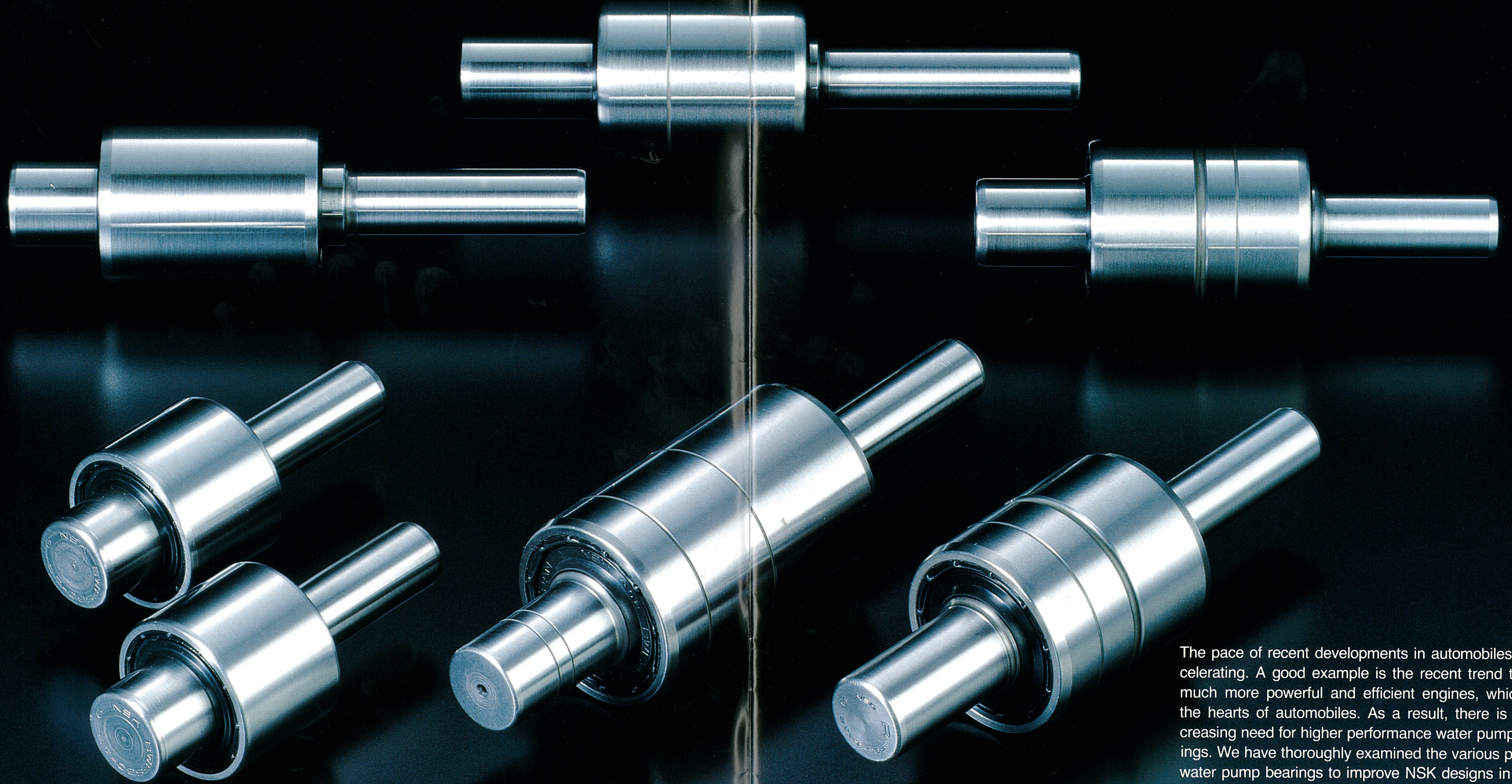


High Durability NSK Water Pump Bearings

- High durability for powerful engines
- High reliability through a newly developed water resistant seal
- Improved grease



*High durability NSK water pump bearings support the advancement of engines.
These reliable bearings have three times greater durability than previous bearings.*



The pace of recent developments in automobiles is accelerating. A good example is the recent trend toward much more powerful and efficient engines, which are the hearts of automobiles. As a result, there is an increasing need for higher performance water pump bearings. We have thoroughly examined the various parts of water pump bearings to improve NSK designs in terms of high load durability as well as high resistance to heat, load and water. As a result, NSK has developed water pump bearings with higher performance. These improved bearings are the NSK high durability water pump bearings. We would like to introduce you to the outstanding features of these bearings, such as their newly developed water resistant seals, and the adoption of improved grease and materials.

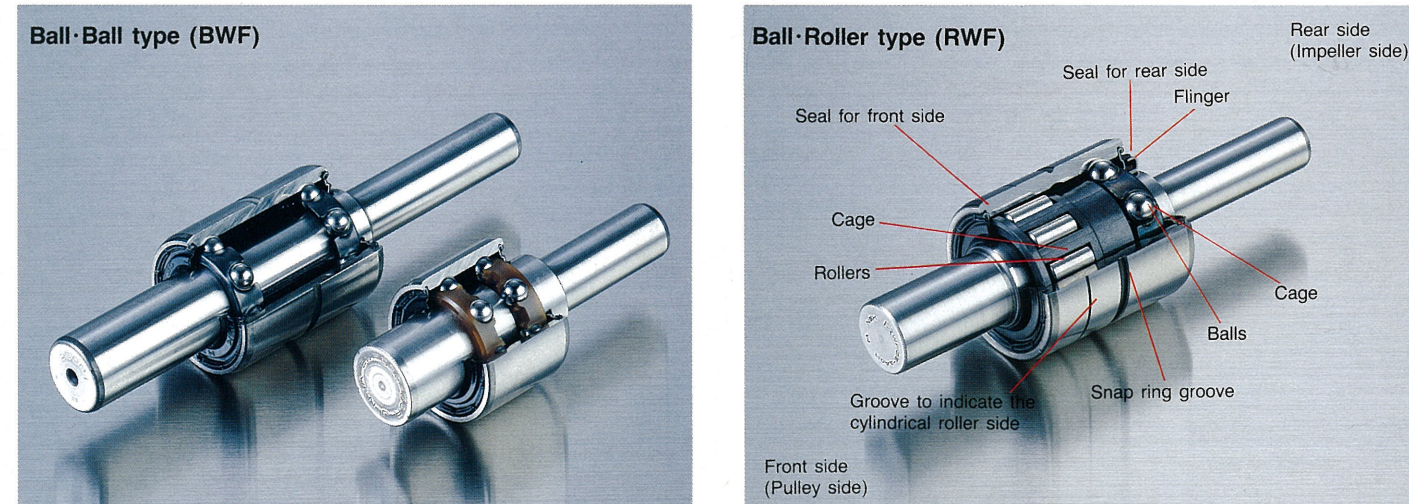
Types and Features

Types

Water pump bearings come in two types. One is a Ball·Ball type (BWF) and the other is a Ball·Roller type (RWF). The Ball·Roller type design offers a much higher radial load capability of the roller row, which is particularly important when supporting either a fan or a relatively high off-set belt load.

Features

- **Newly developed water resistant seals offer five times greater durability.** NSK has developed brand-new water resistant seals. As a result, the durability under wet conditions is increased over five times.
- **A better grease <WPH> was developed.** NSK has developed an improved grease for water pumps. It is superior in terms of resistance to water, heat, and rust.
- **Longer life is achieved by adoption of a new steel material.** The new steel is a low oxygen and high cleanliness steel which has a life three times longer than common bearing steels. Also, the steel is carburized to achieve a much longer life.



Properties

Any water (or water + coolant) entering through the mechanical seal may adversely affect the water pump bearing's effectiveness. If water enters into the bearing, surface fatigue occurs more rapidly due to insufficient oil film formation. Consequently, the bearing life decreases sharply. Therefore, it is very important to prevent water penetration to achieve full bearing life. <High durability water pump bearings> are so named for their high durability and reliability.

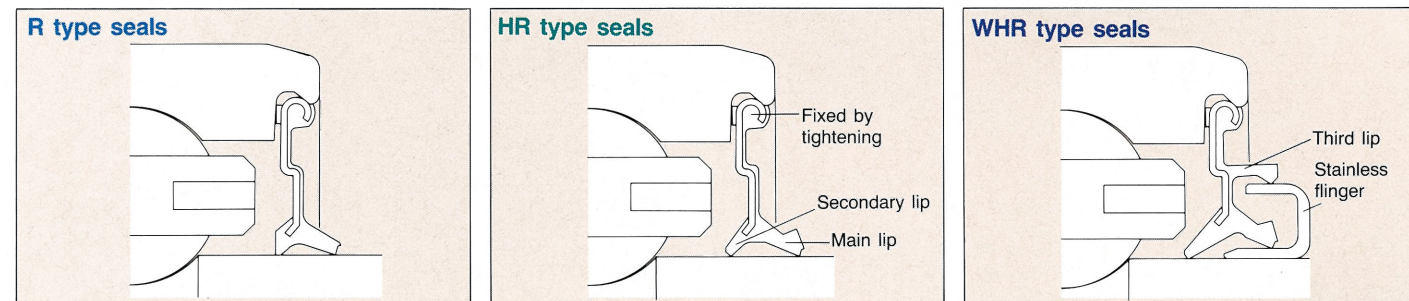


Fig. 1 Kinds of seals

•Seals

<R type seals>

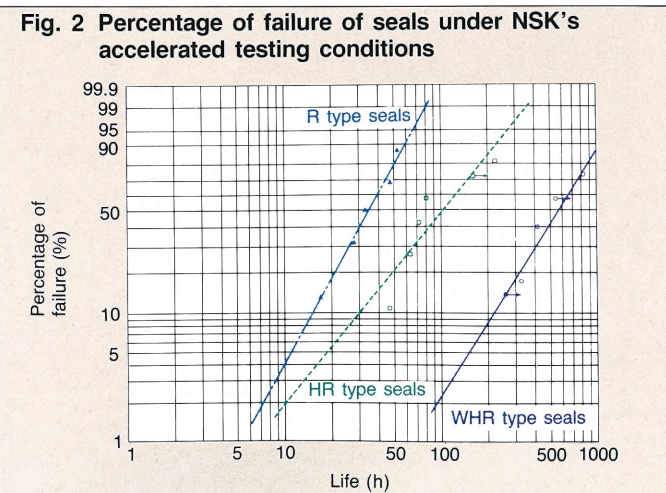
Since rubber seals tightly hug the outer ring recess, water penetration from the outside is prevented completely. A double-lip type seal is adopted, so that water penetration and grease leakage can be minimized.

<HR type seals>

The water resistance of the main lips is increased beyond the degree of R type seals. Also, the HR type seal provides improved sealing in environments of engine vibration and unbalanced runout vibration.

<WHR type seals>

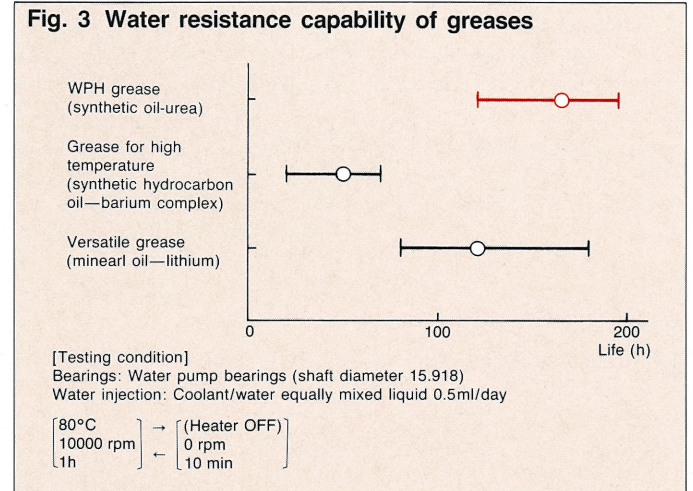
The third lip and flinger prevent water penetration remarkably well. The flinger prevents seal wear generated by a rusty surface, thereby increasing reliability.



•Grease (WPH grease)

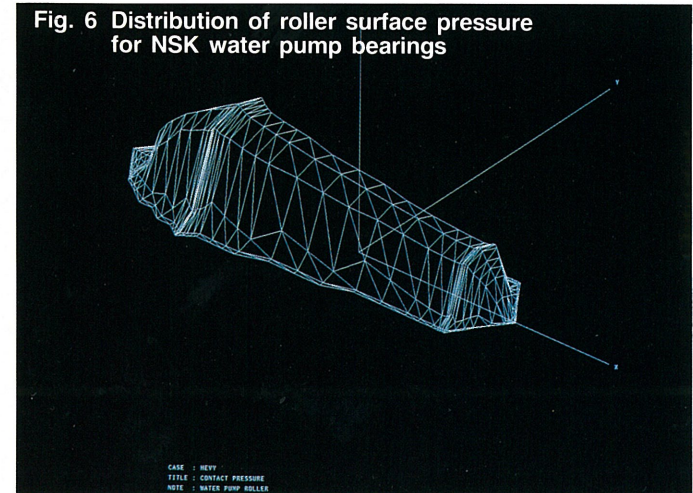
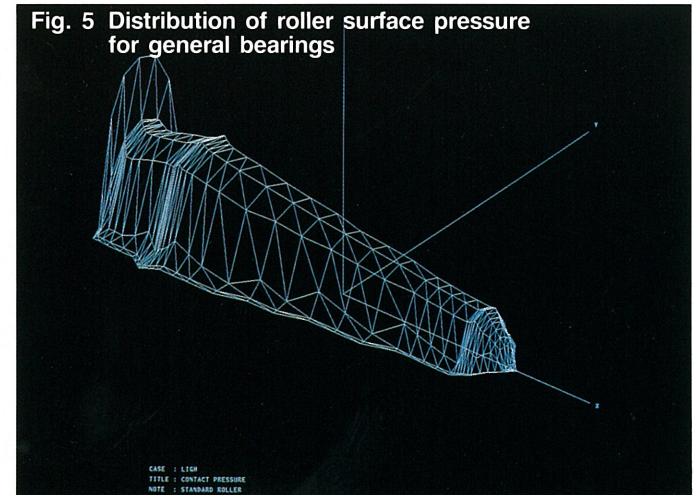
The recent trends toward more powerful and efficient engines require better grease which has higher resistance to heat, load and water. NSK's WPH grease was developed to answer these demands.

1. The thickener is a urea compound, which ensures proper lubrication for long periods because of its resistance to water and temperature effects.

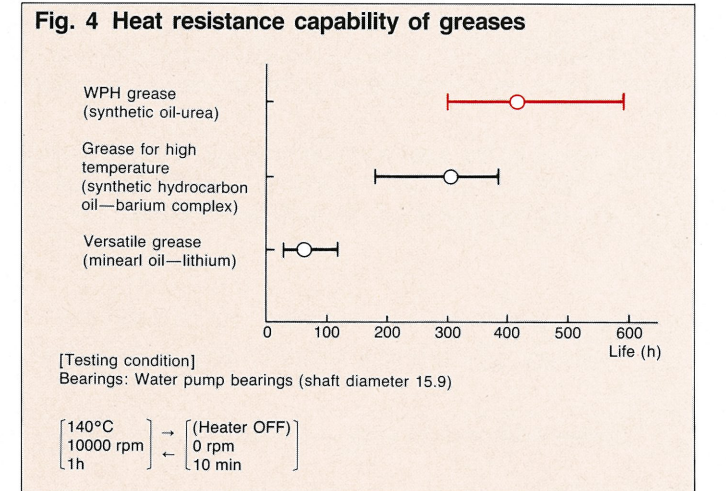


Design and Manufacturing

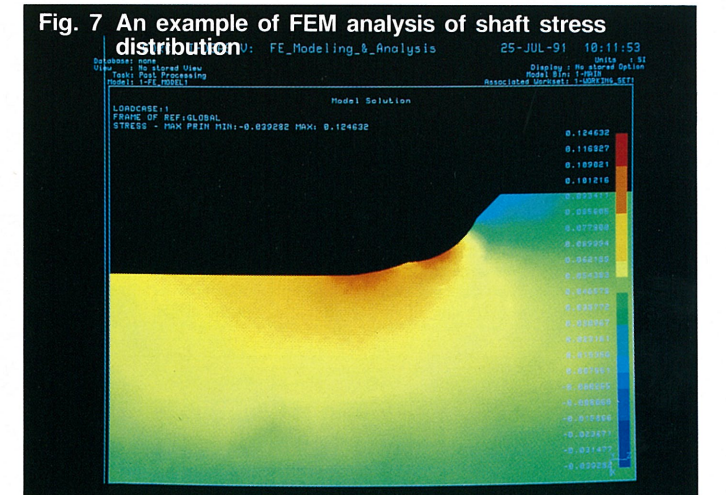
- NSK high durability water pump bearings incorporate NSK's technology in their design and manufacturing.
- Rollers in the bearings are crowned, thus avoiding edge loading even under an off-set load which would otherwise cause large misalignment. (See Fig. 5 and Fig. 6)



2. The base oil of WPH is poly-alpha-olefin, which has high anti-oxidation capability and high heat stability. These characteristics result in excellent resistance to grease deterioration and bearing seizure at elevated bearing temperatures.
3. WPH has been shown to be excellent for rust prevention.



- NSK water pump bearings are designed to minimize stress concentration and are produced without distortion, to maintain the high strength required in certain applications such as those with cooling fan resonance or excessive belt tension. (See Fig. 7)



*When using water pumps with cooling fan clutches, NSK recommends the selection of one of the lower resonant bearings which were originally developed by NSK for fan clutches.

- Each chamfer is designed for ease of assembly and to avoid generating an unbalanced load.

Technical specification and bearing number system

Technical specification

(1) Calculation of rating fatigue life

Suppose a number of bearings of the same type are operated individually under the same conditions. After a certain period of time, 10% of them fail as a result of flaking caused by rolling fatigue. In this case, the total number of revolutions is defined as the rating fatigue life, or if the speed is constant, the rating fatigue life is often expressed by the total number of operating hours completed at the time when 10% of the bearings become inoperable due to flaking. It can be calculated by using the equation on the right.

If the amount of the load's off-set is large, it is necessary to investigate and consider the incline of shafts, as well as the effect of the edge load. In such cases please consult NSK.

(2) Standard design dimensions

Standard design dimensions of both Ball-Roller type and Ball-Ball type water pump bearings are described from page 7 to page 10. If other dimensions are required, please consult NSK.

Calculation of rating fatigue life

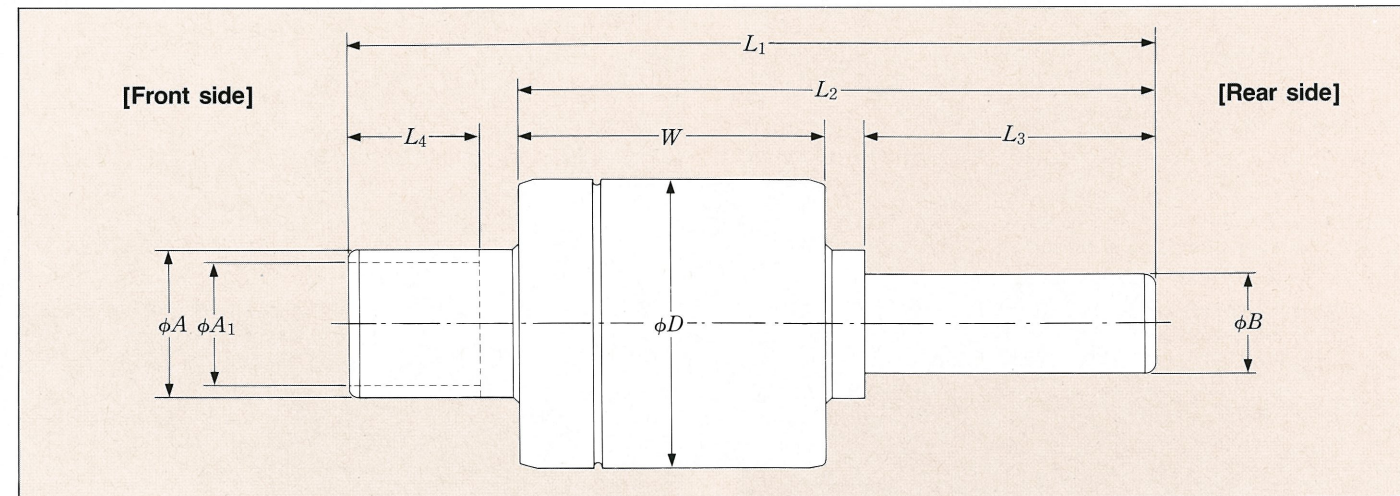
$$\text{Ball bearings } L_h = \frac{10^6}{60n} \left(\frac{C}{P}\right)^3$$

$$\text{Roller bearings } L_h = \frac{10^6}{60n} \left(\frac{C}{P}\right)^{10}$$

where
 L_h : Rating fatigue life (h)
 P : Bearing load (N) {kgf}
 C : Basic load rating (N) {kgf}
 n : Bearing speed (rpm)

(3) Accuracy

Both Ball-Ball type and Ball-Roller type of water pump bearings have the same dimensional tolerances as outlined below.

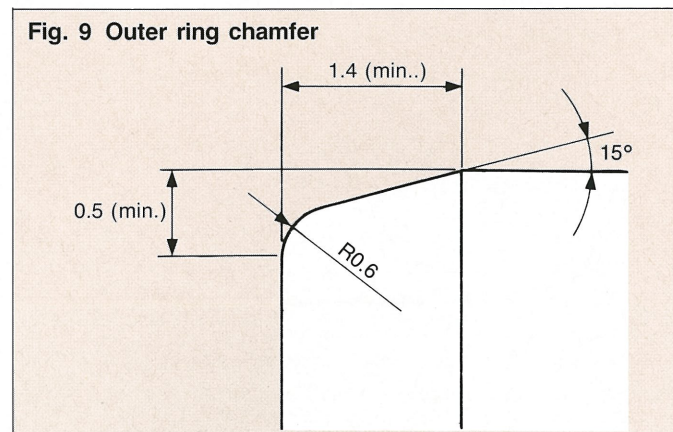
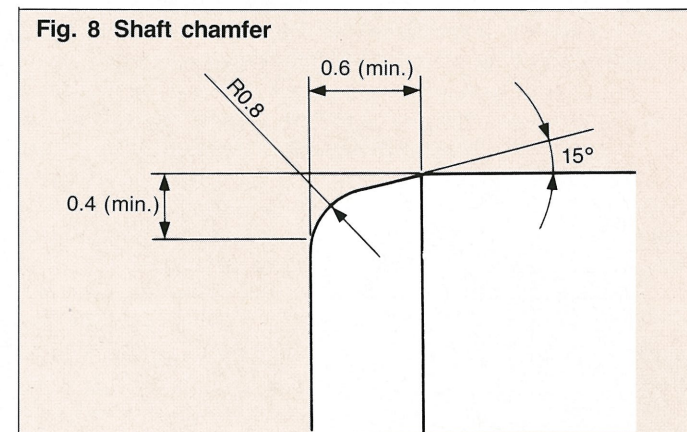


Units: μm

Types of bearings	Tolerance of outside diameter of outer ring D		Tolerance of width of outer ring W		Tolerance of diameter of main shaft A		Tolerance of diameter of front shaft A_1		Tolerance of diameter of rear shaft B		Tolerance of shaft length L_1		Tolerance of front shaft length L_4		Tolerance of rear shaft length L_3		Tolerance of assembled width L_2			
	high	low	high	low	high	low	high	low	high	low	high	low	high	low	high	low	high	low		
RWF	0	-13	+150	-150	0	-13	0	-13	0	-13	+250	-250	+250	-250	+250	-250	+250	-250	+150	-150
BWF	All dimensions																			

(4) Dimensions of chamfers

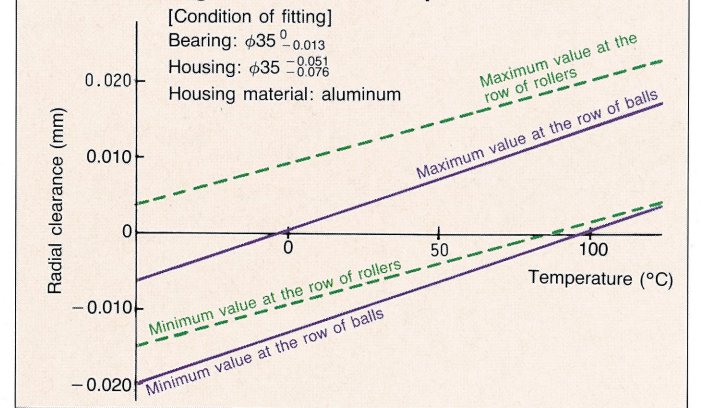
Standard chamfer designs and dimensions of NSK water pump bearings are as follows:



(5) Internal bearing clearances

The internal clearance in rolling bearings in operation greatly influences bearing performance in terms of fatigue life, vibration, noise, heat-generation, etc. Consequently, the selection of a proper internal clearance is one of the most important tasks. Theoretically, the longest bearing life can be expected when the clearance is slightly negative. However, it is difficult to achieve such an ideal condition, and an excessive negative clearance will greatly shorten the bearing life. Therefore, a clearance of zero or a slightly positive amount, instead of a negative one, should be selected in general. The clearance of water pump bearings is normally selected within the range between 0.010 mm—0.040 mm, but it may be necessary to change this range depending on the interference, rigidity, material, and temperature of the housing. Please consult NSK for further information on this topic.

Fig. 10 Water pump bearings: correlation of internal bearing clearance and temperature



(6) Mounting

The mounting of bearings deserves careful attention, because the entry of dust and debris on bearing raceways or rolling elements can cause excessive noise, vibration and premature failure. Also, proper tools and assembly techniques should be used to prevent the transmission of forces between the bearing shaft and the outer ring.

Fig. 11 Pressing bearing into housing

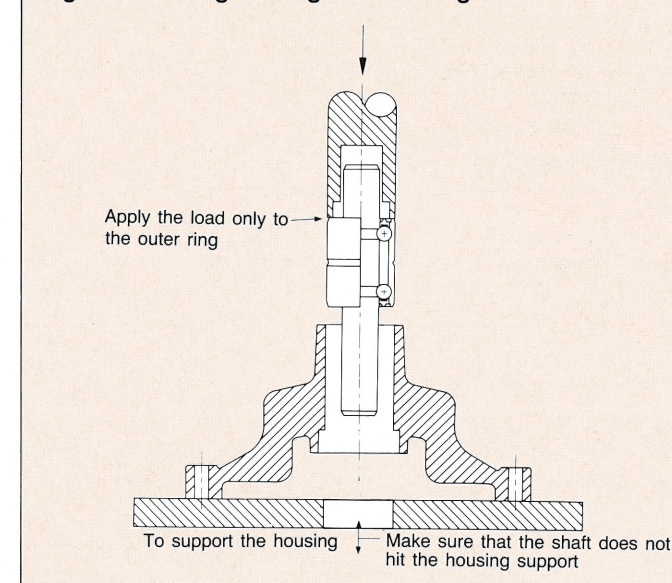
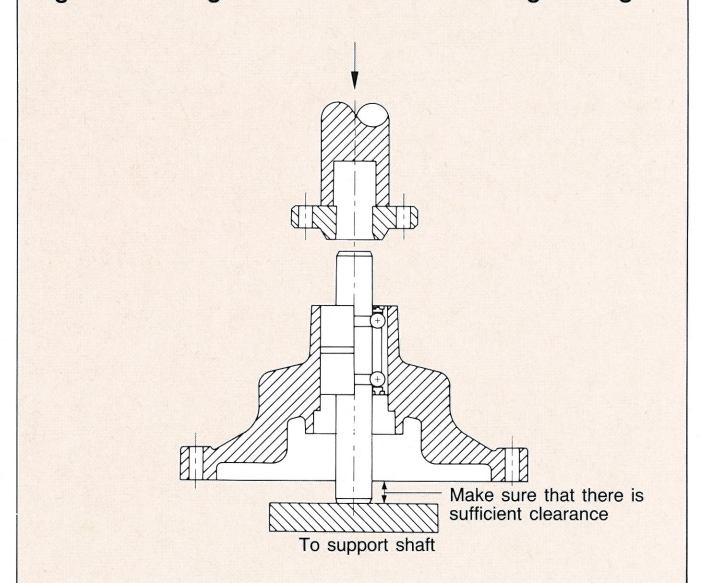


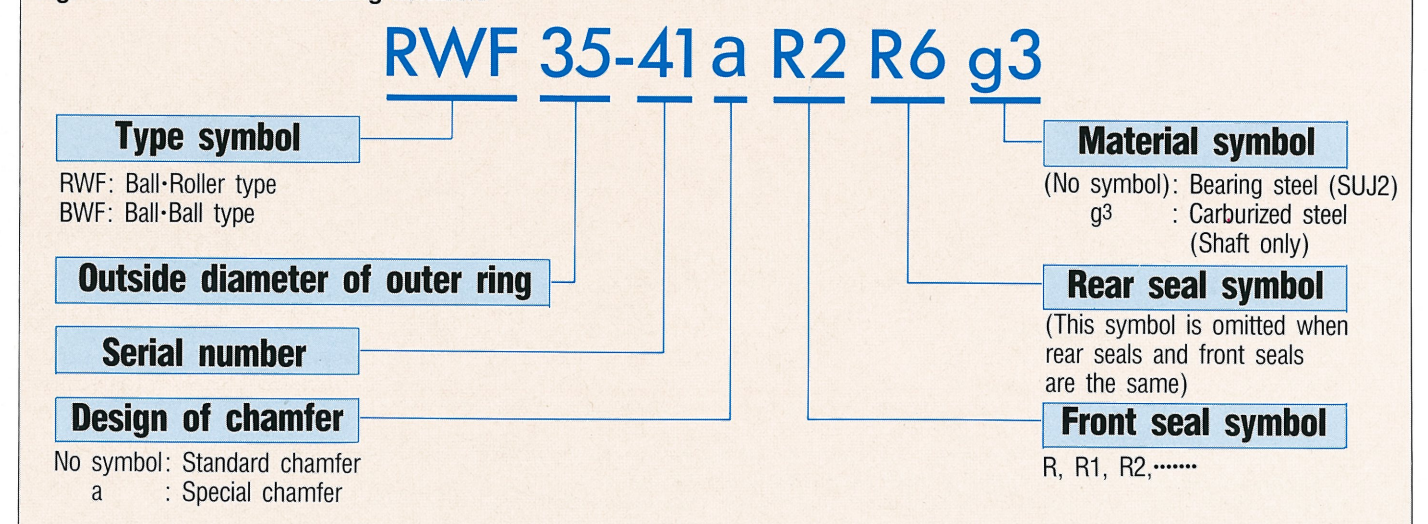
Fig. 12 Pressing hub onto shaft of mounting bearing



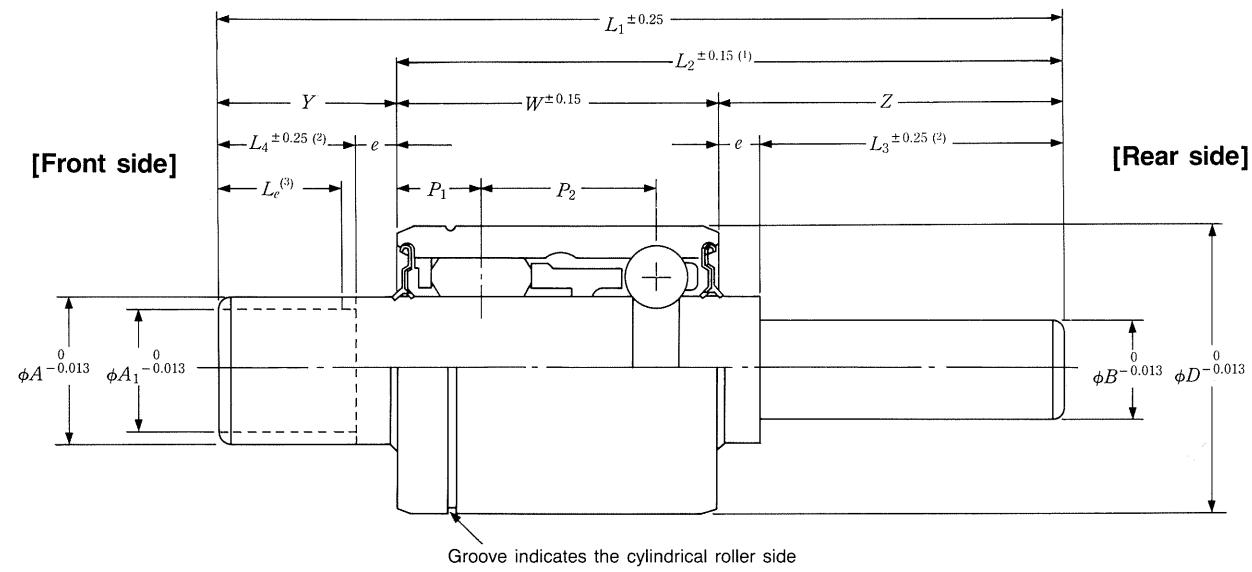
Bearing numbering system

The water pump bearing numbering system is outlined in Fig. 13. The dimensions for each bearing number are shown in the design tables on pages 7 to 18.

Fig. 13 Formulation of bearing numbers



Design table (Ball·Roller type <RWF>)

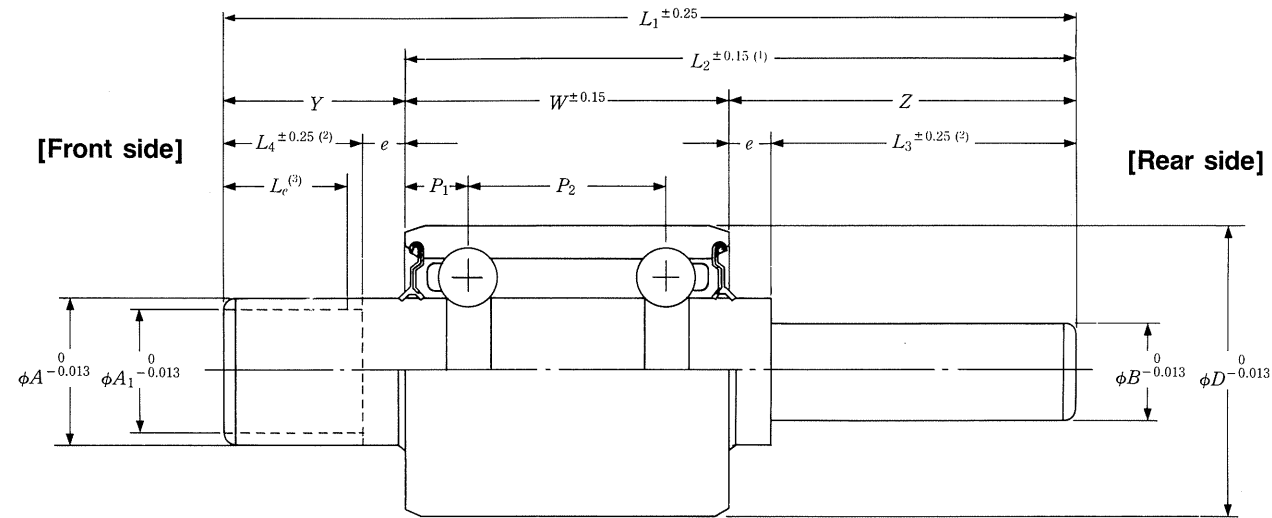


Bearing series numbers	Dimensions (mm)									Basic load ratings									
	Outside dia. of outer ring D	Width of outer ring W	Dia. of main shaft A	Dia. of front shaft A_1	Dia. of rear shaft B	Shaft length ⁽⁴⁾ L_1	Protrusion from outer ring face ⁽⁴⁾ (Maximum) Y	Protrusion from the stepped shaft ⁽⁴⁾ (Maximum) Z	Protrusion of stepped part ⁽⁵⁾ e	Pitches		Roller row				Ball row			
										P_1	P_2	(N)		{kgf}		(N)		{kgf}	
											C_r	C_{or}	C_r	C_{or}	C_r	C_{or}	C_r	C_{or}	
RWF26	26	30	12	—	12	150	55	55	R type seals:	9.75	14.25	12 800	11 400	1 310	1 160	3 950	1 560	405	159
	26	39	12	—	12	150	55	55	1.5	9.75	23.25	12 800	11 400	1 310	1 160	3 950	1 560	405	159
RWF28	28	20	17.2	—	12	150	55	55	HR type seals:	5.25	9.55	6 300	5 250	645	535	5 100	2 400	520	244
RWFS30	30	30	17.2	—	12	150	55	55	WHR type seals:	8.75	14.75	13 200	12 600	1 350	1 280	6 000	2 670	615	273
RWF30	30	30	15.918	—	12	150	55	55		8.85	14.38	15 300	13 600	1 560	1 390	6 600	2 760	675	281
	30	38.84	15.918	—	12	150	55	55		9.8	22.27	17 700	16 400	1 800	1 670	6 600	2 760	675	281
	30	46	15.918	—	12	150	55	55		9.8	29.43	17 700	16 400	1 800	1 670	6 600	2 760	675	281
RWF35	35	38.84	17.5	(15.918)	12	150	55	55		9.85	21.49	21 800	20 300	2 200	2 070	8 150	3 450	830	355
	35	46	17.5	(15.918)	12	150	55	55		9.85	28.65	21 800	20 300	2 200	2 070	8 150	3 450	830	355
	35	56	17.5	(15.918)	12	150	55	55		9.8	38.7	21 800	20 300	2 200	2 070	8 150	3 450	830	355
RWF41	41	38.9	20	—	12	150	55	55		12.65	16.74	28 000	27 200	2 860	2 770	9 800	4 250	1 000	430
RWF42	42	46	22	(15.918)	12	150	55	55		12.15	24.35	24 900	23 600	2 540	2 410	11 600	5 100	1 180	520
	42	56	22	—	12	150	55	55		12.15	34.35	24 900	23 600	2 540	2 410	11 600	5 100	1 180	520

- Notes**
- (1) The assembled width (L_2) is considered to be the standard dimension for specifying a design. As shown in the figure, the assembled length (L_2) is the distance between the front end face of an outer ring and the rear end face of a shaft. Please contact NSK, if you want to use a different dimension to specify a design. The tolerance of the assembled width (L_2) refers to the case when there is no axial clearance.
 - (2) The standard shaft length of the front side (L_4) or that of the rear side (L_3) is obtained by subtracting the protrusion of the stepped part (e) from the shaft protrusion (front: Y ; rear: Z).
 - (3) The effective shaft length of the front or rear side (L_c : the length which can assure the tolerance of the shaft diameter) is obtained by subtracting 2.5 mm from the shaft length (from: L_4 ; rear: L_3).
 - (4) The shaft length (L_1), the shaft protrusion of the front side (Y), and the shaft protrusion of the rear side (Z) show their maximum dimension. When you need a dimension larger than these values, please contact NSK.
 - (5) The protrusion of the stepped part (e) shows the minimum length necessary to prevent seals from touching the stepped part.

Remarks When other dimensions than those shown here are necessary, please contact NSK. For actual results of manufacture, please refer to page 11 to page 14.

Dimensional table (Ball·Ball type <BWF>)



Bearing series numbers	Dimensions (mm)										Basic load ratings (One row)				
	Outside dia. of outer ring D	Width of outer ring W	Dia. of main shaft A	Dia. of front shaft A_1	Dia. of rear shaft B	Shaft length ⁽⁴⁾ (Maximum) L_1	Protrusion from outer ring face ⁽⁴⁾ (Maximum) Y	Protrusion from the stepped shaft ⁽⁴⁾ (Maximum) Z	Protrusion of stepped part ⁽⁵⁾ e	Pitches		(N)		{kgf}	
										P_1	P_2	C_r	C_{or}	C_r	C_{or}
BWF24	24	15	10	(9.6)	(8)	150	55	55	R type seals: 1.5	4	7	3 300	1 200	340	122
BWF26	26	30	12	—	—	150	55	55	HR type seals: 2.0	6	18	3 950	1 560	405	159
	26	39	12	—	—	150	55	55		6	27	3 950	1 560	405	159
BWF28	28	20	17.2	—	12	150	55	55	WHR type seals: 2.5	5.2	9.6	5 100	2 400	520	244
										6.5	7	6 000	2 670	615	273
BWFS30	30	20	17.2	12	12	150	55	55		6.5	10	6 000	2 670	615	273
	30	23	17.2	(15.918)	12	150	55	55		6.5	17	6 000	2 670	615	273
	30	30	17.2	—	12	150	55	55		(6.74)	9.525	6 600	2 750	675	281
	30	23	17.2	—	12	150	55	55		6	18	6 000	2 640	610	269
BWF30	30	30	15.918	—	12	150	55	55		5.945	27	6 000	2 640	610	269
	30	38.89	15.918	(12)	12	150	55	55		6.77	25.35	6 600	2 750	675	281
	30	38.89	15.918	(12)	12	150	55	55		6.95	16	8 150	3 450	830	355
BWF35	35	29.9	17.5	—	12	150	55	55		7.195	24.5	8 150	3 450	830	355
	35	38.89	17.5	(15.918)	12	150	55	55		7.195	24.5	8 150	3 450	830	355
	35	38.89	18	—	12	150	55	55		7.195	31.61	8 150	3 450	830	355
	35	46	17.5	(15.918)	12	150	55	55		7 195	31.61	8 150	3 450	830	355
	35	46	18	—	12	150	55	55		8	30	9 800	4 250	995	430
BWF40	40	46	19	(17)	12	150	55	55							

Notes

(1) The assembled width (L_2) is considered to be the standard dimension for specifying a design. As shown in the figure, the assembled length (L_2) is the distance between the front end face of an outer ring and the rear end face of a shaft. Please contact NSK, if you want to use a different dimension to specify a design. The tolerance of the assembled width (L_2) refers to the case when there is no axial clearance.

(2) The standard shaft length of the front side (L_4) or that of the rear side (L_3) is obtained by subtracting the protrusion of the stepped part (e) from the shaft protrusion (front: Y ; rear: Z).

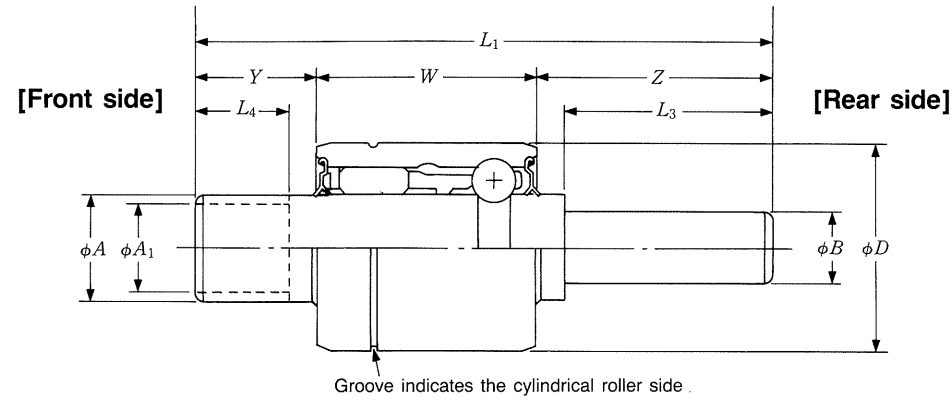
(3) The effective shaft length of the front or rear side (L_e : the length which can assure the tolerance of the shaft diameter) is obtained by subtracting 2.5 mm from the shaft length (from: L_4 ; rear: L_3).

(4) The shaft length (L_1), the shaft protrusion of the front side (Y), and the shaft protrusion of the rear side (Z) show their maximum dimension. When you need a dimension larger than these values, please contact NSK.

(5) The protrusion of the stepped part (e) shows the minimum length necessary to prevent seals from touching the stepped part.

Remarks When other dimensions than those shown here are necessary, please contact NSK. For actual results of manufacture, please refer to page 15 to page 18.

Dimensional table (Ball·Roller type <RWF>)



Bearing series numbers	Dimensions (mm)										Bearing numbers
	D	W	A	A ₁	B	L ₁	Y	Z	L ₄	L ₃	
RWF26	26	30	12	—	—	82	17.6	34.4	—	—	RWF26-3R
	26	30	12	—	—	94.5	21.5	34	—	—	RWF26-4R
	26	39	12	—	—	73	19	34	—	—	RWF26-2aR
	26	39	12	—	—	73	19	34	—	—	RWF26-2a1R
RWF28	28	20	17.2	—	12	74.6	13.1	41.5	—	39.5	RWF28-1R4
	28	20	17.2	—	12	74.6	13.1	41.5	—	39.5	RWF28-1R4U1
	28	20	17.2	—	12	74.6	13.1	41.5	—	37.85	RWF28-1AR4R9U1
	28	20	17.2	—	12	74.6	13.1	41.5	—	37.85	RWF28-1AR4R10U1
	28	20	17.2	—	12	65.5	11	34.5	—	32.5	RWF28-2aR4
RWF30	30	30	15.918	—	12	94.2	16.5	47.7	—	45.2	RWF30-114CR11
	30	30	15.918	—	12	100	17	53	—	51	RWF30-115CR11
	30	30	15.918	—	12	79.3	12.1	37.2	—	34.05	RWF30-118CaR11R15U1
	30	30	15.918	—	12	79.3	12.1	37.2	—	34.05	RWF30-118Ca1R11R15U1
	30	30	15.918	—	12	79.3	13.1	36.2	—	32.2	RWF30-140CaR11R15U1
	30	30	15.918	—	12	89.5	15.5	44	—	41	RWF30-152HaR11R15
	30	30	15.918	—	12	80	11	39	—	35	RWF30-153CR11R15
	30	30	15.918	—	12	80.3	12.1	38.2	—	35.2	RWF30-161CR11R15
	30	38.84	15.918	—	12	112	30.025	43.135	—	40.5	RWF30-2R
	30	38.84	15.918	—	12	101	25	37.16	—	33.95	RWF30-8HaR11R10
	30	38.84	15.918	—	12	114	25.025	50.135	—	47.5	RWF30-10aR
	30	38.84	15.918	—	12	88	12.5	36.66	—	34	RWF30-23R
	30	38.84	15.918	—	12	106	30	37.16	—	33.95	RWF30-29HaR11R10g3
	30	38.84	15.918	—	12	105.2	20.5	45.86	—	41.31	RWF30-31BaR
	30	38.84	15.918	—	12	105.2	20.5	45.86	—	41.31	RWF30-31CaR
	30	38.84	15.918	—	12	112	30	43.16	—	40.5	RWF30-32HaRR6
	30	38.84	15.918	—	12	106.8	20.5	47.46	—	42.91	RWF30-33aR
	30	38.84	15.918	—	12	106.8	20.5	47.46	—	42.91	RWF30-33CaR
	30	38.84	15.918	—	12	93	18.5	35.66	—	32.61	RWF30-40BR
	30	38.84	15.918	—	12	93	18.5	35.66	—	32.61	RWF30-40CR
	30	38.84	15.918	—	12	106.2	18.5	48.86	—	41	RWF30-45BaR
	30	38.84	15.918	—	12	118.9	20	60.06	—	52.9	RWF30-48BaR
	30	38.84	15.918	—	12	96.7	20.5	37.36	—	34.31	RWF30-49BaR
	30	38.84	15.918	—	12	122.4	33.5	50.06	—	47.01	RWF30-52R
	30	38.84	15.918	—	—	68.39	25.05	4.5	—	—	RWF30-58R
	30	38.84	15.918	—	—	68.39	25.05	4.5	—	—	RWF30-58CR
	30	38.84	15.918	—	12	93.05	20	34.21	—	32.21	RWF30-67BR
	30	38.84	15.918	—	12	93.05	20	34.21	—	32.21	RWF30-67CR
	30	38.84	15.918	—	12	90.2	15.5	35.86	—	33.86	RWF30-68BaR
	30	38.84	15.918	—	12	90.2	15.5	35.86	—	33.86	RWF30-68CaR

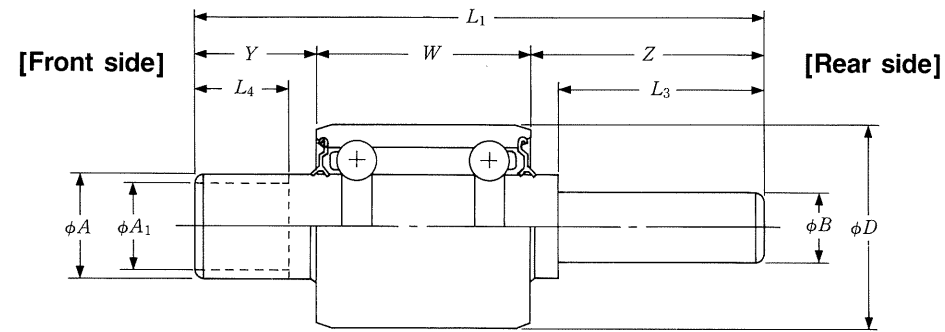
Bearing series numbers	Dimensions (mm)										Bearing numbers	
	D	W	A	A ₁	B	L ₁	Y	Z	L ₄	L ₃		
RWF30	30	38.84	15.918	—	12	93	18.5	35.66	—	32.61	RWF30-69BR	
	30	38.84	15.918	—	12	93	18.5	35.66	—	32.61	RWF30-69CR	
	30	38.84	15.918	—	12	115.3	20.5	55.96	—	52.96	RWF30-72BR	
	30	38.84	15.918	—	12	115.3	20.5	55.96	—	52.96	RWF30-72CR	
	30	38.84	15.918	—	12	94.6	16	39.76	—	36.71	RWF30-74BR	
	30	38.84	15.918	—	12	94.6	16	39.76	—	36.71	RWF30-74CR	
	30	38.84	15.918	—	12	115.3	24.5	51.96	—	48.96	RWF30-77BR	
	30	38.84	15.918	—	12	108.9	20	50.06	—	48.4	RWF30-82BR	
	30	38.84	15.918	—	12	92.7	19.2	34.66	—	31.61	RWF30-86R11	
	30	38.84	15.918	—	12	99	11	49.16	—	46	RWF30-94CR11R6	
	30	38.84	15.918	—	12	104.2	16.7	48.66	—	47	RWF30-97R11	
	30	38.84	15.918	—	12	103	16.5	47.66	—	43	RWF30-98CR	
	30	38.84	15.918	—	12	94.5	16.5	39.16	—	35.95	RWF30-102a1R11R10	
	30	38.84	15.918	—	12	123.3	20.5	63.96	—	60.81	RWF30-104BaR11R10	
	30	38.84	15.918	—	12	123.3	20.5	63.96	—	60.81	RWF30-104CaR11R15	
	RWF30	30	38.84	15.918	—	12	99	20.5	39.66	—	36.51	RWF30-105CaR11R15
30		38.84	15.918	—	12	92.5	15.5	38.16	—	35.01	RWF30-106CaR11R15	
30		38.84	15.918	—	12	109.1	20.5	49.76	—	46.61	RWF30-109CaR11R15	
30		38.84	15.918	—	12	106.2	18.5	48.86	—	45.71	RWF30-110CaR11R15	
30		38.84	15.918	—	12	108.9	20	50.06	—	46.91	RWF30-111CaR11R15	
30		38.84	15.918	—	12	99.7	16.5	44.36	—	41.7	RWF30-112CR11	
30		38.84	15.918	—	12	121.2	20	62.36	—	59.21	RWF30-113CaR11R15	
30		38.84	15.918	—	12	93.9	17.4	37.66	—	34.51	RWF30-117CaR11R15	
30		38.84	15.918	—	12	91	13.5	38.66	—	36.32	RWF30-121CR11	
30		38.84	15.918	—	12	91	13.5	38.66	—	36.32	RWF30-121CaR11	
RWF30		30	38.84	15.918	—	12	103	16.5	47.66	—	43	RWF30-125CR
	30	38.84	15.918	—	12	106.5	17.5	50.16	—	48	RWF30-126CR11	
	30	38.84	15.918	—	12	96.5	16.5	41.16	—	38.75	RWF30-128HaRR6	
	30	38.84	15.918	—	12	92.5	16.5	37.16	—	34.75	RWF30-129HaRR6	
	30	38.84	15.918	—	12	100.75	15.5	46.41	—	42.36	RWF30-132Ca1R11R15	
	30	38.84	15.918	—	12	126.4	16.7	70.86	—	69.2	RWF30-136R11	
	30	38.84	15.918	—	12	98.4	17.7	41.86	—	38.71	RWF30-137CaR11R15	
	30	38.84	15.918	—	12	99.4	18.5	42.06	—	39.45	RWF30-141CaR	
	30	38.84	15.918	—	12	100	20	41.16	—	39.45	RWF30-143CaR	
	30	38.84	15.918	—	12	108.8	20.5	49.46	—	44.91	RWF30-145CaR	
	30	38.84	15.918	—	12	106	30	37.16	—	33.95	RWF30-158HaR11R10g3	
RWF30	30	46	15.918	—	12	99.5	17	36.5	—	33.35	RWF30-90EaR11R15	
	30	46	15.918	—	12	99.5	17	36.5	—	33.35	RWF30-90Ea1R11R15	
	RWFS30	30	30	17.2	—	12	80.5	13.5	37	—	35	RWFS30-7BaR
		30	30	17.2	—	12	77	13.1	33.9	—	31.9	RWFS30-8BaR
		30	30	17.2	—	12	77.7	12.1	35.6	—	33.6	RWFS30-14BaR13
		30	30	17.2	—	12	82.8	13.5	39.3	—	36.3	RWFS30-19aR13R16
		30	30	17.2	—	12	79.3	13.1	36.2	—	33.2	RWFS30-20aR13R16
		30	30	17.2	—	12	79.2	13.1	36.2	—	33.2	RWFS30-20a1R13R16
		30	30	17.2	—	12	78.6	12.1	36.5	—	33.5	RWFS30-22aR13R16U1
		30	30	17.2	—	12	78.7	13.1	35.6	—	33.6	RWFS30-28aR
		30	30	17.2	—	12	78.7	13.1	35.6	—	33.6	RWFS30-28aRR23
30		30	17.2	—	—	52.4	19.4	3	—	—	RWFS30-29HaR13	
30		30	17.2	—	12	82.8	14.5	38.3	—	35.3	RWFS30-33aR13R16	

Dimensional table (Ball·Roller type <RWF>)

Bearing series numbers	Dimensions (mm)										Bearing numbers
	D	W	A	A ₁	B	L ₁	Y	Z	L ₄	L ₃	
	30	34	17.2	—	12	95.3	14.9	46.4	—	43.4	RWFS30-30aR19R16
RWF35	35	29.9	17.5	—	12	96.2	13.6	52.7	—	50.45	RWF35-79R4
	35	29.9	17.5	—	12	99.9	15.3	54.7	—	51.4	RWF35-197CR25R34
	35	33.4	17.5	—	12	83.7	13.95	36.35	—	32.35	RWF35-111aR28R24
	35	33.4	17.5	—	12	86	13.95	38.65	—	34.65	RWF35-131aR28R34
	35	33.4	17.5	—	12	86	13.95	38.65	—	34.65	RWF35-131CaR28R34
	35	38.84	18	15.918	12	112	30.025	43.135	28.525	40.75	RWF35-1AaRR12
	35	38.84	18	15.918	12	101	25.025	37.135	23.5	33.95	RWF35-9HaR17R21
	35	38.84	18	15.918	12	106	30	37.16	28.5	33.95	RWF35-48HaR17R35
	35	38.84	18	15.918	12	112	30	43.16	28.75	40.5	RWF35-82aRR21
	35	38.84	17.5	—	12	100.4	15	46.56	—	40.35	RWF35-118CaR25R26+Y1
	35	38.84	18	17.5	12	100.4	15	46.56	15	40.35	RWF35-136aR17R21+Y1
	35	38.84	17.5	—	12	100.4	17	44.56	—	38.35	RWF35-138CaR25R26g3+Y1
	35	38.84	17.5	—	12	105.2	26	40.36	—	37.15	RWF35-139CaR25R34
	35	38.84	17.5	—	12	113.12	24.53	49.75	—	46.54	RWF35-141CaR25R34U5
	35	38.84	17.5	—	12	101.62	24.53	41.46	—	35.04	RWF35-144CaR25R34
	35	38.84	18	15.918	12	113.5	25.1	49.56	23.85	47	RWF35-153R17
	35	38.84	17.5	—	12	133.9	32.56	62.5	—	59.29	RWF35-155CaR25R34
	35	38.84	17.5	—	12	99.25	17.05	43.36	—	40.15	RWF35-166CaR25
	35	38.84	17.5	15.918	12	128.5	30.1	59.56	28.6	56.35	RWF35-177AR25
	35	38.84	18	15.918	12	92.5	16.5	37.16	14	34.75	RWF35-183JaR17R12
	35	38.84	17.5	—	12	100.3	20	41.46	—	38.96	RWF35-191CaR25R34
	35	38.84	17.5	—	12	99	20.5	39.66	—	36.45	RWF35-192CaR25R34
	35	46	18	15.918	12	114	27	41	25.5	38.75	RWF35-3KaR17R12
	35	46	18	15.918	12	114	27	41	25.5	37.85	RWF35-3LaR17R21
	35	46	18	15.918	12	119	30	43	28.5	39.85	RWF35-5Ha1R17R21g3
	35	46	18	15.918	12	119	30	43	28.5	39.85	RWF35-5Ha1R17R35g3
	35	46	18	15.918	12	100.5	18	36.5	16.25	34	RWF35-14a2R17R21
	35	46	18	—	12	114	26.3	41.7	—	37	RWF35-15R
	35	46	18	15.918	12	143.2	43.5	53.7	8.7	50.7	RWF35-31aR
	35	46	18	15.918	12	108.5	21.5	41	19.5	38.75	RWF35-45HaR
	35	46	18	—	10.2	116.5	18.5	52	—	20	RWF35-53aARR19
	35	46	18	17	12	112.9	23.9	43	21.65	38.5	RWF35-54R
	35	46	18	17	12	123	34	43	32.25	38.5	RWF35-77R
	35	46	18	17.5	12	115.3	20.5	48.8	19	44.3	RWF35-93aR17
	35	46	18	17.5	12	111.4	20.5	43.9	19	41.9	RWF35-120BaR17
	35	46	17.5	—	12	111.4	20.5	44.9	—	41.9	RWF35-120CaR25
	35	46	17.5	15.918	12	120.5	30	44.5	28.5	41.75	RWF35-124GaR25R34g3
	35	46	17.5	15.918	12	120.5	30	44.5	28.5	41.75	RWF35-124HaR25R26g3
	35	46	17.5	—	12	109.1	21	42.1	—	38.89	RWF35-142CaR25R34
	35	46	17.5	—	12	125.6	20.5	59.1	—	55.89	RWF35-143CaR25R26
	35	46	17.5	—	12	125.6	20.5	59.1	—	55.89	RWF35-143CaR25R34
	35	46	17.5	—	12	113.9	21	46.9	—	43.69	RWF35-146CaR25R26
	35	46	17.5	—	12	113.9	21	46.9	—	43.69	RWF35-146CaR25R34
	35	46	18	15.918	12	98.6	16.8	35.8	15.5	33.3	RWF35-154R17
	35	46	18	15.918	12	110.7	26.5	38.2	25	35.95	RWF35-162HaR17R10
	35	46	17.5	—	12	104.25	17	41.25	—	38.04	RWF35-167CaR25
	35	46	18	15.918	12	110.7	26.5	38.2	25	35.95	RWF35-184HaR17R10
	35	56	18	15.918	12	126	28.5	41.5	26.5	37	RWF35-19AR17R10

Bearing series numbers	Dimensions (mm)										Bearing numbers
	D	W	A	A ₁	B	L ₁	Y	Z	L ₄	L ₃	
	35	56	18	15.918	—	89	28.5	4	27.25	—	RWF35-42BaRg3
	35	56	18	15.918	12	125.5	27.5	42	26	39.25	RWF35-69HaR17R21g3
	35	56	17.5	—	12	136.6	20.5	60.1	—	56.89	RWF35-171CR25R26
	35	56	17.5	—	12	136.6	20.5	60.1	—	56.89	RWF35-171CR25R34
	35	56	17.5	—	12	121.9	20	45.9	—	42.69	RWF35-172CR25R34UR2
	35	56	17.5	15.918	12	123	27.5	39.5	26	36.75	RWF35-182CaR25R34g3
	35	56	18	—	12	122.5	28.5	38	—	35.25	RWF35-185AaR17R12g3
	35	56	17.5	—	12	145.6	20.5	69.1	—	46.5	RWF35-194CR25R34
RWF38Z	38.1	53.98	18.961	—	12	123.3	20.495	48.825	—	45.825	RWF38Z-10aR1R5
	38.1	53.98	18.961	—	12	123.3	20.495	48.825	—	45.825	RWF38Z-10aR1R6
RWF41	41	38.9	20	—	12	101.4	13.5	49	—	47.4	RWF41-3R
	41	38.9	20	—	12	101.4	13.5	49	—	46.4	RWF41-3AR2R1
RWF42	42	46	22	19	12	132.45	36.45	50	34.95	45	RWF42-12R
	42	46	22	18	12	112	28.5	37.5	27	35	RWF42-15R
	42	46	22	19	12	112	28.5	37.5	27	35	RWF42-24R
	42	46	22	—	16	142	33	63	—	57	RWF42-30RR3+Y
	42	46	22	19	12	110.5	23.6	40.9	22.6	39	RWF42-33AR
	42	46	22	18	13	115.5	26.5	43	24	38.5	RWF42-34AR
	42	46	22	15.918	12	126	30	50	29	47.5	RWF42-36RR5
	42	46	22	—	12	111.4	24.4	41	—	38.75	RWF42-39Ha1R6R4g3
	42	46	22	17.5	12	106	24.5	35.5	23.5	33	RWF42-41RR4
	42	46	22	15.918	12	111	28	37	10.5	33.75	RWF42-50HR6R8g3
	42	46	22	17	12	126.5	32.5	48	11.5	41.5	RWF42-51AR6
	42	46	22	—	16	149.5	35	68.5	—	62.5	RWF42-58AR6R5
	42	46	22	—	12	107.6	24.4	37.2	—	34.95	RWF42-62R6R4
	42	46	22	—	16	147.5	41	60.5	—	54.5	RWF42-67R6R5
	42	46	22	19	12	130.8	23.6	61.2	22.6	59.3	RWF42-68R6
	42	46	22	—	12	104.4	17.4	41	—	38.75	RWF42-71aR6R4g3
	42	46	22	—	12	104.4	17.4	41	—	38.75	RWF42-71a1R6R4g3
	42	46	22	—	12	111.4	24.4	41	—	38.75	RWF42-73HaR6R4g3
	42	46	22	—	12	146.5	56.7	43.8	—	37.8	RWF42-78R6R3g3+Y
	42	46	22	—	12	130.2	40.4	43.8	—	37.8	RWF42-79R6R3g3+Y
	42	46	22	—	12	130.2	40.4	43.8	—	37.8	RWF42-79AR6R3g3+Y
	42	46	22	—	12	139.2	49.4	43.8	—	37.8	RWF42-84R6R3g3+Y
	42	46	22	—	12	139.2	49.4	43.8	—	37.8	RWF42-84AR6R3g3+Y
	42	46	22	—	12	106.5	21	39.5	—	36.25	RWF42-85R6R8
	42	46	22	—	12	117.8	28	43.8	—	37.8	RWF42-86R6R3g3+Y
	42	46	22	—	12	147.5	41	60.5	—	54.5	RWF42-89RR3+Y
42	46	22	15.918	12	115.5	30	39.5	8.5	35.5	RWF42-96MR9	
42	46	22	—	12	111.4	24.4	41	—	38.5	RWF42-99MR9	
42	46	22	—	12	118	28	44	—	40.75	RWF42-104HaR6R8g3	
42	46	22	15.918	12	114	28	40	9	36	RWF42-109HaR6R8g3	
42	56	22	—	12	140.9	35.8	49.1	—	46.1	RWF42-77AR6R8	
42	56	22	—	12	127.8	28	43.8	—	37.8	RWF42-97AR6R3g3+Y	
42	56	22	—	12	127	29	42	—	38	RWF42-98MR9	
42	56	22	—	12	136.1	19.2	60.9	—	51.9	RWF42-101R6R8	

Dimensional table (Ball·Ball type <BWF>)



Bearing series numbers	Dimensions (mm)										Bearing numbers
	D	W	A	A_1	B	L_1	Y	Z	L_4	L_3	
BWF24	24	15	10	9.6	8	60.35	11.65	33.7	1.5	—	BWF24-7g3
	24	15	10	9.6	8	60.35	11.65	33.7	1.5	—	BWF24-8g3
	24	15	10	—	8	60.35	11.65	33.7	—	—	BWF24-9g3
BWF26	26	30	12	—	12	78.5	15	33.5	—	—	BWF26-38R
	26	39	12	—	12	99	21.5	38.5	—	—	BWF26-3AR
	26	39	12	—	12	102.5	21.5	42	—	—	BWF26-4FR
	26	39	12	—	12	103.5	21.5	43	—	—	BWF26-11R
	26	39	12	—	12	94.5	21.5	34	—	—	BWF26-14RUJ
	26	39	12	—	12	89.5	16.5	34	—	—	BWF26-36aR
	26	39	12	—	12	94.5	21.5	34	—	—	BWF26-44R
	26	39	12	—	12	94.5	21.5	34	—	—	BWF26-44R7
	26	39	12	—	12	98	16.5	42.5	—	—	BWF26-46a1Rg3
	26	39	12	—	12	94.5	21.5	34	—	—	BWF26-59R
	26	39	12	—	12	103.5	17.5	47	—	—	BWF26-61R
	26	39	12	—	12	94.5	21.5	34	—	—	BWF26-62aR7R
	26	39	12	—	12	94.5	21.5	34	—	—	BWF26-66MR11
BWF28	28	20	17.2	—	12	77.1	13	44.1	—	40.45	BWF28-17aR4R10
	28	20	17.2	—	12	77.1	13	44.1	—	40.45	BWF28-17AaR4R10
BWF30	30	27	15.918	—	12.008	83.3	18.78	37.52	—	35.8	BWF30-E12
	30	27	15.918	—	12.008	81.5	18	36.5	—	34.5	BWF30-E20
	30	30	15.918	—	12	86	16.5	39.5	37	—	BWF30-209R
	30	32.645	15.918	—	12.738	83.44	16.865	33.93	—	32.13	BWF30-259XaR11
	30	38.89	15.918	—	12	107.5	85.945	47.055	—	44	BWF30-5R
	30	38.89	15.918	12	12	103.5	21.555	43.055	19.5	40.75	BWF30-6HaRR6
	30	38.89	15.918	—	12	105.5	23.5	43.11	—	40.5	BWF30-15aRR6
	30	38.89	15.918	14	12	101	24	38.11	21.8	35.11	BWF30-44R
	30	38.89	15.918	—	12	93	18.5	35.61	—	32.61	BWF30-56aR
	30	38.89	15.918	—	12	93	18.5	35.61	—	32.61	BWF30-56AaR11R14
	30	38.89	15.918	—	12	93	18.5	35.61	—	32.61	BWF30-56CR
	30	38.89	15.918	—	12	93	18.5	35.61	—	32.61	BWF30-56GaR
	30	38.89	15.918	15	—	124.05	35.155	50.005	32.6	—	BWF30-74R
	30	38.89	15.918	—	12	112	30	43.11	—	40.5	BWF30-76BaR
	30	38.89	15.918	—	12	98.5	22.5	37.11	—	33.5	BWF30-119Z
	30	38.89	15.918	—	—	115.9	23.81	53.2	—	—	BWF30-121R
	30	38.89	15.918	14	12	113.7	24	50.81	22	47.81	BWF30-124R
30	38.89	15.918	—	12	112	23.1	50.01	—	—	BWF30-130R	
30	38.89	15.918	12	12	115	25.3	50.81	23.1	47.81	BWF30-138R	
30	38.89	15.918	—	12	78	12	36	—	33.4	BWF30-143AR	

Bearing series numbers	Dimensions (mm)										Bearing numbers
	D	W	A	A_1	B	L_1	Y	Z	L_4	L_3	
	30	38.89	15.918	—	12	99.5	16.5	44.11	—	41.5	BWF30-148R1
	30	38.89	15.918	—	12	100	26	35.11	—	32.61	BWF30-151R
	30	38.89	15.918	—	12	122.4	33.5	50.01	—	47	BWF30-158R
	30	38.89	15.918	—	12	94.6	16	39.71	—	36.71	BWF30-159R
	30	38.89	15.918	—	12	91.9	18.5	34.51	—	31.51	BWF30-162R
	30	38.89	15.918	—	12	94.9	16.455	39.555	—	36.5	BWF30-164R
	30	38.89	15.918	—	12	112.69	27	46.8	—	44.3	BWF30-165aR
	30	38.89	15.918	—	12	112.69	27	46.8	—	44.3	BWF30-165AaR
	30	38.89	15.918	—	12	90.2	15.5	35.81	—	32.81	BWF30-175aR
	30	38.89	15.918	12	12	98.5	16.5	43.11	14.5	40.75	BWF30-177aRR6
	30	38.89	15.918	—	12	98	17	42.11	—	39.11	BWF30-180R
	30	38.89	15.918	12	12	92.5	16.5	37.11	14.5	34.5	BWF30-181aR
	30	38.89	15.918	—	12	93.05	20	34.16	—	32.16	BWF30-198XR
	30	38.89	15.918	12	12	105.5	16.5	50.11	13.5	46	BWF30-214R
	30	38.89	15.918	—	12	99.5	16.5	44.11	—	41.5	BWF30-218R1
	30	38.89	15.918	—	—	78.89	15	25	—	—	BWF30-219R
	30	38.89	15.918	—	12	101.8	16.5	46.41	—	43.8	BWF30-220R
	30	38.89	15.918	12	12	103	16.5	47.61	1.5	43	BWF30-223XR
	30	38.89	15.918	—	12	88	12.5	36.61	—	34.61	BWF30-225XR11R6
	30	38.89	15.918	—	12	99	11	49.11	—	46.56	BWF30-226R11R6
	30	38.89	15.918	—	12	82.6	11.2	32.51	—	30.51	BWF30-229XR11R6
	30	38.89	15.918	12	12	103	16.5	47.61	1.5	43	BWF30-231XR
	30	38.89	15.918	—	12	101.8	16.5	46.41	—	43.8	BWF30-234R
	30	38.89	15.918	12	12	92.5	16.5	37.11	14.5	34.75	BWF30-240aR
	30	38.89	15.918	12	12	103.5	21.555	43.055	19.5	40.75	BWF30-241HaRR6
	30	38.89	15.918	—	12	92.5	16.5	37.11	—	34.75	BWF30-242HaRR6
	30	38.89	15.918	—	12	92.5	16.5	37.11	—	34.75	BWF30-243JaRR6
	30	38.89	15.918	—	12	92.7	19.2	34.61	—	32	BWF30-246MR17
	30	38.89	15.918	—	12	121.2	20	62.31	—	59.7	BWF30-248MaR17
	30	38.89	15.995	—	—	97.79	17.9	41	—	—	BWF30-258XaR11
	30	38.89	15.918	—	12	99.4	18.5	42.01	—	39.45	BWF30-262aR
	30	38.89	15.918	—	12	99.4	18.5	42.01	—	39.01	BWF30-264aR11R15
	30	38.89	15.918	—	12	94.5	16.5	39.11	—	36.1	BWF30-265MR17
	30	38.89	15.918	—	12	112.69	27	46.8	—	44.3	BWF30-266AR
	BWFS30	30	20	17.2	12	12	62.7	13.5	29.2	11.5	26.2
30		23	17.2	—	12	71.2	13.5	34.7	—	31.7	BWFS30-1R
30		23	17.2	—	12	71.2	13.5	34.7	—	31.7	BWFS30-1BR10R12
30		23	17.2	—	12	71.2	13.5	34.7	—	31.7	BWFS30-1BR10R22
30		23	17.2	—	12	77.8	15.5	39.3	—	33.3	BWFS30-5aRR3
30		23	17.2	—	12	77.8	15.5	39.3	—	33.3	BWFS30-5CaR
30		23	17.2	—	12	77.8	15.5	39.3	—	33.3	BWFS30-5CaRR3+Y
30		23	17.2	—	12	77.8	15.5	39.3	—	33.3	BWFS30-5CaR13R12
30		23	17.2	—	12	79	13.5	42.5	—	40	BWFS30-6R
30		23	17.2	—	12	75	13.5	38.5	—	36.5	BWFS30-15R
30		23	17.2	—	12	75	13.5	38.5	—	36.2	BWFS30-21AR10R12
30		23	17.2	—	12	75	13.5	38.5	—	35.6	BWFS30-26aR13R16
30		23	17.2	—	12	92.5	15.5	54	—	51	BWFS30-29aR13R16
30		23	17.2	15.918	12	92.5	16.5	53	14.5	50	BWFS30-30R13R12

Dimensional table (Ball·Ball type <BWF>)

Bearing series numbers	Dimensions (mm)										Bearing numbers
	D	W	A	A ₁	B	L ₁	Y	Z	L ₄	L ₃	
	30	23	17.2	—	12	76.5	13	40.5	—	37.5	BWFS30-32aR13R16
	30	23	17.2	—	12	68.7	11	34.7	—	32.4	BWFS30-49AR10R22
	30	23	17.2	—	12	80	15.5	41.5	—	39.2	BWFS30-50R13R16
	30	23	17.2	—	12	71.2	13.5	34.7	—	31.7	BWFS30-54XaR10R22
	30	30	17.2	—	12	79.3	13.1	36.2	—	34.2	BWFS30-39MR23
BWF35	35	29.9	17.5	—	12	79	12	37.1	—	32	BWF35-27XaR4R18
	35	29.9	17.5	—	12	79	12	37.1	—	32.25	BWF35-27aR25R26
	35	29.9	17.5	—	12	88	16	42.1	—	38.95	BWF35-28AaR25R26
	35	29.9	17.5	—	12	85.55	17.3	38.35	—	35.35	BWF35-40aR4
	35	29.9	17.5	—	12	102.85	17.3	55.65	—	52.65	BWF35-48aR25
	35	29.9	17.5	—	12	103.55	17.3	56.35	—	53.2	BWF35-54AaR25R34
	35	29.9	17.5	—	12	86.25	17.3	39.05	—	35.9	BWF35-55AaR25R34
	35	29.9	17.5	—	12	99.75	15.6	54.25	—	51.1	BWF35-57Aa1R25R34
	35	29.9	17.5	—	12	92	15.5	46.6	—	44.25	BWF35-58aR25R18
	35	29.9	17.5	—	12	85.5	15.5	40.1	—	37.75	BWF35-60XaR4R18
	35	29.9	17.5	—	12	85.5	15.5	40.1	—	36.95	BWF35-61AaR25R34
	35	29.9	17.5	—	12	103.55	17.3	56.35	—	53.2	BWF35-66MaR38
	35	29.9	17.5	—	12	88	16	42.1	—	39	BWF35-68MR38
	35	29.9	17.5	—	12	79	12	37.1	—	34	BWF35-71MR38
	35	38.89	17.5	—	12	91	15	37.11	—	33.95	BWF35-32AaR25R26
	35	38.89	17.5	—	12	91	15	37.11	—	33.95	BWF35-32AaR25R34
	35	38.89	18	—	12	108.2	22	47.31	—	45	BWF35-42R
	35	38.89	17.5	15.918	12	103.4	16.4	48.11	14.9	45.75	BWF35-59aR4R18
	35	38.89	17.5	—	12	113.12	24.48	49.75	—	47	BWF35-63MaR38
	35	38.89	17.5	15.918	12	101	25	37.11	23.5	34.1	BWF35-70MR38
	35	38.89	17.5	—	12	91	15	37.11	—	34.1	BWF35-72MR38
	35	38.89	17.5	15.918	12	106	28.75	38.36	27.25	34.1	BWF35-74MR38
	35	38.89	17.5	—	12	100.4	15	40.1	—	40.1	BWF35-78MR38
	35	46	18	—	13	119	26.5	46.5	—	42	BWF35-3BR
	35	46	18	—	12	114	26.5	41.5	—	37	BWF35-13R
	35	46	18	—	13	112	26.5	39.5	—	35	BWF35-14R
	35	46	17.5	—	12	113.9	21	46.9	—	42.4	BWF35-64MR38
	35	46	17.5	15.918	12	100.5	18	36.5	16.25	33.5	BWF35-69MR38
	35	46	17.5	15.918	12	119	30	43	28.25	40	BWF35-73MR38
	35	46	17.5	15.918	12	114	27	41	25.25	38	BWF35-76MR38
BWF40	40	46	19	—	12	126.35	30.35	50	—	45	BWF40-6AR
	40	46	19	—	—	82.5	4	32.5	—	—	BWF40-16
	40	46	19	18	13	119	26.5	46.5	24	42	BWF40-17R
	40	46	19	—	12	111	24.3	40.7	—	38.7	BWF40-19R
	40	46	19	—	12	110.5	22.6	41.9	—	39.9	BWF40-25R
	40	46	19	—	12	93.5	25	47.5	—	45.5	BWF40-26R
	40	46	19	18	13	125.8	33.3	46.5	30.8	42	BWF40-28R
	40	46	19	12	12	118.5	25	47.5	—	45.5	BWF40-31R
	40	46	19	18	13	115.5	26.5	43	24	38.5	BWF40-34R
	40	46	19	—	12	118.5	31.8	40.7	—	38.7	BWF40-38R
	40	46	19	—	12	105.4	20.5	38.9	—	36.9	BWF40-43R
	40	46	19	—	12	111.45	28.9	36.55	—	34.55	BWF40-52aR
	40	46	19	18	13	112	28.5	37.5	26	35	BWF40-76R
	40	46	19	17	12	116.85	30.35	40.5	27.8	35.5	BWF40-77AR
	40	46	19	18	12	112	28.5	37.5	26	35	BWF40-80R

Bearing series numbers	Dimensions (mm)										Bearing numbers
	D	W	A	A ₁	B	L ₁	Y	Z	L ₄	L ₃	
	40	46	19	—	—	66.8	3	17.8	—	—	BWF40-81aR
	40	46	19	—	12	116.8	30.3	40.5	—	35.5	BWF40-87R
	40	46	19	—	12	126.35	30.35	50	—	45	BWF40-88R
	40	46	19	17	12	126.35	30.35	50	27.8	45	BWF40-89R
	40	46	19	17	12	126.35	30.35	50	27.8	45	BWF40-89S8R
	40	46	19	17	12	129.8	29.8	54	27.3	49	BWF40-90R
	40	46	19	—	12	112	28.5	37.5	—	35	BWF40-91R
	40	46	19	18	12	112	28.5	37.5	26	35	BWF40-92R
	40	46	19	—	12	129.8	29.8	54	—	49	BWF40-93R
	40	46	19	—	12	112.12	28.9	37.22	—	33.35	BWF40-94aRR1
	40	46	19	—	12	117.12	33.9	37.22	—	33.35	BWF40-95aRR1
	40	46	19	—	12	105.52	22.3	37.22	—	33.35	BWF40-96aRR1
	40	46	19	—	12	104.52	22.3	36.22	—	32.35	BWF40-97aRR1
	40	46	19	18	12	119	26.5	46.5	24	42	BWF40-98R

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