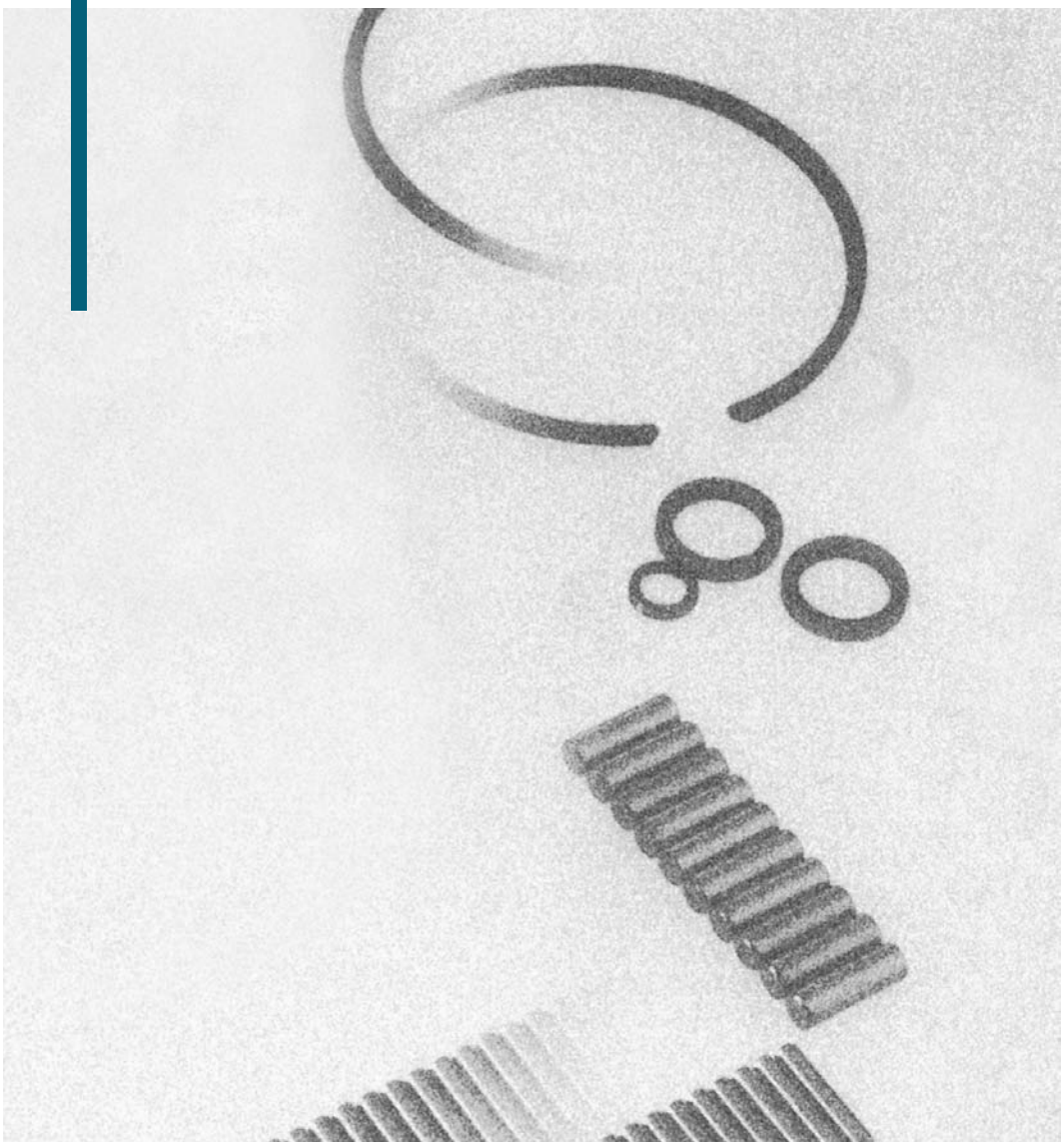
COMPONENTS
Needle Rollers/Snap Rings/Seals



Needle Rollers

NTN needle rollers are all made of high carbon chrome bearing steel, fine-finished by grinding and polishing after heat-treated, and the hardness thereof ranges from HRC60 to 65. These needle rollers are supplied as not only rolling element but also pin and shaft individuals.

End face profile of needle roller

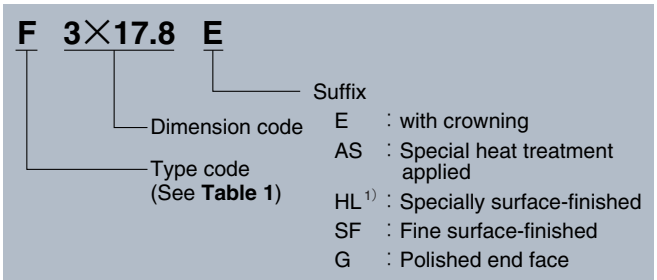
F-type needle roller bearing with flat end face is standard type, while A-type with round end face is semi-standard type. In addition to these two types, another needle roller type (nominal number with (suffix E) capable of damping edge load is also available. Feel free to contact **NTN** for the detail thereof.

Table 1 End face profile

Type	Name	Profile
F	Flat	
A	Round	

Composition of needle roller number

The needle roller number comprises type code (end face profile), dimension code [diameter (D_w)×length (L_w)] and a suffix.



1) For HL refer to Subsection 12.1 **"HL Bearings"** on page A-53.

Fig. 1

Needle roller tolerances

The **NTN** needle rollers are manufactured per the dimensional accuracy and profile accuracy specified in JIS B 1506 "Rollers for roller bearings". (Refer to **Table 2** in this page.)

Table 2 Needle roller tolerances Unit: μm

Characteristics	Tolerance and allowable value
Tolerance for mean value of diameter D_w	0～−10
Mutual deviation of diameter D_w	2
Roundness of diameter D_w, Diameter variation in a single radial plane	1.0 ($L_w/D_w \leqq 6$) 1.5 ($L_w/D_w > 6$)
Tolerance for length L_w	h13
Accuracy class	Class-2

The needle rollers are delivered contained in same package after the mutual deviation of diameter D_w was assorted to 2 μm and less. Before being delivered, the needle rollers are identified by label colors such as red, dark blue, blue, etc. according to the respective dimensional tolerances.

Further, mixed use of needle rollers contained in packages of different label colors is prohibited.

Table 3 Discrimination of needle rollers

Label color	Dimensional tolerance range μm	Discrimination
Red	0～− 2	Standard
Dark blue	−1～− 3	
Blue	−2～− 4	
Black	−3～− 5	
White	−4～− 6	
Gray	−5～− 7	Semi-standard
Green	−6～− 8	
Brown	−7～− 9	
Yellow	−8～−10	

Application of needle rollers

When configuring a full complement needle roller bearing using standard needle rollers, the shaft diameter ((*d*), housing bore diameter (*D*), circumferential clearance (ΔC) and radial internal clearance (Δr) can be determined based on the needle roller diameter (D_w) and number of rollers (*Z*) by using the formula below (refer to **Fig. 2**).

Determine the minimum value of circumferential clearance (ΔC) using **formula (1)**. The radial internal clearance (Δr) of an intended needle roller bearing can be determined based on the shaft diameter and projected bearing operating conditions by referring to **Table 5.1** in Sec. **5.1 "Bearing radial internal clearance"** (page A-30). Generally, any full complement roller bearing needs a greater radial internal clearance compared with a needle roller and cage assembly.

$$\Delta C = (0.005 \sim 0.020) \times Z \text{ mm (minimum value)} \quad \textbf{(1)}$$

Then, determine the minimum value of housing bore diameter (*D*) and the maximum value of shaft diameter (*d*) using the **formulas (2)** and **(3)**.

$$D = \frac{1}{\sin\left(\frac{\pi}{Z}\right)} \cdot \left(D_w + \frac{\Delta C}{Z}\right) + D_w \text{ mm (minimum value)} \quad \textbf{(2)}$$

$$d = D - 2D_w - \Delta r \text{ mm (maximum value)} \quad \textbf{(3)}$$

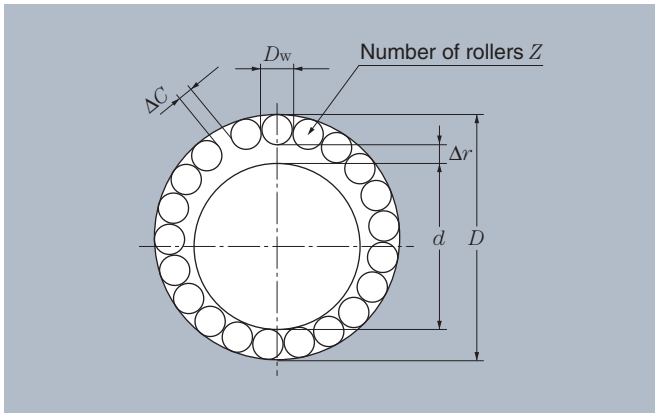


Fig. 2

The maximum value of housing bore diameter (*D*) required to retain needle rollers in a housing by a keystone can be determined from the minimum diameter value ($D_{w\,min}$) of the roller and the number of rollers using **formula (4)**. The coefficient *K* to be used in that time is as shown in **Table 4**.

$$D = K \cdot D_{w\,min} \text{ mm (max.)} \quad \textbf{(4)}$$

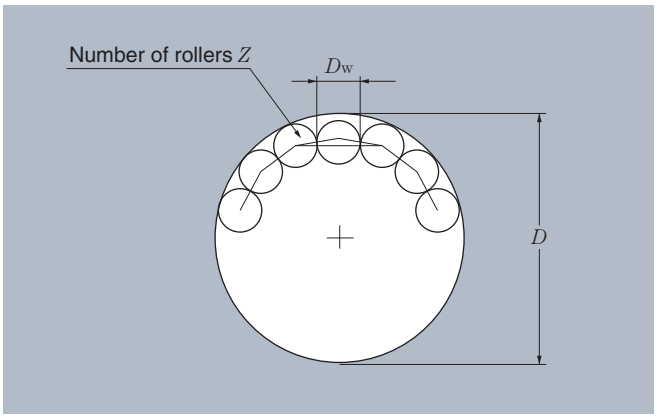
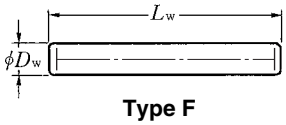


Fig. 3

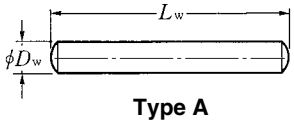
Table 4 Coefficient *K* value

Z	*K*	*Z*	*K*
8	3.6763333	17	6.4536463
9	3.9709394	18	6.7689303
10	4.2727719	19	7.0846088
11	4.5789545	20	7.4006100
12	4.8879667	21	7.7168786
13	5.1989251	22	8.0333713
14	5.5112799	23	8.3500534
15	5.8246707	24	8.6668970
16	6.1388508	25	8.9838796

Type F
Type A



Type F



Type A

D_w 1.5～4.5mm

Boundary dimensions mm D_w	L_w	Bearing numbers flat type	disk type	Mass kg per 1 000 pcs
1.5	5.8	**F1.5× 5.8**	A1.5× 5.8	0.080
	6.8	**F1.5× 6.8**	A1.5× 6.8	0.090
	7.8	**F1.5× 7.8**	A1.5× 7.8	0.104
	9.8	**F1.5× 9.8**	A1.5× 9.8	0.131
	11.8	**F1.5×11.8**	A1.5×11.8	0.159
	13.8	**F1.5×13.8**	A1.5×13.8	0.186
2	6.8	**F2 × 6.8**	A2 × 6.8	0.158
	7.8	**F2 × 7.8**	A2 × 7.8	0.183
	9.8	**F2 × 9.8**	A2 × 9.8	0.232
	11.8	**F2 ×11.8**	A2 ×11.8	0.281
	13.8	**F2 ×13.8**	A2 ×13.8	0.330
	15.8	**F2 ×15.8**	A2 ×15.8	0.379
	17.8	**F2 ×17.8**	A2 ×17.8	0.428
	19.8	**F2 ×19.8**	A2 ×19.8	0.477
2.5	7.8	**F2.5× 7.8**	A2.5× 7.8	0.284
	9.8	**F2.5× 9.8**	A2.5× 9.8	0.351
	11.8	**F2.5×11.8**	A2.5×11.8	0.438
	13.8	**F2.5×13.8**	A2.5×13.8	0.514
	15.8	**F2.5×15.8**	A2.5×15.8	0.591
	17.8	**F2.5×17.8**	A2.5×17.8	0.668
	19.8	**F2.5×19.8**	A2.5×19.8	0.745
	21.8	**F2.5×21.8**	A2.5×21.8	0.821
	23.8	**F2.5×23.8**	A2.5×23.8	0.898
3	9.8	**F3 × 9.8**	A3 × 9.8	0.556
	11.8	**F3 ×11.8**	A3 ×11.8	0.671
	13.8	**F3 ×13.8**	A3 ×13.8	0.784
	15.8	**F3 ×15.8**	A3 ×15.8	0.897
	17.8	**F3 ×17.8**	A3 ×17.8	1.01
	19.8	**F3 ×19.8**	A3 ×19.8	1.12
	21.8	**F3 ×21.8**	A3 ×21.8	1.23
3	23.8	**F3 ×23.8**	A3 ×23.8	1.34
	25.8	**F3 ×25.8**	A3 ×25.8	1.45
	27.8	**F3 ×27.8**	A3 ×27.8	1.56
3.5	11.8	**F3.5×11.8**	A3.5×11.8	0.849
	13.8	**F3.5×13.8**	A3.5×13.8	1.00
	15.8	**F3.5×15.8**	A3.5×15.8	1.15
	17.8	**F3.5×17.8**	A3.5×17.8	1.30
	19.8	**F3.5×19.8**	A3.5×19.8	1.45
	21.8	**F3.5×21.8**	A3.5×21.8	1.60
	23.8	**F3.5×23.8**	A3.5×23.8	1.75
	25.8	**F3.5×25.8**	A3.5×25.8	1.90
	29.8	**F3.5×29.8**	A3.5×29.8	2.20
	31.8	**F3.5×31.8**	A3.5×31.8	2.35
	34.8	**F3.5×34.8**	A3.5×34.8	2.58
4	13.8	**F4 ×13.8**	A4 ×13.8	1.27
	15.8	**F4 ×15.8**	A4 ×15.8	1.50
	17.8	**F4 ×17.8**	A4 ×17.8	1.70
	19.8	**F4 ×19.8**	A4 ×19.8	1.89
	21.8	**F4 ×21.8**	A4 ×21.8	2.09
	23.8	**F4 ×23.8**	A4 ×23.8	2.26
	25.8	**F4 ×25.8**	A4 ×25.8	2.48
	27.8	**F4 ×27.8**	A4 ×27.8	2.68
	29.8	**F4 ×29.8**	A4 ×29.8	2.87
	31.8	**F4 ×31.8**	A4 ×31.8	3.07
	34.8	**F4 ×34.8**	A4 ×34.8	3.31
	37.8	**F4 ×37.8**	A4 ×37.8	3.62
	39.8	**F4 ×39.8**	A4 ×39.8	3.82
4.5	17.8	**F4.5×17.8**	A4.5×17.8	2.11
	19.8	**F4.5×19.8**	A4.5×19.8	2.36
	21.8	**F4.5×21.8**	A4.5×21.8	2.61

D_w 4.5～5mm

Boundary dimensions mm		Bearing numbers		Mass kg per 1 000 pcs
D_w	L_w	flat type	disk type	
4.5	23.8	**F4.5×23.8**	A4.5×23.8	2.86
	25.8	**F4.5×25.8**	A4.5×25.8	3.11
	29.8	**F4.5×29.8**	A4.5×29.8	3.62
	31.8	**F4.5×31.8**	A4.5×31.8	3.87
	34.8	**F4.5×34.8**	A4.5×34.8	4.25
	37.8	**F4.5×37.8**	A4.5×37.8	4.63
	39.8	**F4.5×39.8**	A4.5×39.8	4.88
	44.8	**F4.5×44.8**	A4.5×44.8	5.51
5	19.8	**F5 ×19.8**	A5 ×19.8	2.89
	21.8	**F5 ×21.8**	A5 ×21.8	3.20
	23.8	**F5 ×23.8**	A5 ×23.8	3.52
	25.8	**F5 ×25.8**	A5 ×25.8	3.82
	29.8	**F5 ×29.8**	A5 ×29.8	4.45
	31.8	**F5 ×31.8**	A5 ×31.8	4.74
	34.8	**F5 ×34.8**	A5 ×34.8	5.11
	37.8	**F5 ×37.8**	A5 ×37.8	5.55
	39.8	**F5 ×39.8**	A5 ×39.8	5.85
	49.8	**F5 ×49.8**	A5 ×49.8	7.33

Snap Rings

These snap rings are used exclusively for fixing or guiding a needle roller bearing ring or cage in axial direction. Furthermore, these snap rings have the profile identical to C-type concentric snap ring specified in JIS B 2806 and, in addition, snap rings with smaller section height (b) and also available in smaller dimension range are manufactured according to application of needle roller bearings. These snap rings are manufactured using hard steel wire rod and, after manufactured, chemical conversion treatment is applied to the surface thereof.

Types of snap ring

Two types of snap ring are available; one is **Type WR** designed for application to shaft and another is **Type BR** for application to bearing housing.

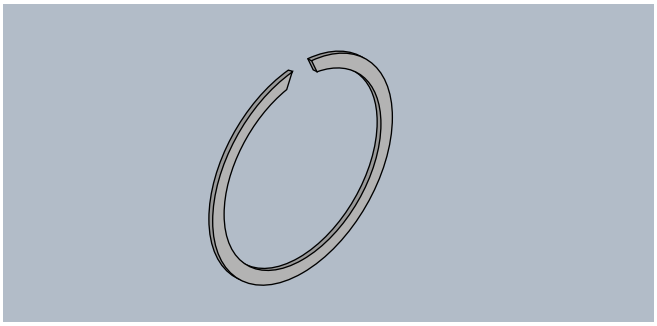


Fig. 1 WR snap ring

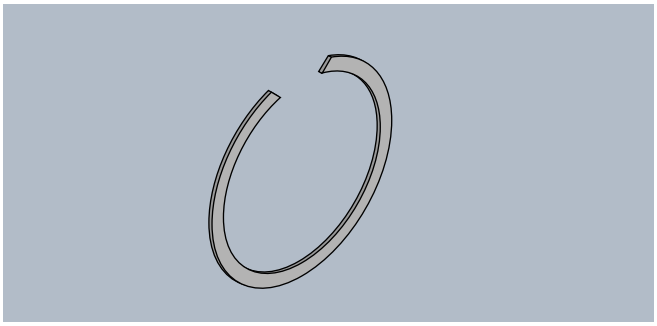


Fig. 2 BR snap ring

Table 1 Cut section angle of snap ring (α)

Type	Nominal number	Cut section angle(α)
Type WR	WR4, WR5	40°
	Type WR6 up to	60°
Type BR	All nominal numbers	90°

Composition of snap ring number

The snap ring number is composed of type code (**WR** or **BR**) and dimension code. The dimension code represents applicable shaft diameter in **Type WR** and applicable housing bore diameter in **Type BR**.

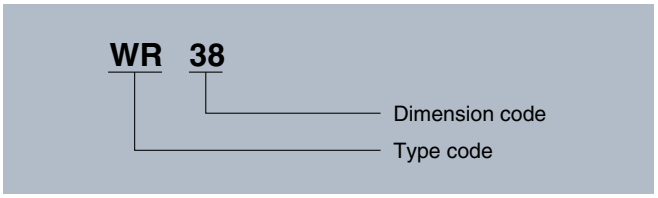


Fig. 3

Allowable running speed

The allowable running speed for **Type WR** for shaft application is as described in applicable Dimensions Table. This means the running speed when snap ring begins to get loose with opening of its cut ends.

Mounting relation

It is recommended to insert a spacer between snap ring and cage for guiding the cage in axial direction (Refer to **Fig. 4**.). On occasion, snap ring is difficult to remove, but limited to a portion in which a pull-out tool can not be inserted easily. In such a case, consider the cross-sectional height of the needle roller bearing in question, and then judge whether or not an ordinary retaining ring (JIS B 2804 “Retaining rings-C type”) can be used.

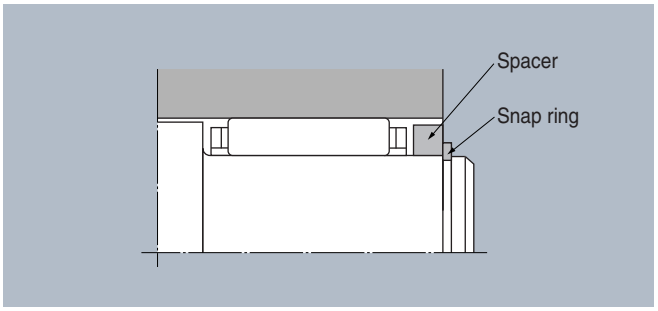
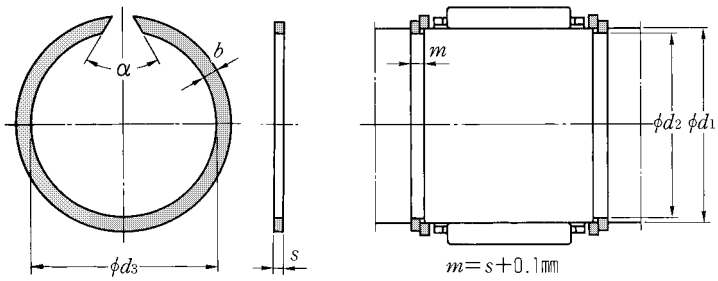


Fig. 4

For shaft

Type WR

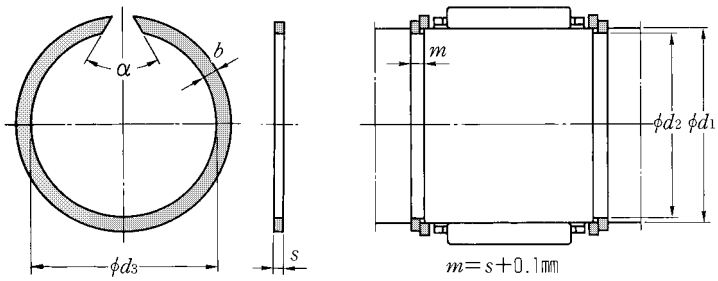


Bearing numbers	Boundary dimensions mm					Limiting speeds min^{-1}
	d_1	d_3 max	b	s ±0.06	d_2	
WR 4	4	3.7	0.8	0.5	3.8	275 000
WR 5	5	4.7	1	0.5	4.8	192 000
WR 6	6	5.6	1.1	0.7	5.7	141 000
WR 7	7	6.5	1.2	0.7	6.7 $^{0}_{-0.09}$	134 000
WR 8	8	7.4	1.3	1	7.6	108 000
WR 9	9	8.4	1.3	1	8.6	80 000
WR10	10	9.4	1.3	1	9.6	68 000
WR11	11	10.2	1.3	1	10.5	64 500
WR12	12	11.2	1.3	1	11.5	53 000
WR13	13	12.2	1.3	1	12.5	49 600
WR14	14	13.1	1.5	1.2	13.5 $^{0}_{-0.11}$	45 900
WR15	15	14	1.75	1.2	14.4	44 500
WR16	16	15	1.75	1.2	15.4	38 000
WR17	17	16	1.75	1.2	16.4	34 500
WR18	18	17	1.75	1.2	17.4	30 000
WR19	19	17.9	1.75	1.2	18.4	28 900
WR20	20	18.7	1.75	1.2	19.2	26 200
WR21	21	19.7	1.75	1.2	20.2	23 400
WR22	22	20.7	1.75	1.2	21.2	20 800
WR23	23	21.7	1.75	1.2	22.2	19 500
WR24	24	22.5	1.75	1.2	23 $^{0}_{-0.13}$	18 100
WR25	25	23.5	1.75	1.2	24	16 400
WR26	26	24.5	1.75	1.2	25	14 800
WR28	28	26.5	2.3	1.5	27	15 400
WR29	29	27.5	2.3	1.5	28	14 400
WR30	30	28.5	2.3	1.5	29	13 200
WR32	32	30.2	2.3	1.5	30.8	13 300
WR35	35	33.2	2.3	1.5	33.8 $^{0}_{-0.16}$	10 700

Bearing numbers	Boundary dimensions mm					Limiting speeds min^{-1}
	d_1	d_3 max	b	s ±0.06	d_2	
WR 37	37	35.2	2.3	1.5	35.8	9 200
WR 38	38	36.2	2.3	1.5	36.8	8 700
WR 40	40	37.8	2.3	1.5	38.5	8 100
WR 42	42	39.8	2.3	1.5	40.5	7 000
WR 43	43	40.8	2.3	1.5	41.5 $^{0}_{-0.16}$	6 800
WR 45	45	42.8	2.3	1.5	43.5	5 800
WR 47	47	44.8	2.3	1.5	45.5	5 500
WR 48	48	45.8	2.3	1.5	46.5	5 300
WR 50	50	47.8	2.3	1.5	48.5	4 800
WR 52	52	49.8	2.3	1.5	50.5	4 300
WR 55	55	52.6	2.3	1.5	53.5	4 400
WR 58	58	55.6	2.3	1.5	56.5	3 900
WR 60	60	57.6	2.3	1.5	58.5	3 500
WR 61	61	58.6	2.3	1.5	59.5	3 300
WR 62	62	59.6	2.3	1.5	60.5	3 200
WR 63	63	60.6	2.3	1.5	61.5	3 100
WR 64	64	61.6	2.3	1.5	62.5 $^{0}_{-0.19}$	2 900
WR 65	65	62.6	2.3	1.5	63.5	2 800
WR 68	68	65.4	2.8	2	66.2	2 900
WR 70	70	67.4	2.8	2	68.2	2 700
WR 72	72	69.4	2.8	2	70.2	2 600
WR 73	73	70.4	2.8	2	71.2	2 500
WR 75	75	72.4	2.8	2	73.2	2 300
WR 80	80	77.4	2.8	2	78.2	1 950
WR 85	85	82	3.4	2.5	83	2 300
WR 90	90	87	3.4	2.5	88	2 000
WR 95	95	92	3.4	2.5	93 $^{0}_{-0.22}$	1 750
WR100	100	97	3.4	2.5	98	1 560

For shaft

Type WR

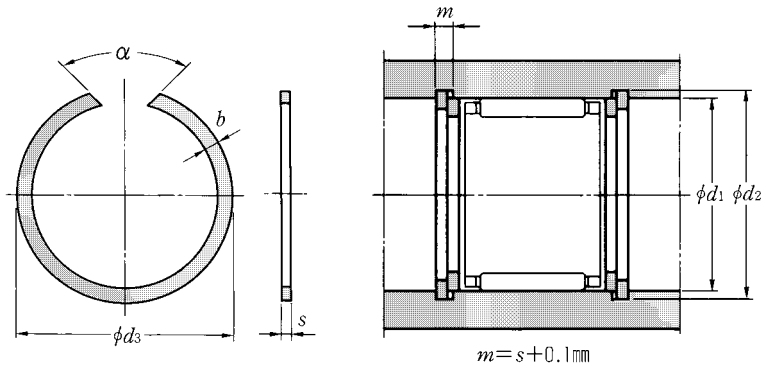


Bearing numbers	Boundary dimensions mm						Limiting speeds r/min
	d_1	d_3 max	b	s ±0.06	d_2		
WR105	105	101.7	3.4	2.5	102.7		1 390
WR110	110	106.7	3.4	2.5	107.7	$^{0}_{-0.22}$	1 240
WR115	115	111.7	3.4	2.5	112.7		1 100
WR120	120	116.7	3.4	2.5	117.7		1 000
WR125	125	121.7	3.4	2.5	122.7		920
WR130	130	126.7	3.4	2.5	127.7		830
WR135	135	131.6	4	2.5	132.4		830
WR140	140	136.6	4	2.5	137.4		760
WR145	145	141.6	4	2.5	142.4		690
WR150	150	146.6	4	2.5	147.4	$^{0}_{-0.25}$	640
WR155	155	151.6	4	2.5	152.4		590
WR160	160	156.6	4	2.5	157.4		550
WR165	165	161.6	4	2.5	162.4		500
WR170	170	166.6	4	2.5	167.4		470
WR175	175	171.6	4	2.5	172.4		440
WR180	180	175.6	5	3	177		430
WR185	185	180.6	5	3	182		590
WR190	190	185.6	5	3	187		540
WR195	195	190.6	5	3	192		510
WR200	200	195.6	5	3	197		480
WR210	210	205.6	5	3	207		420
WR220	220	215.6	5	3	217	$^{0}_{-0.29}$	380
WR225	225	220.6	5	3	222		360
WR230	230	225.6	5	3	227		350
WR240	240	235.6	5	3	237		310
WR250	250	245.6	5	3	247		270
WR260	260	253	7.5	4	255		430
WR265	265	258	7.5	4	260	$^{0}_{-0.32}$	410

Bearing numbers	Boundary dimensions mm						Limiting speeds r/min
	d_1	d_3 max	b	s ±0.06	d_2		
WR270	270	263	7.5	4	265		380
WR280	280	273	7.5	4	275		360
WR285	285	278	7.5	4	280		350
WR290	290	283	7.5	4	285	$^{0}_{-0.32}$	340
WR300	300	293	7.5	4	295		300
WR305	305	298	7.5	4	300		290
WR310	310	303	7.5	4	305		280
WR320	320	313	7.5	4	315		260
WR330	330	323	7.5	4	325		240
WR340	340	333	7.5	4	335		220
WR350	350	343	7.5	4	345		210
WR360	360	353	7.5	4	355	$^{0}_{-0.36}$	190
WR370	370	363	7.5	4	365		180
WR380	380	373	7.5	4	375		170
WR390	390	383	7.5	4	385		160
WR400	400	393	7.5	4	395		150

For housing

Type BR

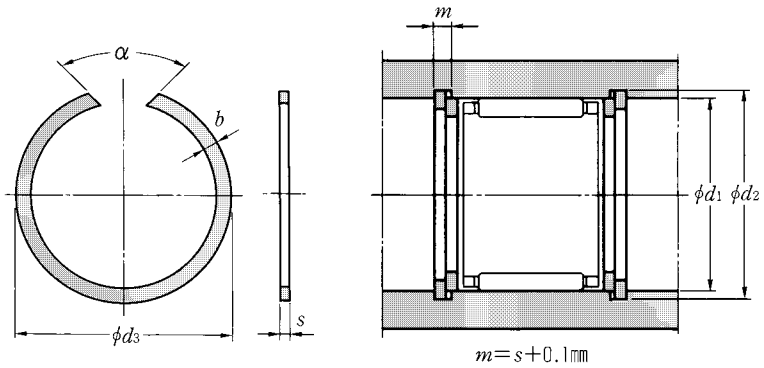


Bearing numbers	Boundary dimensions mm					
	d_1	d_3 min	b	s ±0.06	d_2	
BR 7	7	7.5	1	0.8	7.3	+0.09 0
BR 8	8	8.5	1	0.8	8.3	
BR 9	9	9.5	1.1	0.8	9.3	
BR10	10	10.6	1.2	0.8	10.4	
BR11	11	11.6	1.3	1	11.4	
BR12	12	12.7	1.3	1	12.4	
BR13	13	13.8	1.3	1	13.5	+0.11 0
BR14	14	14.8	1.3	1	14.5	
BR15	15	15.8	1.3	1	15.5	
BR16	16	16.8	1.6	1.2	16.5	
BR17	17	17.8	1.6	1.2	17.5	
BR18	18	18.9	1.75	1.2	18.5	
BR19	19	19.9	1.75	1.2	19.6	
BR20	20	21	1.75	1.2	20.6	
BR21	21	22	1.75	1.2	21.6	
BR22	22	23	1.75	1.2	22.6	
BR23	23	24	1.75	1.2	23.6	
BR24	24	25.2	1.75	1.2	24.8	+0.13 0
BR25	25	26.2	1.75	1.2	25.8	
BR26	26	27.2	1.75	1.2	26.8	
BR27	27	28.2	1.75	1.2	27.8	
BR28	28	29.2	1.75	1.2	28.8	
BR29	29	30.2	1.75	1.2	29.8	
BR30	30	31.4	2.3	1.5	31	
BR31	31	32.4	2.3	1.5	32	
BR32	32	33.4	2.3	1.5	33	+0.16 0
BR33	33	34.4	2.3	1.5	34	
BR34	34	35.4	2.3	1.5	35	

Bearing numbers	Boundary dimensions mm					
	d_1	d_3 min	b	s ±0.06	d_2	
BR35	35	36.4	2.3	1.5	36	
BR36	36	37.8	2.3	1.5	37.2	
BR37	37	38.8	2.3	1.5	38.2	
BR38	38	39.8	2.3	1.5	39.2	
BR39	39	40.8	2.3	1.5	40.2	
BR40	40	41.8	2.3	1.5	41.2	
BR41	41	42.8	2.3	1.5	42.2	+0.16 0
BR42	42	43.8	2.3	1.5	43.2	
BR43	43	44.8	2.3	1.5	44.2	
BR44	44	45.8	2.3	1.5	45.2	
BR45	45	46.8	2.3	1.5	46.2	
BR46	46	47.8	2.3	1.5	47.2	
BR47	47	48.8	2.3	1.5	48.2	
BR48	48	49.8	2.3	1.5	49.2	
BR49	49	50.8	2.3	1.5	50.2	
BR50	50	51.8	2.3	1.5	51.2	
BR52	52	54.3	2.3	1.5	53.5	
BR53	53	55.3	2.3	1.5	54.5	
BR54	54	56.3	2.3	1.5	55.5	
BR55	55	57.3	2.3	1.5	56.5	
BR57	57	59.3	2.3	1.5	58.5	+0.19 0
BR58	58	60.3	2.3	1.5	59.5	
BR60	60	62.3	2.3	1.5	61.5	
BR61	61	63.3	2.3	1.5	62.5	
BR62	62	64.3	2.3	1.5	63.5	
BR63	63	65.3	2.3	1.5	64.5	
BR64	64	66.3	2.3	1.5	65.5	
BR65	65	67.3	2.3	1.5	66.5	

For housing

Type BR



Bearing numbers	Boundary dimensions mm					
	d_1	d_3 min	b	s ±0.06	d_2	
BR 66	66	68.3	2.3	1.5	67.5	
BR 68	68	70.3	2.3	1.5	69.5	
BR 70	70	72.3	2.3	1.5	71.5	
BR 72	72	74.6	2.8	2	73.8	
BR 73	73	75.6	2.8	2	74.8	+0.19 0
BR 74	74	76.6	2.8	2	75.8	
BR 75	75	77.6	2.8	2	76.8	
BR 76	76	78.6	2.8	2	77.8	
BR 77	77	79.6	2.8	2	78.8	
BR 78	78	80.6	2.8	2	79.8	
BR 79	79	81.6	2.8	2	80.8	
BR 81	81	83.6	2.8	2	82.8	
BR 82	82	84.6	2.8	2	83.8	
BR 83	83	85.6	2.8	2	84.8	
BR 85	85	87.6	2.8	2	86.8	
BR 86	86	88.6	2.8	2	87.8	
BR 88	88	91	3.4	2.5	90	
BR 90	90	93	3.4	2.5	92	
BR 92	92	95	3.4	2.5	94	+0.22 0
BR 93	93	96	3.4	2.5	95	
BR 95	95	98	3.4	2.5	97	
BR 97	97	100	3.4	2.5	99	
BR 98	98	101	3.4	2.5	100	
BR100	100	103	3.4	2.5	102	
BR102	102	105.3	3.4	2.5	104.3	
BR103	103	106.3	3.4	2.5	105.3	
BR105	105	108.3	3.4	2.5	107.3	
BR107	107	110.3	3.4	2.5	109.3	

Bearing numbers	Boundary dimensions mm					
	d_1	d_3 min	b	s ±0.06	d_2	
BR108	108	111.3	3.4	2.5	110.3	
BR110	110	113.3	3.4	2.5	112.3	
BR112	112	115.3	3.4	2.5	114.3	+0.22 0
BR113	113	116.3	3.4	2.5	115.3	
BR115	115	118.3	3.4	2.5	117.3	
BR117	117	120.3	3.4	2.5	119.3	
BR118	118	121.3	3.4	2.5	120.3	
BR120	120	123.3	3.4	2.5	122.3	
BR123	123	126.3	3.4	2.5	125.3	
BR125	125	128.3	3.4	2.5	127.3	
BR127	127	130.3	3.4	2.5	129.3	
BR130	130	133.3	3.4	2.5	132.3	
BR133	133	136.3	3.4	2.5	135.3	
BR135	135	138.3	3.4	2.5	137.3	
BR137	137	140.3	3.4	2.5	139.3	
BR140	140	143.6	4	2.5	142.6	+0.25 0
BR143	143	146.6	4	2.5	145.6	
BR150	150	153.6	4	2.5	152.6	
BR153	153	156.6	4	2.5	155.6	
BR160	160	163.6	4	2.5	162.6	
BR163	163	166.6	4	2.5	165.6	
BR165	165	168.6	4	2.5	167.6	
BR170	170	173.6	4	2.5	172.6	
BR173	173	176.6	4	2.5	175.6	
BR175	175	178.6	4	2.5	177.6	
BR180	180	183.6	4	2.5	182.6	
BR183	183	186.6	4	2.5	185.6	+0.29 0
BR190	190	194.5	5	3	193	

Bearing numbers	Boundary dimensions mm					
	d_1	d_3 min	b	s ±0.06	d_2	
BR195	195	199.5	5	3	198	
BR200	200	204.5	5	3	203	
BR205	205	209.5	5	3	208	
BR210	210	214.5	5	3	213	+0.29 0
BR215	215	219.5	5	3	218	
BR220	220	224.5	5	3	223	
BR225	225	229.5	5	3	228	
BR230	230	234.5	5	3	233	
BR240	240	244.5	5	3	243	
BR250	250	254.5	5	3	253	
BR260	260	267	7.5	4	265	+0.32 0
BR270	270	277	7.5	4	275	
BR280	280	287	7.5	4	285	
BR300	300	307	7.5	4	305	
BR320	320	327	7.5	4	325	
BR325	325	332	7.5	4	330	
BR350	350	357	7.5	4	355	
BR355	355	362	7.5	4	360	
BR360	360	367	7.5	4	365	+0.36 0
BR375	375	382	7.5	4	380	
BR380	380	387	7.5	4	385	
BR385	385	392	7.5	4	390	
BR395	395	402	7.5	4	400	
BR400	400	407	7.5	4	405	
BR415	415	422	7.5	4	420	
BR420	420	427	7.5	4	425	+0.40 0
BR440	440	447	7.5	4	445	

Seals

Seals

These are the special-purposed seals for needle roller bearings whose cross sectional height is designed so small as to match applicable needle roller bearings. These contact seals are made of synthetic rubber reinforced with steel plate, being then used in operating temperature range of -25 to +120˚C and, under continuous running, at 100˚C and less. Further, feel free to contact **NTN** for the use of these seals under special operating condition, e.g. operating temperature of over 120˚C.

Types of seal

Two different seal types are available; one is **Type G** with one lip and another is **Type GD** with two lips. In addition to these two, sliding rubber seals (**LEG**, **LEGD**), wherein lubrication property was assigned to a rubber material fulfilling low torque under an non-lubrication environment, are also manufactured. Feel free to contact **NTN** for the detail of these seal types.

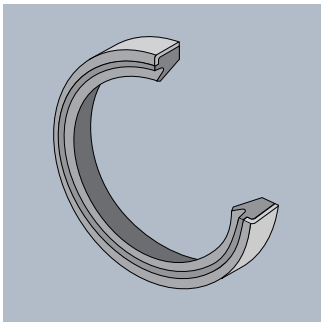


Fig. 1 Type G (LEG)

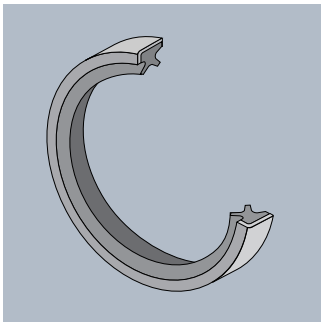


Fig. 2 Type GD (LEGD)

Where seal contact surface and lubricating condition are good, **Type G** with one lip can be used up to 10m/s maximum at peripheral speed and **Type GD** with two lips used up to 6m/s maximum.

This seal is intended to hold grease and to prevent dust invasion from outside. It has no function to hold lubrication oil, etc. unlike oil seal.

Composition of seal number

The seal number is composed of type code (G, GD) and dimension code (bore dia.×outer dia.×width).

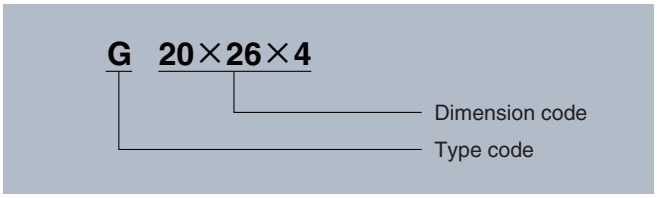


Fig. 3

Fitting relations

The seal contact surface must be finished by grinding, after hardened, to get its good sealing performance. In addition, harmful flaw and indent are not allowed to exist on the seal contact surface. Where the inner ring raceway surface is used as seal contact surface, a wide inner ring must be used.

When fitting a seal in a bearing, it is desirable to taper the shaft end face or the housing end face so as to protect the seal lip and outer surface from damaging, as illustrated in **Fig. 4**. Where shaft end is not tapered or chamfered (rounded), it is recommended to a fitting jig as illustrated in **Fig.5**. Regarding the seal to housing interference, a adequate interference can be got in the usual housing tolerance range of G7 toR7.

Furthermore, it is recommended to apply pre-coat of a lubricant to the seal lip before fitting seals G and GD, for better lubrication. Further, when fitting a seal and inserting it through a shaft, take good care to protect its lip from deforming.

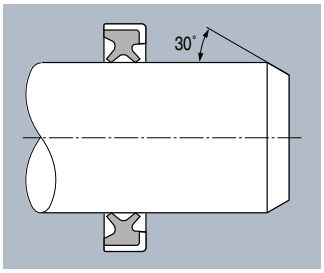


Fig. 4

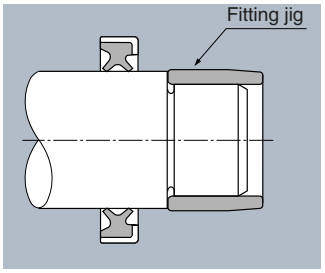


Fig. 5

Seal application examples

Figs.6 to **8** illustrate design examples using these seals.

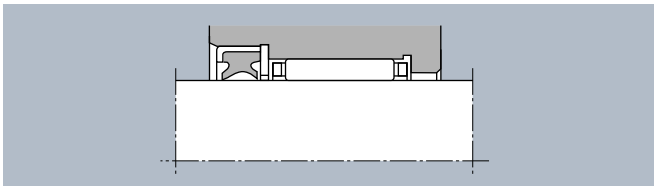


Fig. 6

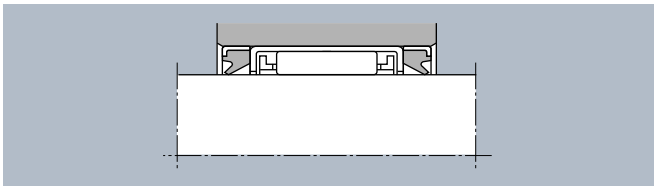


Fig. 7

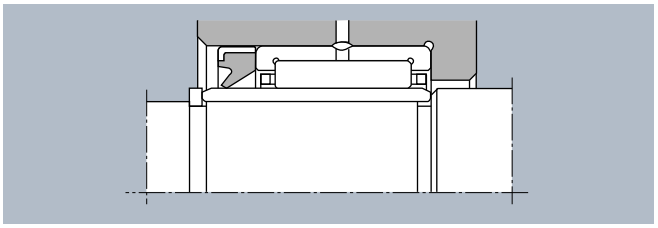
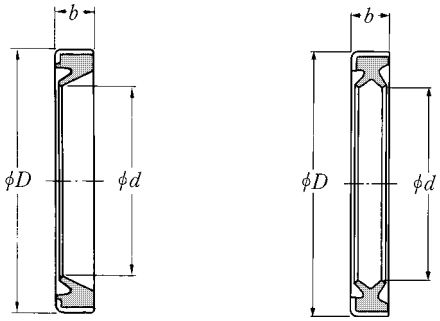


Fig. 8

Type G
Type GD



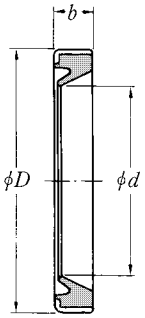
Type G　　Type GD

Bearing numbers		Boundary dimensions mm			Mass ×10⁻³ kg	
Type G	Type GD	d	$D^{1)}$	b $^{+0.2}_{0}$	G	GD
G 4× 8×2	—	4	8	2	0.18	—
G 5× 9×2	—	5	9 $^{+0.081}_{+0.023}$	2	0.19	—
G 5×10×2	—	5	10	2	0.22	—
G 6×10×2	—	6	10	2	0.21	—
G 6×12×2	—	6	12	2	0.38	—
G 7×11×2	—	7	11	2	0.25	—
G 7×14×2	—	7	14	2	0.52	—
G 8×12×3	—	8	12	3	0.41	—
G 8×15×3	—	8	15	3	0.74	—
G 9×13×3	—	9	13 $^{+0.098}_{+0.028}$	3	0.44	—
G 9×16×3	—	9	16	3	0.69	—
G10×14×3	—	10	14	3	0.50	—
G10×17×3	—	10	17	3	0.87	—
G12×16×3	—	12	16	3	0.56	—
G12×18×3	—	12	18	3	0.86	—
G12×19×3	—	12	19	3	0.94	—
G13×19×3	—	13	19	3	0.87	—
G14×20×3	GD14×20×3	14	20	3	0.96	0.99
G14×21×3	GD14×21×3	14	21	3	1.1	1.1
G14×22×3	GD14×22×3	14	22	3	1.3	1.2
G15×21×3	GD15×21×3	15	21	3	1.0	1.0
G15×23×3	GD15×23×3	15	23 $^{+0.119}_{+0.035}$	3	1.3	1.3
G16×22×3	GD16×22×3	16	22	3	1.3	1.1
G16×24×3	GD16×24×3	16	24	3	1.3	1.3
G16×25×3	GD16×25×3	16	25	3	1.6	1.6
G17×23×3	GD17×23×3	17	23	3	1.3	1.1
G17×25×3	GD17×25×3	17	25	3	1.5	1.4
G18×24×3	GD18×24×3	18	24	3	1.2	1.2

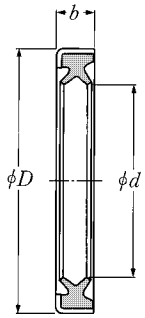
Bearing numbers		Boundary dimensions mm			Mass ×10⁻³ kg	
Type G	Type GD	d	$D^{1)}$	b $^{+0.2}_{0}$	G	GD
G18×26×4	GD18×26×4	18	26	4	1.8	1.8
G19×27×4	GD19×27×4	19	27	4	2.0	1.9
G20×26×4	GD20×26×4	20	26	4	1.8	1.8
G20×28×4	GD20×28×4	20	28 $^{+0.119}_{+0.035}$	4	2.1	2.1
G21×29×4	GD21×29×4	21	29	4	2.2	2.1
G22×28×4	GD22×28×4	22	28	4	1.8	1.9
G22×30×4	GD22×30×4	22	30	4	2.2	2.3
G24×32×4	GD24×32×4	24	32	4	2.5	2.4
G25×32×4	GD25×32×4	25	32	4	2.3	2.2
G25×33×4	GD25×33×4	25	33	4	2.5	2.5
G25×35×4	GD25×35×4	25	35	4	2.6	2.6
G26×34×4	GD26×34×4	26	34	4	2.6	2.6
G28×35×4	GD28×35×4	28	35	4	2.4	2.5
G28×37×4	GD28×37×4	28	37	4	3.1	2.8
G29×37×4	GD29×37×4	29	37	4	2.7	2.7
G29×38×4	GD29×38×4	29	38	4	3.2	2.9
G30×37×4	GD30×37×4	30	37 $^{+0.143}_{+0.043}$	4	2.7	2.6
G30×40×4	GD30×40×4	30	40	4	3.6	3.3
G32×42×4	GD32×42×4	32	42	4	3.7	3.9
G32×45×4	GD32×45×4	32	45	4	5.1	5.2
G35×42×4	GD35×42×4	35	42	4	3.0	2.9
G35×45×4	GD35×45×4	35	45	4	4.1	3.6
G37×47×4	GD37×47×4	37	47	4	4.0	3.8
G38×48×4	GD38×48×4	38	48	4	4.4	4.0
G40×47×4	GD40×47×4	40	47	4	3.3	3.5
G40×50×4	GD40×50×4	40	50	4	4.6	4.0
G40×52×5	GD40×52×5	40	52 $^{+0.173}_{+0.053}$	5	4.8	4.7
G42×52×4	GD42×52×4	42	52	4	4.7	4.2

Note 1) The outer diameter tolerance is the mean value of the measured values at two measuring points.

Type G
Type GD



Type G



Type GD

Bearing numbers		Boundary dimensions mm			Mass ×10⁻³ kg	
Type G	Type GD	d	D [1)]	b $^{+0.2}_{0}$	G	GD
G43×53×4	GD43×53×4	43	53	4	4.8	4.3
G45×52×4	GD45×52×4	45	52	4	3.8	3.8
G45×55×4	GD45×55×4	45	$55^{+0.173}_{+0.053}$	4	5.2	5.5
G50×58×4	GD50×58×4	50	58	4	4.5	5.2
G50×62×5	GD50×62×5	50	62	5	10.4	10

Note 1) The outer diameter tolerance is the mean value of the measured values at two measuring points.