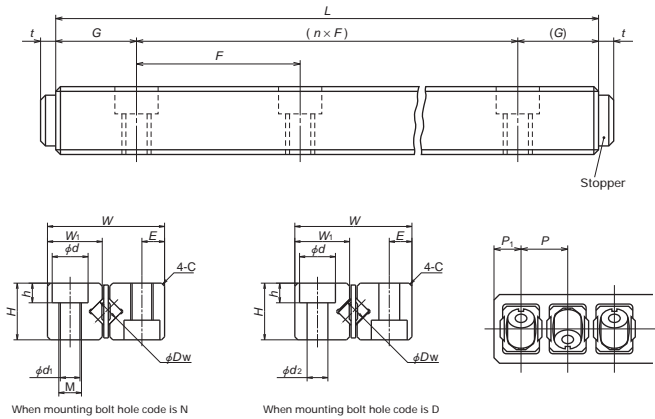


(12) Dimension Table

Crossed roller guide: Model CRG



Model No.	$D_w$	$W$	$H$	$w$	$C$	$E$	$d$	$h$	$d_1$	$d_2$	$M$	$G$	$F$	$t$	$P$	$P_1$	Dynamic load rating $C$ when rollers are 20 (N)	Static load rating $C_{01}$ when roller is one (N)	L	
																			Max length	Saper high precision P5 P6
CRG04...A	4	24	12	11.3	0.5	5	8	4.2	4.3	5	M 5x0.8	20	40	2.3	6.5	3.8	9800	665	200	300
CRG04...T	4	26	10	12.3	0.5	5	8	4.2	4.3	5	M 5x0.8	12/15	38/40	2.3	6.5	3.8	9800	665	200	300
CRG06...A	6	31	15	14.5	0.8	6	9.5	5.2	5.2	5.5	M 6x1	25	50	3.2	9.5	5.8	26700	1510	400	600
CRG09...A	9	44	22	20.7	1	9	11	6.2	6.8	7	M 8x1.25	50	100	4	14	8	72500	3400	600	900
CRG12...A	12	58	28	27.6	1.5	12	14	8.2	8.5	9	M 10x1.5	50	100	5	20	12	130000	6050	900	1200

Remarks: The area which embraces the roller is plastic for the standard retainer. A solid type made of steel plate is available for high temperature resistance.

A-6-3 Roller Pack

(1) Structure

A roller pack comprises a main body which supports load from the guide way block via two rows of rollers; an end cap which changes the direction of the recirculation of rollers at the end of the main body; a side plate which guides the rollers. (Fig. 1). Roller pack is one of the linear rolling guides, where rollers are allowed to re-circulate infinitely.

There is a plate spring attached to a side of roller pack to prevent roller pack from falling out when it is turned upside down after assembly.

Other component of the roller pack is spring pin. Spring pin is on the top surface of the roller pack, and makes installation of wedge block and fitting plate easier.

Wedge block is a unit to provide preload (Fig. 3) to roller pack; a fitting plate (Fig. 2), functioning like a pivot, adjusts misalignment of roller pack automatically. Wedge of wedge block moves up and down, to apply preload, by turning the adjust screw.



Photo 1 Roller pack

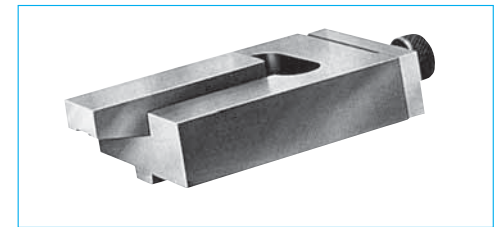


Photo 2 Wedge block

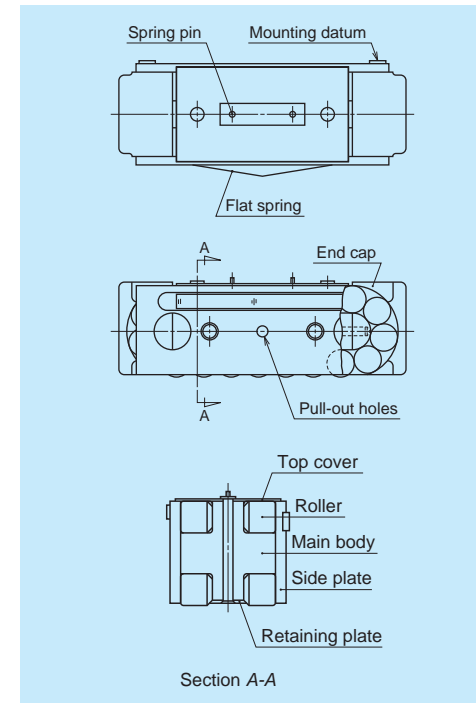


Fig. 1 Roller pack

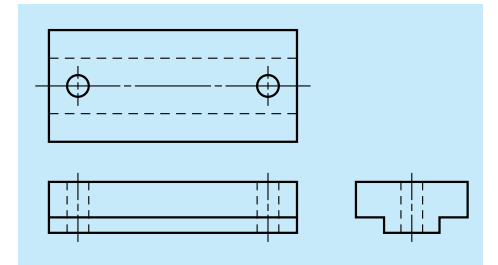


Fig. 2 Fitting plate

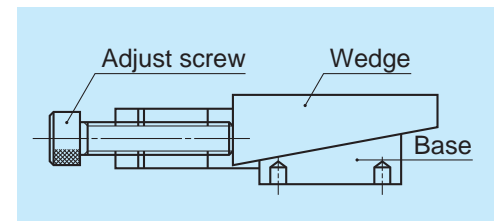


Fig. 3 Wedge block

**(2) Features**

Roller pack has two remarkable characteristics other linear roller guide bearings do not have.

① **No roller skewing**

If the roller is long relative to its diameter, the roller inclines during operation. This phenomenon is called skewing. Skewing causes problems such as sudden rise in friction force. However, a short roller lacks large load carrying capacity. The roller introduced here solved the skewing problem, yet has a large load carrying capacity: short rollers are combined into double rows.

② **Load is applied equally.**

This is due to a "fitting plate," a result of "changed way of conceiving." Installation is quite easy: Merely place the fitting plate through the two holes to spring pins. The stop pins are inserted to holes on the top surface of the roller pack. The contact area between the fitting plate and the main body is made small. This way, the self-alignment is automatically accomplished by elastic contact of both parts.

This distributes an equal load to the rollers, far extending the life, compared to conventional roller linear guides.

Other characteristics include: Easy to provide preload by the wedge block; can be installed to vertical shaft; and reduction in noise level.

**(3) Accuracy**

The height tolerance of roller pack is 10 μm. Roller packs are grouped into a size difference of every 2 μm (corded by A to E) before delivery (Table 1).

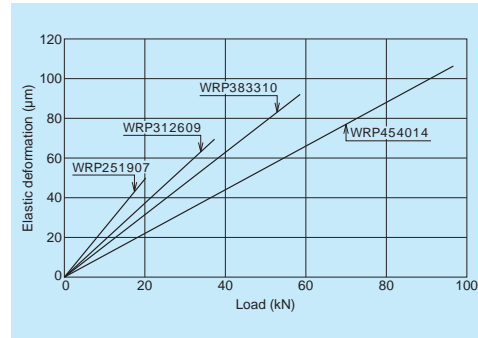
**Table 1 Height Classification**

Unit: μm

Category	Code
over or less	
+3 - +5	A
+1 - +3	B
-1 - +1	C
-3 - -1	D
-5 - -3	E

**(4) Rigidity**

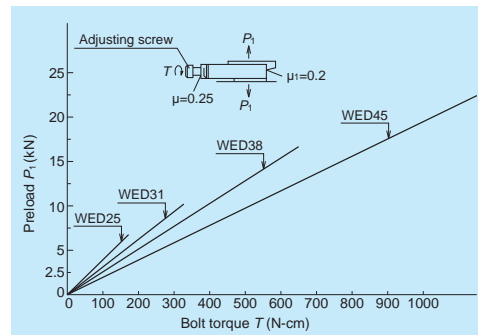
Fig. 4 shows the relationship between load and deformation. This includes deformation caused by contact between: the rollers and main body; the rollers and guide way surface; the main body and fitting plate.



**Fig. 4 Elastic deformation of the roller pack**

**(5) Preload**

Fig. 5 shows conversions of tightening torque of the wedge block adjust screw into preload volume. Use a dial gauge for accurate measurement.



**Fig. 5 Tightening torque of the adjust screw, and preload volume**

**(6) Friction and Lubrication**

**1. Lubricants and volume**

Mineral oils are commonly used. Since roller pack is used under a relatively heavy load, the oil should, ideally, have high viscosity and provide a strong film. Select from JIS viscosity 32-150.

Criteria of oil supply per roller pack Q (cc/h) can be calculated by the following formula.

$$Q \geq S \times 1/4 \dots\dots\dots (1)$$

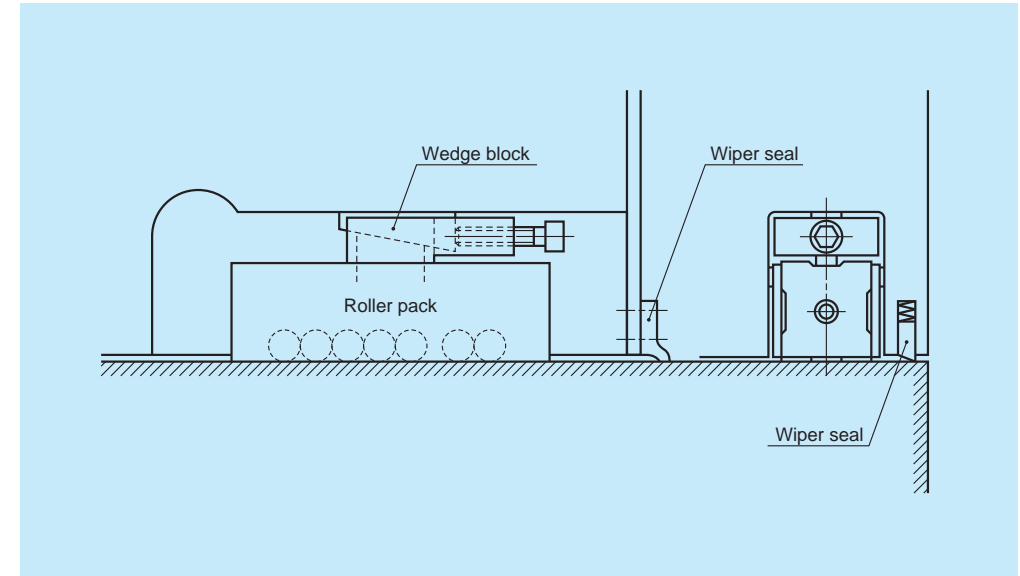
In this formula, S (stroke) is shown in meters. The oil volume, when the stroke is 1 m, per roller pack is more than 0.25 (cc/h). It is more desirable to supply a small amount of oil at short intervals than supplying a large amount at one time. In case of grease lubrication, use a grease of consistency 2. Albania EP2 is widely used.

**2. Friction coefficient**

Starting friction coefficient is significantly small at under 0.005.

**3. Seal**

It is necessary to install a wiper seal to the guide way surface to prevent foreign matters (swarf from cutting, and other dust) from entering the roller pack to enjoy the full benefit of the designed life of it. The material of the seal should have strong resistance to oil and wear. Felt and synthetic rubber (acrylonitril butadiene rubber) are some of the suitable materials. Fig. 6 shows a general method to install the seals.



**Fig. 6 Installation of seal**

**(7) Installation**

**1. Installation and applying preload**

As shown in Fig. 7, it is basic that a fitting plate is installed on the roller pack which receives load, and a wedge block is installed on the roller pack which receives no load, but is only used for preload. All components should be secured with a stop pin, facing toward the direction of movement. To cut costs for processing, it is recommended to divide the pocket (which contains roller pack) into some blocks and secure them with bolts (Fig. 7). Preload is provided by the wedge block. Estimate the actual load beforehand, so the preload shall not be lost when a load is applied. A load variation equivalent to up to two times of the preload volume can be absorbed in this case.

(Take into consideration the life in (8) in determining preload volume.)

**2. Accuracy of way block**

The following is the ideal accuracy specification and installation accuracy of way block as a guide face.

- Hardness by heat treatment : More than HRC58 hardened depth 2 mm or more
- Surface roughness : Less than 1.6 S
- Parallelism as a single unit: Less than 0.010 mm per meter
- Parallelism after installation : Less than 0.020 mm per meter

Please consult NSK when using cast iron or cast steel guide face.

**3. Pocket accuracy**

Accuracy of the pocket in which the roller pack is mounted should satisfy the following conditions.

- Pocket width : Roller pack width + 0.10 mm to 0.20 mm
- Parallelism of the pocket side faces to the guide way face : Less than 0.010 mm per 100 mm.
- Parallelism of the fitting plate (pocket bottom) mounting face to the guide way face and parallelism of the wedge block mounting face to the guide way face : Less than 0.040 mm per 100 mm.

**(8) Rated life**

Rated life L (km) is shown in the following formula. In this formula:

$$L = 50 \left( \frac{C}{f_w \cdot F_c} \right)^{\frac{10}{3}} \dots\dots\dots (2)$$

- C : Basic dynamic load rating (kN)
- f<sub>w</sub> : Load factors. 1.0 to 1.2 at time of smooth operation
- F<sub>c</sub> : Calculated load (kN) applied to the roller pack

**(9) Disassembly**

Remove the roller pack preloaded by the wedge block in the following manner.

- Loosen the adjust screw of the wedge block. Lightly tap the wedge. In case of light preload, the wedge loosens, and the roller pack can be pulled out.
- When pulling, put the bolt in the tap hole at the end of the end cap, and tug the bolt.
- In case of heavy load, the roller pack could not be pulled out by the above method. Hook a tool to the pull-out hole (Fig. 1) on the side plate of the roller pack, and pull out the roller pack.

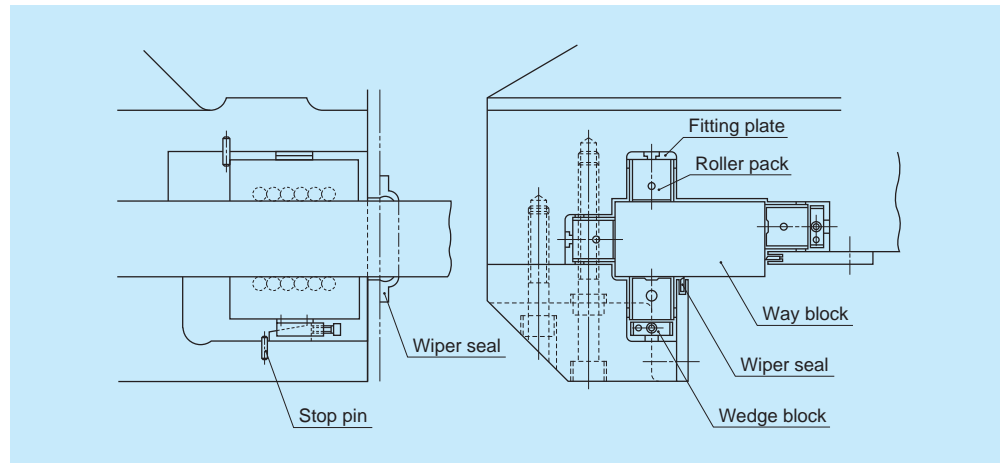
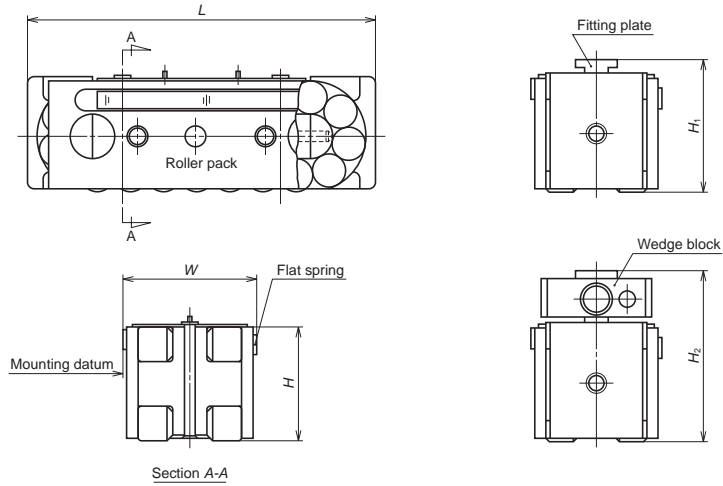


Fig. 7 Design of the roller pack pocket (example)

(10) Dimension Table

Roller pack: Model WRP

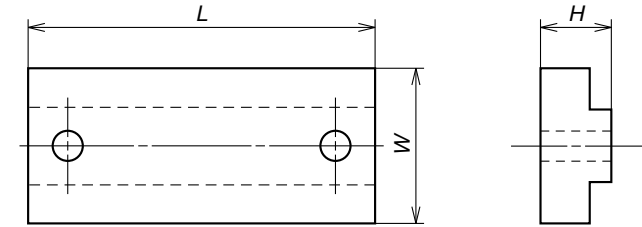


Unit: mm

Model No.	Width <i>W</i>	Height $\pm 0.005$ <i>H</i>	Length <i>L</i>	Applicable fitting plate reference No.	Assembled height <i>H</i> <sub>1</sub>	Applicable wedge reference No.	Assembled height <i>H</i> <sub>2</sub>	Basic dynamic load rating <i>C</i> (N)	Basic static load rating <i>C</i> <sub>0</sub> (N)
<b>WRP 251907</b>	25	19	65.5	WFT 25	24	WED 25	31 (30.4 - 31.6)	31000	40500
<b>WRP 312609</b>	31	26	85	WFT 31	31	WED 31	40 (39.4 - 40.6)	57000	73000
<b>WRP 383310</b>	38.1	33.31	104	WFT 38	38.91	WED 38	50.8 (50 - 51.5)	91000	113000
<b>WRP 454014</b>	45	40	138	WFT 45	45	WED 45	60 (59.2 - 60.8)	151000	191000

Remarks : Numbers in the parentheses in column *H*<sub>2</sub> show the adjustable height range of the wedge block.

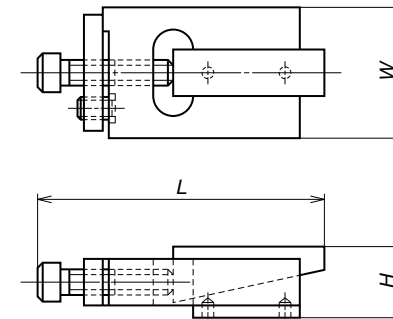
Fitting plate: Model WFT



Unit: mm

Model No.	Width <i>W</i>	Height $(\pm 0.01)$ <i>H</i>	Length <i>L</i>	Applicable Roller pack
<b>WFT 25</b>	10	5	20	WRP 251907
<b>WFT 31</b>	12	5	26	WRP 312609
<b>WFT 38</b>	12.8	5.6	29	WRP 383310
<b>WFT 45</b>	16	5	40	WRP 454014

Wedge block: Model WED



Unit: mm

Model No.	Width <i>W</i>	Height <i>H</i>	Length <i>L</i>	Applicable Roller pack
<b>WED 25</b>	23	12(11.5 - 12.5)	47	WRP 251907
<b>WED 31</b>	28	14(13.5 - 14.5)	63	WRP 312609
<b>WED 38</b>	35	17.47(16.9 - 18.1)	76	WRP 383310
<b>WED 45</b>	40	20(19.2 - 20.8)	95	WRP 454014

Remarks : Numbers in the parentheses in column *H*<sub>2</sub> show adjustable height range of the wedge block.