		N
Clearance (No Preload)	**T**		A
Preload	**Z**	C1	B
Seals	Standard with side and bottom seals	SS-end/bottom UU-end	 LDS
Scraper	**P**	ZZ-end/bottom/scraper	ZZ
Double Seals	**D**	DD-double/bottom	DD
Double Scraper	**DP**	KK-double/bottom/scraper	KK

Interchangeable Linear Guide P/N System:
LH Series – Sliders Only



Interchangeable Linear Guide P/N System:
LH Series – Rail Only

L1H 20 3960 _ Z + D085 20 F

Plant Code

G1 Dimension
Distance from the end of the rail to the center of the first bolt-hole
20 = 20MM
20.5 = 20.5MM

Series
L1H
The addition of the number "1" to the series prefix indicates an interchangeable series rail only. Interchangeable sliders are sold separately.

Dowel Hole Code p 22-25

Capacity Number (Size)
Number equals the nominal *rail width* in mm for all series. See page 10.

Dowel Hole Flag
Blank: No dowel holes
+: Dowel holes required

Rail Length
Number equals total rail length in mm. This number is always four digits long. 100mm long rail would be "0100" and 75mm rail length would be "0075".

Preload
Z: Preload for all rails

Material Code
C: **If standard carbon steel - LEAVE BLANK**
S: Stainless steel
A: Carbon steel + Armoloy
B: Stainless steel + Armoloy

Interchangeable Linear Guide P/N System:
LH Series – Assemblies - Rail & Slider

LH 20 3960 EM __ 2 PC Z K1 __ P 20 F

Plant Code

G1 Dimension
Distance from the end of the rail to the center of the first bolt-hole
20 = 20MM

Scrapers
Blank: No scrapers
P: 1 scraper per side

Seal Options
Blank: 1 seal per side
H: HP seals; must also use K1 in previous field

Maintenance Free K1 Lubrication Units
Blank: No K1 Lube Units
K1: 1 K1 Unit per side
K2: 2 K1 Units per side
K3: 3 K1 Units per side

Preload/Clearance
Z: Preload
T: Clearance

Accuracy Grade
PC: Interchangeable grade

Number of Sliders per Rail
A number must always be placed in this field including the need for only one slider.

Material Code
C: **If standard carbon steel - LEAVE BLANK**
S: Stainless steel
A: Carbon steel + Armoloy
B: Stainless steel + Armoloy

Series
LH

Capacity Number (Size)
Number equals the nominal *rail width* in mm.

Rail Length
Number equals total rail length in mm. This number is always four digits long. 100mm long rail would be "0100" and 75mm rail length would be "0075".

Carriage Style (Slider Type)
This suffix works in combination with the series prefix to describe the exact carriage (slider or block) shape and mounting holes.
LH-AN: Square, 4 tapped holes, standard length block
LH-BN: Square, 4 tapped holes, long block
LH-EM: Flange, 4 thru & tapped holes for universal mounting; standard length block formerly known as EL-90, see page 8-9
LH-GM: Flange, 4 thru & tapped holes for universal mounting; long block formerly known as GL-90, see page 8-9

Standard Dowel Hole Options for NSK LH Linear Guides
Slider Modifications; Reference Table 1 and Illustration 1, page 23

Code	Sizes	Description
D035	20,25	Slider with 6mm slip fit dowel hole located centrally in line with bolt holes on reference side of slider.
D065	30~65	Slider with 10mm s/f dowel hole located centrally in line with bolt holes on reference side of slider.
D047	25~65	Slider with M6X.75 side lube port located centrally in line with bolt holes on non-reference side of slider.
D086	25	Slider with 6mm s/f dowel hole located centrally in line with bolt holes on reference side of slider and M6X.75 lube port located centrally in line with bolt holes on non-reference side of slider.(D035+D047)
D087	25	Slider with 6mm s/f dowel hole located centrally in line with bolt holes on reference side and 1/16NPT lube port located centrally in line with bolt holes on non-reference side of slider.(D035+M047)
D088	30~65	Slider with 10mm s/f dowel hole located centrally in line with bolt holes on reference side and M6X.75 lube port located centrally in line with bolt holes on non-reference side of slider.(D065+D047)
D089	30~65	Slider with 10mm s/f dowel hole located centrally in line with bolt holes on reference side and 1/16NPT lube port located centrally in line with bolt holes on non-reference side of slider.(D065+M047)
D075	20,25	Slider with two 6mm slip fit dowel holes located centrally in line with bolt holes on both sides of slider.
D095	30~65	Slider with two 10mm s/f dowel holes located centrally in line with bolt holes on both sides of slider.
D100	30~65	Slider with two 10mm s/f dowel holes located centrally in line with bolt holes on both sides of slider and M6X.75 lube port 25% of the bolt span from G1 side of bolt on non-reference surface.
M035	20,25	Slider with 1/4" dowel hole located centrally in line with bolt holes on reference side.
M065	30~65	Slider with 3/8" dowel hole located centrally in line with bolt holes on reference side.
M047	25~65	Slider with 1/16 NPT side lube port option located centrally in line with bolt holes on non-reference side of slider.
M087	25	Slider with 1/4" s/f dowel hole located centrally in line with bolt holes on reference side of slider and a 1/16NPT lube port located centrally in line with bolt holes on non-reference side of slider.(M035+M047)
M089	30~65	Slider with 3/8" s/f dowel hole located centrally in line with bolt holes on reference side of slider and a 1/16NPT lube port located centrally in line with bolt holes on non-reference side of slider.(M065+M047)
M075	20,25	Slider with 1/4" dowel hole located centrally in line with bolt holes on both sides.
M095	30~65	Slider with 3/8" s/f dowel hole located centrally in line with bolt holes on both sides.
M100	30~65	Slider with 3/8" s/f dowel hole located centrally in line with bolt holes on both sides of slider and M6X.75 lube port 25% of the bolt span from G1 side of bolt on non-reference surface.
W31	20~65	Oil port with plug in non-reference sie of slider, centrally located between bolt holes. Oil port size as follows: Size 20=M6X.75, Sizes 25~65=1/8NPT

Illustration 1 – Slider Modifications

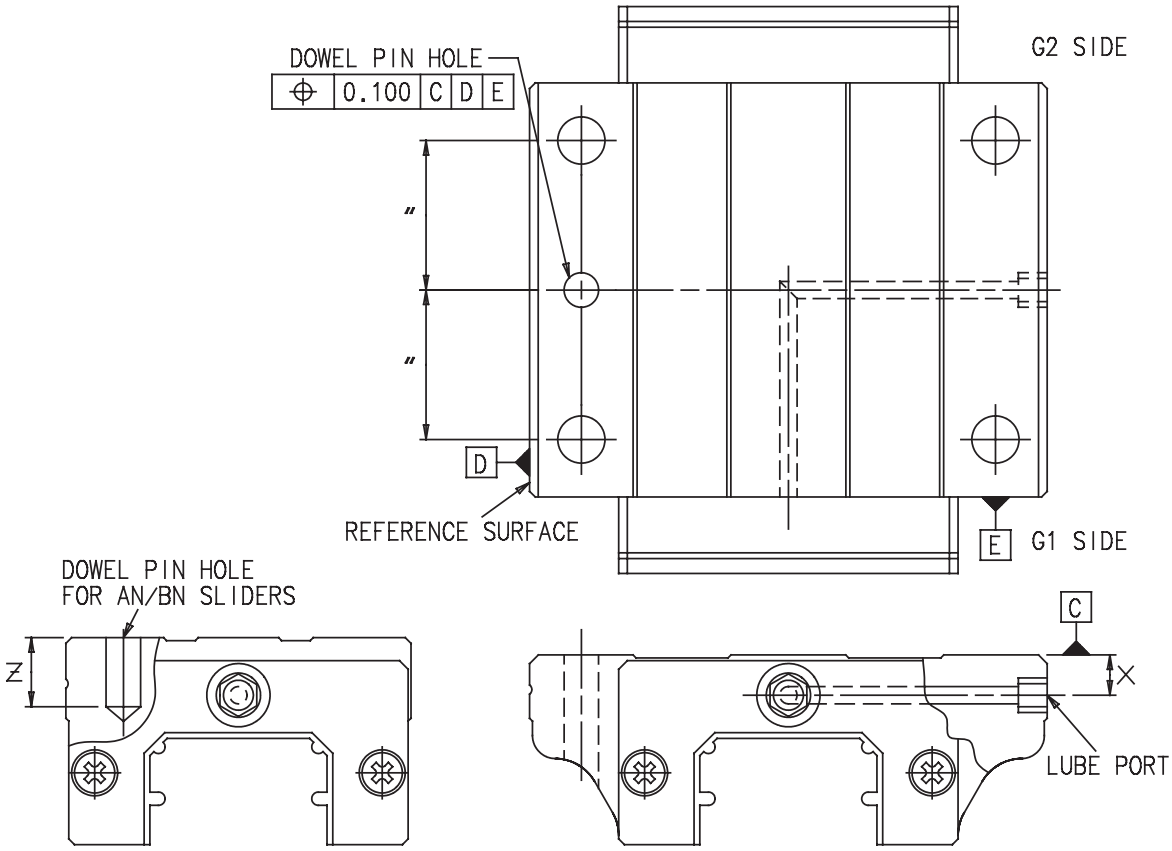


Table 1

Size	Related Stds.	Dowel 1 Dia	Dowel Pin Depth "Z" AN/BN	Lube Port Depth "X" EL/FL/GL/HL 1/16NPT	Lube Port Depth "X" EL/FL/GL/HL M6	Lube Port Depth "X" AN/BN Sliders 1/16NPT	Lube Port Depth "X" AN/BN Sliders M6
20	D/M035, D/M075	6mm (1/4")	6				
25	D/M035, D/M047, D/M075, D/M087, D086	6mm (1/4")	9	6	6	8	10
30	D/M047, D/M065, D/M089, D/M095, D/M100, D088	10mm (3/8")	12	7	7	8	10
35	D/M047, D/M065, D/M089, D/M095, D/M100, D088	10mm (3/8")	13	8	8	8	15
45	D/M047, D/M065, D/M089, D/M095, D/M100, D088	10mm (3/8")	18	9	9	8	19
55	D/M047, D/M065, D/M089, D/M095, D/M100, D088	10mm (3/8")	19	10	10	8	20
65	D/M047, D/M065, D/M089, D/M095, D/M100, D088	10mm (3/8")	20	19	19	8	19

Notes:
Tolerance for metric dowel holes = 6mm $^{+0.025/+0.0}$ and 10mm $^{+0.025/+0.0}$.
Tolerance for inch dowel holes = 1/4 in $^{+0.001/+0.0}$ and 3/8 in $^{+0.001/+0.0}$.
Dowel holes for EM and GM sliders have thru dowel holes, AN, BN sliders have dowel depth "Z" shown in table.

Rail Modifications Reference Table 2 and Illustration 2, page 25

Code	Sizes	Description
D080	20	Rail with 6mm slot located 30mm inside of last bolt hole on G1 side and a 6mm s/f dowel thru hole located 30mm inside last bolt hole on G2 end.
D085	25-65	Rail with 10mm slot located 30mm inside last bolt hole on G1 end and a 10mm s/f dowel thru hole located 30mm inside last bolt hole on G2 end.
D110	20-65	M5X.8, 10mm deep, tapped hole located at center point of both ends of rail for Bellows attachment per table 2.
D185	20-65	Rail with thru dowel hole and slot per D080 and D085 with both ends prepped for bellows per R2R2.
M080	20	Rail with 1/4" slot located 30mm inside last bolt hole on G1 end and a 1/4" s/f dowel thru hole located 30mm inside last bolt hole on G2 side.
M085	25-65	Rail with 3/8" slot located 30mm inside last bolt hole on G1 side and a s/f dowel thru hole located 30mm inside last bolt hole on G2 side.
M110	25-65	Rail with 10-32 UNF, .5 inch deep, tappepd hole located at center point of both ends of rail for bellows attachment.
M185	20-65	Rail with dowel hole and slot per M080 or M085 with both ends prepped for bellows per R2R2.

Misc. Codes

Code	Sizes	Description
R2R2	20-65	Rail with both ends prepped for bellows per Table 2.
R2	20-65	Rail with G1 rail end prepped for bellows per Table 2.

Illustration 2 – Rail Modifications

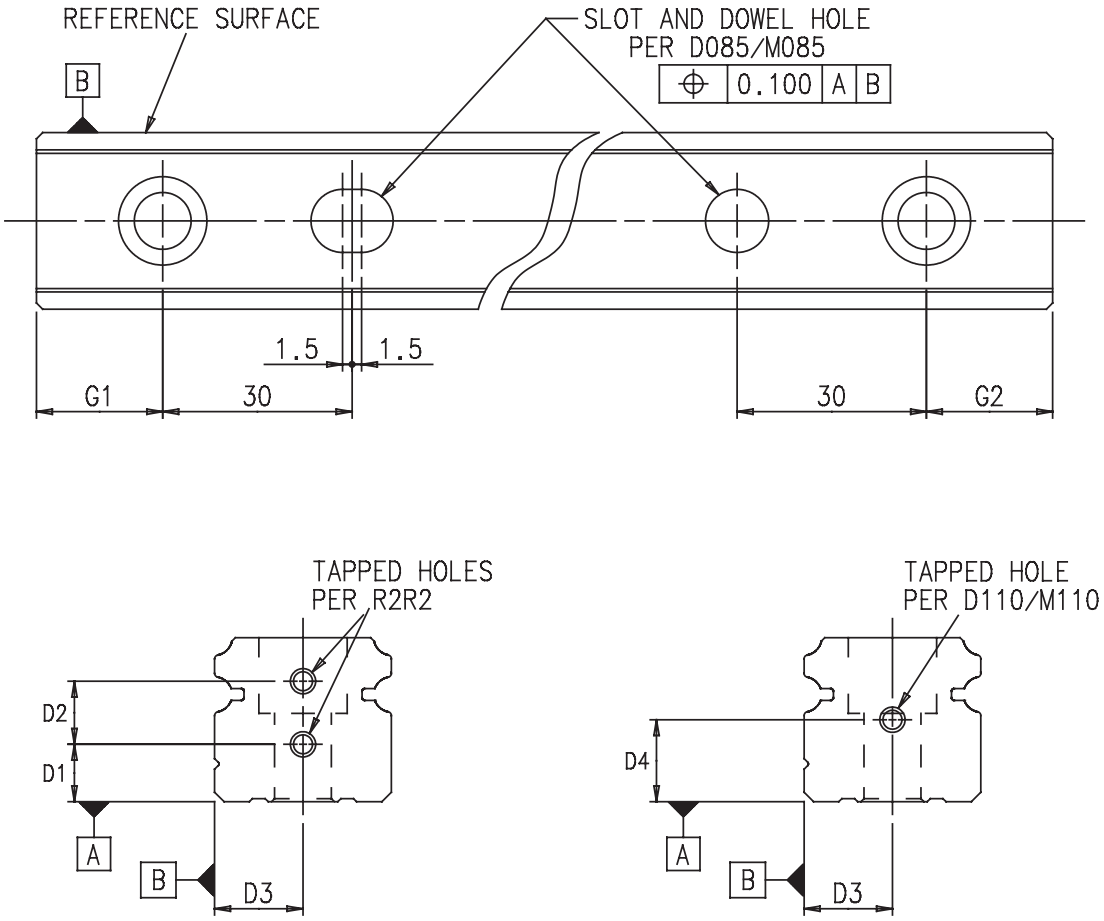


Table 2, R2R2 and M110/D110 Rail end preparations for bellows

Size	Dowel Hole	d1	d2	d3	Thread Spec for R2R2	d4 for D110 andM110
20	D080-6mm M080-1/4"	5mm	8mm	10mm	M3X.5	9
25	D085-10mm M085-3/8"	7.25mm	10mm	11.5mm	M4X.7	11
30	D085-10mm M085-3/8"	9.1mm	10mm	14mm	M4X.7	13
35	D085-10mm M085-3/8"	11mm	10mm	17mm	M4X.7	15
45	D085-10mm M085-3/8"	15mm	10mm	22.5mm	M4X.7	19
55	D085-10mm M085-3/8"	18mm	23.9mm	26.5mm	M4X.7	22
65	D085-10mm M085-3/8"	18mm	23.9mm	26.5mm	M4X.7	26

Tolerance for metric dowel holes and slots = 6mm $^{+0.025/+0.0}$ and 10mm $^{+0.025/+0.0}$.
Tolerance for inch dowel holes and slots = 1/4 in $^{+0.001/+0.0}$ and 3/8 in $^{+0.001/+0.0}$.

UNIT CONVERSIONS

TO CONVERT

FROM	TO	MULTIPLY BY
daN	N	10.000
kgf	N	9.81
kgf	lbf	2.205
kgf.cm	lbf.in	0.868
kgf.cm	ozf.in	13.890
kgf.m	lbf.ft	7.234
kgf.m	lbf.in	86.811
N.m	lbf.ft	0.738
mm	inch	0.03937
inch	mm	25.4

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