HIGH PRECISION

BALL BEARINGS

Extra Thin Type Bearings
Flanged Bearings
Stainless Bearings
Bore Dia , 0.6mm to 95mm

EZO
PRECISION BALL BEARINGS

SAPPORO PRECISION INC.

Introduction

Sapporo Precision group has been fostering "EZO" brand for long years since its establishment.
Fortunately, "EZO", which was derived from the ancient name of Hokkaido Island, "EZO-CHI",
has achieved a remarkable growth and is enjoying profound trust
from a number of domestic and foreign users in 35 different countries throughout the world.

This new catalogue includes the recent revisions of ISO standards for ball bearings as well as the new bearing series we have introduced during recent years.
It consists of two parts: TECHNICAL EXPLANATION and DIMENSION TABLES.
The basic dynamic load ratings listed in the Bearing Tables are in accordance with ISO 281.
The values reflect the effect of longer life due to improved manufacturing techniques and materials.
The basic static load ratings listed in the Bearing Tables are in accordance with ISO 76.

SAPPORO PRECISION GROUP has a policy of complying with export-related laws and regulations; e.g. Foreign Exchange and Foreign Trade Act, and we do not export restricted products and technology in violation of such laws and regulations. Customers are requested to obtain export permissions from authorities when exporting our products which are subject to restrictions.

NOTE 1. All information, data and dimension tables in this catalogue have been compiled carefully and have been thoroughly checked. However, no responsibility for possible errors or omissions can be assumed.

NOTE 2. We reserve the right to change specifications and other information included in this catalogue without notice.

Technical Contents

Bearing numbering system

CAGE

STEEL RIBBON TYPE(SPCC,SUS304)	J
STEEL CROWN TYPE(SUS420J2,SUS304)	W
RESIN CROWN TYPE(POLYAMIDE66)	TW
STEEL RIVET TYPE(SPCC,SUS304)	RJ
FULL COMPLEMENT (WITHOUT CAGE)	V
THRUST FM TYPE(SUS304)	TP
THRUST F TYPE(C3604)	TD

MATERIAL

HIGH CARBON CHROMIUM STEEL	
SUJ2	NO SYMBOL
EQUIVALENT MATERIAL TYPE SAE 52100、100Cr6	
STAINLESS STEEL	
KS440 (ACD34、QD51)(OUTER & INNER RING) SUS440C (BALL)	
EQUIVALENT MATERIAL TYPE X65Cr13 (OUTER & INNER RING) AISI440C、X102CrMo17 (BALL)	

STANDARD METRIC MR、MF、ET AND INCH SERIES	H S

SEAL AND SHIELD

TEFLON SEAL WITH SNAP RINGS (PTFE) ON BOTH SIDES	TTS
STEEL SHIELD WITH SNAP RINGS (SUS304) ON BOTH SIDES	ZZS
PRESSED STEEL SHIELD (SPCC,SECC-NC,SUS304) ON BOTH SIDES	ZZ
CONTACT RUBBER SEALS (NBR+SPCC) ON BOTH SIDES	2RS
CONTACT RUBBER SEALS FOR HIGH TEMPERATURE (FKM+SPCC) ON BOTH SIDES	2RS-V
NON-CONTACT RUBBER SEAL (NBR-SPCC) ON BOTH SIDES	2RU

RADIAL CLEARANCE

STANDARD	
C2、C0(CN)、C3、C4、C5	
MINIATURE	
MC1 0~5 μm	
MC2 3~8 μm	
MC3 5~10 μm	
MC4 8~13 μm	
MC5 13~20 μm	
MC6 20~28 μm	

SPECIAL CLESRANCE	
RC(min)-(max)	
e.g. RC3-18(= 3-18μm)	

TOLERANCE CLASS

·RADIAL & THRUST BALL BEARING	
ISO & JIS CLASS 0	NO SYMBOL
ISO & JIS CLASS 6	P6
ISO & JIS CLASS 5	P5
ISO & JIS CLASS 4	P4
ANSI/ABMA ABEC1	NO SYMBOL
ANSI/ABMA ABEC3	A3
ANSI/ABMA ABEC5	A5
ANSI/ABMA ABEC7	A7
·INSTRUMENT BALL BEARING	
ANSI/ABMA CLASS3P	A3P
ANSI/ABMA CLASS5P	A5P
ANSI/ABMA CLASS7P	A7P

Ex.1			686		J	ZZ	NR			MC3		SRL
Ex.2		F	608		TW	2RS				MC4	P6	SRL
Ex.3		MR	52		W	ZZ				MC2	P5	AF2
Ex.4	S	MF	128		W	TTS	BW4		CB	RC5-13	P6	SRL
Ex.5	S	ER	1458		W	ZZS				C0	A3	SRL
Ex.6			6205	H	RJ	2RS		S1		C3		AV2
Ex.7		F	6706	H	W	2RU				C0		SRL
Ex.8	S	R	144		J	ZZS				MC4	A5P	AF2
Ex.9		R	10		RJ	ZZ				C2		AV2
Ex.10		F	3-8M	H	TP							AF2

BEARING TYPE

INCH	R
INCH WITH FLANGE	FR
INCH WITH EXTENDED INNER RING	RW
INCH WITH EXTENDED INNER RING AND FLANGE	FRW
METRIC STANDARD	NO SYMBOL
METRIC WITH FLANGE	F
SPECIAL METRIC	MR
SPECIAL METRIC WITH FLANGE	MF
SPECIAL METRIC THIN TYPE	ET
SPECIAL INCH THIN TYPE	ER
THRUST WITH RACEWAY	FM
THRUST WITHOUT RACEWAY	F

BEARING BASIC PART NO.

SINGLE ROW DEEP GROOVE BALL BEARING METRIC SERIES 67,68,69,60,16,62,63

METRIC SERIES BORE DIAMETER NUMBER: NUMBERS 1-9 DENOTE BORE DIAMETERS IN MM

1X=1.5mm, 2X=2.5mm

00=10mm, 01=12mm, 02=15mm, 03=17mm

04-96:X5 values denote bore dimensions in mm

RING SHAPE

SNAP RING GROOVE IN OUTER RING	N
SNAP RING GROOVE WITH SNAP RING IN OUTER RING	NR
SPECIAL WIDTH	W*
EXTENDED OUTER RING	AW**
EXTENDED INNER RING	BW**
SPECIAL OUTSIDE DIAMETER	AD**
SPECIAL BORE DIAMETER	BD**

DIMENSIONAL STABILIZATION TREATMENT

MAX. OPERATING TEMPERATURE	CODE
120℃	NO SYMBOL
150℃	S0
200℃	S1
250℃	S2

CERAMIC BALL : CB

LUBRICATION

EX. GREASE	CODE
MULTEMP SRL (STANDARD)	SRL
ALVANIA NO.2 (SEMI STD)	AV2
ISOFLEX SUPER LDS18 (LOW TEMP)	SL8
BEACON 325J (LOW TEMP)	B32
CASSIDA RLS2 (FOOD)	RL2
MOLYKOTE 44M (HIGH TEMP)	M4M
KRYTOX 240AC (ULTRA HIGH TEMP)	K24

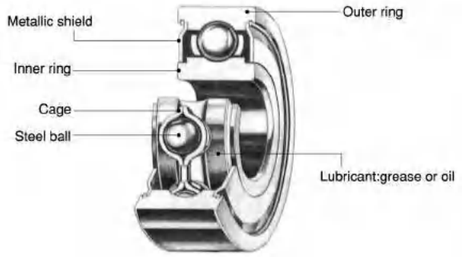
EX. OIL	CODE
AEROSHELL FLUID 12 (STANDARD)	AF2
WINSOR LUBE L-245X (SEMI STD) :	WL2
ISOFLEX PDP38	PD8

The following types of bearings would also be available upon request on certain conditions. Please contact us for the details.

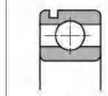
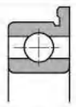
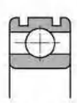
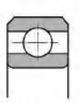
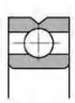
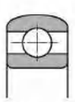
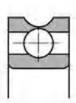
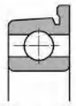
SINGLE-ROW DEEP GROOVE FULL COMPLEMENT BALL BEARING
DOUBLE-ROW DEEP GROOVE BALL BEARING
SINGLE-ROW ANGULAR CONTACT BALL BEARING
DOUBLE-ROW ANGULAR CONTACT BALL BEARING
FOUR POINT CONTACT BALL BEARING
DUPLEX DEEP GROOVE BALL BEARING
DUPLEX ANGULAR CONTACT BALL BEARING
OUTER SURFACE SPECIAL SHAPE BALL BEARING (SPHERICAL SURFACE, R SURFACE, V GROOVE, U GROOVE, etc.)

Design and characteristics of radial ball bearings

STRUCTURE OF BEARING



DESIGN OF BEARING

 standard	 extended inner ring	 (V) full complement of balls	 (N) with snap ring groove	 (NR) with snap ring groove and snap ring	 (F) with flanged outer ring
 examples of special designs	 examples of special designs	 examples of special designs	 examples of special designs	 examples of special designs	 examples of special designs

CHARACTERISTICS OF BEARINGS

LOAD	Single row radial ball bearings with balls separated by a cage can support radial loads, axial loads and tilting moments. A full complement V-type ball bearing can support only radial loads and some low axial loads.
SPEED	Maximum permissible speeds for ball bearings are mainly related to the bearing design and size, cage type, bearing internal clearance, method and type of lubrication, manufacturing accuracy, sealing methods and loads.
TORQUE AND NOISE LEVEL	Single row radial ball bearings are precision components and have low torque and noise levels.
INCLINATION OF INNER/OUTER RINGS	Shaft and housing seats with poor accuracy, fitting errors and shaft bending might cause inclination between the inner and outer rings although the internal clearance of the bearing will permit this to a certain extent.
TOUGHNESS	Bearings under load deform elastically at the contact point between the rolling element and bearing ring. This in influenced by the bearing type, size, form and load.
INSTALLATION AND REMOVAL	The single row radial ball bearing is a non-separable bearing. Therefore, shafts and housings should be so designed to enable bearing inspection and replacement when necessary.
AXIAL LOCATION	Improved axial location is obtation with NR and F type bearings.

Bearing material

Standard material for rings and balls is a vacuum degassed high carbon chromium steel allowing for high efficiency, low torque, low noise level and long bearing life. For bearings requiring anti-corrosion or heat-resistance properties, martensitic stainless steel is used.

CHEMICAL COMPOSITION OF BEARING MATERIALS

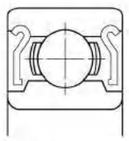
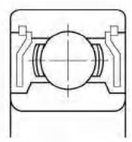
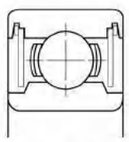
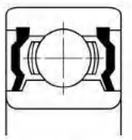
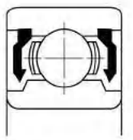
MATERIAL	SYMBOL	CHEMICAL COMPOSITION (Wt%)							EQUIVALENT	HARDNESS (HRC)
		C	Si	Mn	P	S	Cr	Mo		
HIGH CARBON CHROMIUM STEEL	SUJ2	0.95~1.10	0.15~0.35	≦0.50	≦0.025	≦0.025	1.30~1.60	≦0.08	SAE52100,100Cr6, ASTM52100, BS535A99,1.3505	60~64
STAINLESS STEEL	SUS440C (FOR BALL)	0.95~1.20	≦1.00	≦1.00	≦0.040	≦0.030	16.0~18.0	≦0.75	AISI440C, X102CrMo17, X105CrMo17, 1.4125, 1.3543	59~66
	KS440 (ACD34,QD51)	0.60~0.75	≦1.00	≦1.00	≦0.030	≦0.020	11.5~13.5	≦0.30	X65Cr13, 1.4037	58~62

Type and characteristics of cages, shields and seals

CAGES

 W : ONE-PIECE STEEL CROWN TYPE	 J : TWO-PIECES STEEL RIBBON TYPE	 RJ : TWO-PIECES STEEL RIVET TYPE	 TW : ONE-PIECE NYLON CROWN TYPE	 V : FULL COMPLEMENT OF BALLS
The stainless steel pressed cage is inner ring guided. It shows excellent performance in low torque, low speed applications.	Consists of two mating steel pressings, the cover side and the finger side. Usually guided by the rolling elements and designed to reduce frictional torque.	The RJ type cage is suitable for larger bearings with a high load carrying capacity. The two pieces are riveted together and are strong enough to withstand higher levels of vibration and acceleration. The cage is guided by the balls and reduces frictional torque.	Moulded nylon cage. Reduces the fluctuation in running torque. Suitable for high speeds. Guided by the rolling elements. NYLON CAGE operating temperature range:from -30 to +120℃	This type of bearing has no cage but maximum possible number of balls. Due to the fact that the inner and outer ring have a filling slot, the axial load carrying capacity of this bearing type is low. This type of bearing is suitable for high radial load, low speed applications.

SHIELD , SEAL

 ZZ : PRESSED STEEL SHIELD	 ZZS : STEEL SHIELD WITH SNAP RING	 TTS : TEFLON SEAL WITH SNAP RING	 2RS : CONTACT RUBBER SEAL	 2RU : NON-CONTACT RUBBER SEAL
Non-contact shield pressed into outer ring. Very little grease leakage and low ingress of contaminants.	Non-contact shield retained in outer ring. Low ingress of contaminants. Mainly used for smaller or narrower bearings.	Teflon seal reinforced with glass fibre is retained in outer ring by snap ring. Low ingress of contaminants. Mainly used for smaller or narrower bearings. Seal can flex to accommodate intenal pressure changes. TEFLON SEAL operating temperature range:from -100 to +260℃	Rubber seal fitted into outer ring. Light contact with inner ring, retains grease and prevents ingress of extenal contaminants. NBR SEAL operating temperature range:from -40 to +120℃ FKM(VITON)SEAL operating temperature range:from -30 to +230℃	Non-contact rubber seal fitted into outer ring, still provides effective sealing. NBR SEAL operating temperature range:from -40 to +120℃ FKM(VITON)SEAL operating temperature range:from -30 to +230℃

Tolerance, class, chamfer dimension of bearings

TOLERANCES OF INNER RING AND OUTER RING WIDTH

d (mm)		Δ_{dmp}				Δ_{ds}		V_{dsp}										V_{dmp}			
		P0		P6	P5	P4		P0						P5		P4		P0	P6	P5	P4
						Diameter series		Diameter series						Diameter series		Diameter series					
						0,1,2,3		7,8,9	0,1	2,3	7,8,9	0,1	2,3	7,8,9	0,1,2,3	7,8,9	0,1,2,3				
Over	Incl.	Upper	Lower	Lower	Lower	Lower	Upper	Lower	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.
0.6(1)	2.5	0	−8	−7	−5	−4	0	−4	10	8	6	9	7	5	5	4	4	3	6	5	3	2
2.5	10	0	−8	−7	−5	−4	0	−4	10	8	6	9	7	5	5	4	4	3	6	5	3	2
10	18	0	−8	−7	−5	−4	0	−4	10	8	6	9	7	5	5	4	4	3	6	5	3	2
18	30	0	−10	−8	−6	−5	0	−5	13	10	8	10	8	6	6	5	5	4	8	6	3	2.5
30	50	0	−12	−10	−8	−6	0	−6	15	12	9	13	10	8	8	6	6	5	9	8	4	3
50	80	0	−15	−12	−9	−7	0	−7	19	19	11	15	15	9	9	7	7	5	11	9	5	3.5
80	120	0	−20	−15	−10	−8	0	−8	25	25	15	19	19	11	10	8	8	6	15	11	5	4
120	180	0	−25	−18	−13	−10	0	−10	31	31	19	23	23	14	13	10	10	8	19	14	7	5

Remarks1: The upper value of the bore diameter in this table is not applicable when the distance from the bearing ring face is less than 1.2 times the chamfer dimension r smax
Remarks2: According to the revision of ANSI/ABMA Std.20-2011 ,the classes ABEC1 · ABEC3 · ABEC5 · ABEC7 are equivalent to CLASS0·CLASS6·CLASS5·CLASS4.

Unit μm

Δ_{BS} (Δ_{CS}) (2)						V_{BS} (V_{CS})				K_{ia}				S_d		S_{ia}		d (mm)	
Single bearing			Duplex bearing			Inner/outer ring(2)		Inner ring											
P0 P6		P5 P4	P0 P6		P5 P4	P0	P6	P5	P4	P0	P6	P5	P4	P5	P4	P5	P4		
Upper	Lower	Lower	Upper	Lower	Lower	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Over	Incl.
0	−40	−40	—	—	—	12	12	5	2.5	10	5	4	2.5	7	3	7	3	0.6(1)	2.5
0	−120	−40	0	−250	−250	15	15	5	2.5	10	6	4	2.5	7	3	7	3	2.5	10
0	−120	−80	0	−250	−250	20	20	5	2.5	10	7	4	2.5	7	3	7	3	10	18
0	−120	−120	0	−250	−250	20	20	5	2.5	13	8	4	3	8	4	8	4	18	30
0	−120	−120	0	−250	−250	20	20	5	3	15	10	5	4	8	4	8	4	30	50
0	−150	−150	0	−380	−250	25	25	6	4	20	10	5	4	8	5	8	5	50	80
0	−200	−200	0	−380	−380	25	25	7	4	25	13	6	5	9	5	9	5	80	120
0	−250	−250	0	−500	−380	30	30	8	5	30	18	8	6	10	6	10	7	120	180

Note (1) : 0.6mm is included in this classification.
Note (2) : The outer ring width deviation and width variation are the same as those for the inner ring of the same bearing size.
The outer ring width variation for CLASS5 and CLASS4 are shown in "TOLERANCES OF OUTER RING".

TOLERANCES OF OUTER RING

D (mm)		Δ_{Dmp}				Δ_{Ds}		V_{Dsp}(2)												V_{Dmp}(2)			
		P0		P6	P5	P4		P0								P5		P4					
								Open			Seal Shield	Open			Seal Shield	Open		Open					
						Diameter series		Diameter series				Diameter series				Diameter series		Diameter series					
						0,1,2,3		7,8,9	0,1	2,3	2,3	7,8,9	0,1	2,3	0,1,2,3	7,8,9	0,1,2,3	7,8,9	0,1,2,3				
Over	Incl.	Upper	Lower	Lower	Lower	Lower	Upper	Lower	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.
2.5(1)	6	0	−8	−7	−5	−4	0	−4	10	8	6	10	9	7	5	9	5	4	4	3	6	5	3	2
6	18	0	−8	−7	−5	−4	0	−4	10	8	6	10	9	7	5	9	5	4	4	3	6	5	3	2
18	30	0	−9	−8	−6	−5	0	−5	12	9	7	12	10	8	6	10	6	5	5	4	7	6	3	2.5
30	50	0	−11	−9	−7	−6	0	−6	14	11	8	16	11	9	7	13	7	5	6	5	8	7	4	3
50	80	0	−13	−11	−9	−7	0	−7	16	13	10	20	14	11	8	16	9	7	7	5	10	8	5	3.5
80	120	0	−15	−13	−10	−8	0	−8	19	19	11	26	16	16	10	20	10	8	8	6	11	10	5	4
120	150	0	−18	−15	−11	−9	0	−9	23	23	14	30	19	19	11	25	11	8	9	7	14	11	6	5
150	180	0	−25	−18	−13	−10	0	−10	31	31	19	38	23	23	14	30	13	10	10	8	19	14	7	5

Remarks1: The lower value of the outside diameter in this table is not applicable when the distance from the bearing ring face is less than 1.2 times the chamfer dimension r smax
Remarks2: According to the revision of ANSI/ABMA Std.20-2011,the classes ABEC1·ABEC3·ABEC5·ABEC7 are equivalent to CLASS0·CLASS6·CLASS5·CLASS4.

Unit μm

K_{ea}				S_D		S_{ea}		V_{Cs}(3)		D_1 (mm)		Δ_{DIs}				d (mm)		Δ_{CIs}			
P0	P6	P5	P4	P5	P4	P5	P4	P5	P4			Flanged type						Flanged type			
												P0 P6		P5 P4				P0 P6		P5 P4	
Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Over	Incl.	Upper	Lower	Upper	Lower	Over	Incl.	Upper	Lower	Upper	Lower
15	8	5	3	8	4	8	5	5	2.5	2.5(1)	6	125	−50	0	−25	0.6(1)	2.5	0	−50	0	−50
15	8	5	3	8	4	8	5	5	2.5	6	18	125	−50	0	−25	2.5	10	0	−50	0	−50
15	9	6	4	8	4	8	5	5	2.5	18	30	330	−52	0	−52	10	18	0	−120	0	−80
20	10	7	5	8	4	8	5	5	2.5	30	50	390	−62	0	−62	18	30	0	−120	0	−120
25	13	8	5	8	4	10	5	6	3	50	80	460	−74	0	−74	30	50	0	−120	0	−120
35	18	10	6	9	5	11	6	8	4	80	120	540	−87	0	−87	50	80	0	−150	0	−150
40	20	11	7	10	5	13	7	8	5	120	150	630	−100	0	−100	80	120	0	−200	0	−200
45	23	13	8	10	5	14	8	8	5	150	180	630	−100	0	−100	120	150	0	−250	0	−250

Note (1) : Size 2.5mm is included in this classification.
Note (2) : Applicable without locating snap ring.
Note (3) : The outer ring width variations for CLASS0 and CLASS6 are the same as those for the inner ring of the same bearing size.

TOLERANCES OF INNER RING AND OUTER RING WIDTH(ABMA)

Unit μm

d (mm)		Δ_{dmp}		Δ_{ds}		V_{dsp}	V_{dmp}	Δ_{BS}		V_{BS}		K_{ia}		S_{ia}		S_d	
		ABEC 5P ABEC 7P		ABEC 5P ABEC 7P		ABEC 5P ABEC 7P	ABEC 5P ABEC 7P	ABEC 5P ABEC 7P		ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P
								Single bearing									
Over	Incl.	Upper	Lower	Upper	Lower	Max.	Max.	Upper	Lower	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.
—	10	0	−5.1	0	−5.1	2.5	2.5	0	−25.4	5.1	2.5	3.8	2.5	7.6	2.5	7.6	2.5
10	18	0	−5.1	0	−5.1	2.5	2.5	0	−25.4	5.1	2.5	3.8	2.5	7.6	2.5	7.6	2.5
18	30	0	−5.1	0	−5.1	2.5	2.5	0	−25.4	5.1	2.5	3.8	3.8	7.6	3.8	7.6	3.8

Remarks1: ABEC5P and ABEC7P are the tolerance classes for hign precision bearings.

LIMIT TOLERANCE VALUES (METRIC) OF CHAMFER DIMENSIONS OF RADIAL BEARINGS

Unit:mm

r_{smin}	d(mm)		r_{smax}		r_{amax}
	Over	Incl.	Radial	Axial	
0.05	-	-	0.10	0.20	0.05
0.08	-	-	0.16	0.30	0.08
0.10	-	-	0.20	0.40	0.10
0.15	-	-	0.30	0.60	0.15
0.20	-	-	0.50	0.80	0.20
0.30	-	40	0.60	1.00	0.30
0.30	40	-	0.80	1.00	0.30
0.60	-	40	1.00	2.00	0.60
0.60	40	-	1.30	2.00	0.60
1.00	-	50	1.50	3.00	1.00
1.00	50	-	1.90	3.00	1.00
1.10	-	120	2.00	3.50	1.00
1.10	120	-	2.50	4.00	1.00
1.50	-	120	2.30	4.00	1.50
1.50	120	-	3.00	5.00	1.50

d : Nominal bore diameter
Δ_{dmp} : Single plane mean bore diameter deviation
Δ_{ds} : Deviation of a single bore diameter
V_{dsp} : Bore diameter variation in a single radial plane
V_{dmp} : Mean bore diameter variation
Δ_{BS} (Δ_{CS}) : Deviation of the single inner and outer ring width from the nominal dimension
V_{BS} (V_{CS}) : Variation of the inner and outer ring width
K_{ia} : Radial runout of assembled bearing inner ring
S_d : Face runout with bore
S_{ia} : Assembled bearing inner ring face runout with raceway

D : Nominal outside diameter
Δ_{Dmp} : Single plane mean outside diameter deviation
Δ_{Ds} : Deviation of a single outside diameter

V_{Dsp} : Outside diameter variation in a single radial plane
V_{Dmp} : Mean outside diameter variation
K_{ea} : Radial runout of assembled bearing outer ring
S_D : Variation of outside surface generatrix inclination with face
S_{ea} : Assembled bearing outer ring face runout with raceway
V_{Cs} : Variation of the outer ring width
Δ_{DIs} : Flange outside diameter deviation
Δ_{CIs} : Flange width deviation

r_{smin} : Smallest permissible single chamfer dimension(minimum limit)
D_1 : Flange outside diameter
r_{smax} : Largest permissible single chamfer dimension(maximum limit)
r_{amax} : Largest permissible single shaft and housing fillet radius

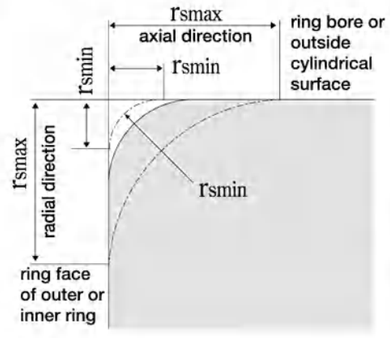
Note(1) : The value of r_{max} in axial direction of bearing with nominal width of under 2mm is the same as the one in radial direction

TOLERANCES OF OUTER RING (ABMA)

Unit μm

D (mm)		Δ_{Dmp}		Δ_{Ds}				V_{Dsp}, V_{Dmp}		Δ_{Cs}		V_{Cs}		S_D		K_{ea}		S_{ea}		Δ_{DIs}		Δ_{CIs}		V_{CIs}(1)		S_{eal}(2)
		ABEC 5P ABEC 7P		Open		Seal,Shield		ABEC 5P ABEC 7P		ABEC 5P ABEC 7P		ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	Flanged type		Flanged type		Flanged type		Flanged type
				ABEC 5P ABEC 7P		ABEC 5P ABEC 7P		Open	Seal Shield	Single bearing										ABEC 5P ABEC 7P		ABEC 5P ABEC 7P		ABEC 5P	ABEC 7P	ABEC 5P ABEC 7P
Over	Incl.	Upper	Lower	Upper	Lower	Upper	Lower	Max.	Max.	Upper	Lower	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Upper	Lower	Upper	Lower	Max.	Max.	Max.
—	18	0	−5.1	0	−5.1	1	−6.1	2.5	5.1	0	−25.4	5.1	2.5	7.6	3.8	5.1	3.8	7.6	5.1	0	−25.4	0	−50.8	5.1	2.5	7.6
18	30	0	−5.1	0	−5.1	1	−6.1	2.5	5.1	0	−25.4	5.1	2.5	7.6	3.8	5.1	3.8	7.6	5.1	0	−25.4	0	−50.8	5.1	2.5	7.6
30	50	0	−5.1	0	−5.1	1	−6.1	2.5	5.1	0	−25.4	5.1	2.5	7.6	3.8	5.1	5.1	7.6	5.1	0	−25.4	0	−50.8	5.1	2.5	7.6

Note (1) : Applies to flange width variation of flanged bearing.
Note (2) : Applies to flange back face.



r s min=smallest permissible single chamfer dimension (minimum limit)
r s max=largest permissible single chamfer dimension (maximum limit)
r a max=largest permissible single shaft and housing fillet radius

NOTE: The exact shape of the chamfer surface is not specified, but its contour in an axial plane shall not be allowed to project beyond the imaginary circular arc, of radius r smin , tangential to the ring face and the bore or outside cylindrical surface of the ring (see figure).

Life and load rating

BEARING LIFE

When bearings rotate, the inner and outer rings and rolling elements are constantly loaded. This produces material fatigue and eventually bearing failure. The total number of revolutions before a failure occurs is called the basic rating life.
Life of individual bearings varies considerably, even if they are of the same size, same material, same heat treatment and are under the same operating conditions.
Statistically, the total number of revolutions reached or exceeded by 90% of a sufficiently large group of apparently identical bearings before the first evidence of material fatigue occurs is called the basic rating life.

BASIC DYNAMIC LOAD RATING"Cr"

The basic dynamic load rating of a bearing with rotating inner ring and stationary outer ring is that load of constant magnitude and size which a sufficiently large group of apparently identical bearings can endure for a basic rating life of one million revolutions.
Radial bearings take central load. Values given for Cr in the dimension tables of this catalogue are for standard high chromium steel. 85% of the chromium steel values should be used for stainless steel.

LIFE FORMULA

The equation for the basic rating life for dynamically loaded ball bearings is as follows:

$L_{10}=(Cr/P)^3(\times 10^6 \text{Revolutions})$, $L_{10h}=16667/n\cdot(Cr/P)^3(\text{Hours})$

whereby:
L_{10}=BASIC RATING LIFE
Cr=BASIC DYNAMIC LOAD RATING(N)
n=R.P.M.(REVOLUTIONS PER MINUTE)
L_{10h}=BASIC RATING LIFE IN OPERATING HOURS
P=EQUIVALENT LOAD(N)

EXAMPLES OF RATING LIFE L_{10h} VALUES USED:

OPERATING CONDITIONS	BASIC RATING LIFE L_{10h}
Infrequent operation.	500
Short or intermittent operation. Failure has little effect on function.	4,000~8,000
Intermittent operation. Failure has significant effect on function.	8,000~12,000
8 hours of non-continuous operation.	12,000~20,000
8 hours of continuous operation.	20,000~30,000
24 hours continuous operation.	40,000~60,000
24 hours of guaranteed trouble-free operation.	100,000~200,000

ADJUSTED LIFE FORMULA

The above life formula is for general use only. In cases where a reliability of over 90% is required depending on the applications, it is not accurate enough. The fatigue life has been prolonged thanks to the improved steel quality and the better understanding in the relation between lubricants and bearings, so the following adjusted life calculation formula is now being used:

$Lna=a_1\times a_2\times a_3\times(Cr/P)^3\times 10^6$ (Revolutions)

whereby:
Lna=Adjusted rating life in millions with a reliability of (100-n)% (n=the reliability rate)
Cr=BASIC DYNAMIC LOAD RATING(N)
P=EQUIVALENT DYNAMIC LOAD(N)
a_1=Factor for a reliabillity other than 90%
a_2=Factor for non-conventional materials
a_3=Factor for non-conventional operating conditions, in particular lubrication

(1) RELIABILITY FACTOR a_1

When a reliability of over 90% is required, the corresponding factor should be selected from the following table.

●RELIABILITY FACTOR a_1

Reliability (%)	90	95	96	97	98	99	99.2	99.4	99.6	99.8	99.9	99.92	99.94	99.95
a1	1	0.64	0.55	0.47	0.37	0.25	0.22	0.19	0.16	0.12	0.093	0.087	0.080	0.077

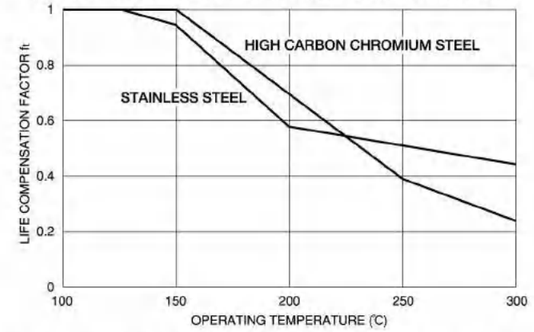
(2) MATERIAL FACTOR a_2

Improvement in manufacturing techniques for raw material and for heat treatment of components have led to an extended fatigue life for bearings.
Our standard bearing material is a superior quality of vacuum degassed steel leading to an extended life for bearings.

(3) OPERATING CONDITIONS FACTOR a_3

This is an adjustment factor to meet non-conventional operating conditions for lubrication, temperature and load.
Under good lubrication conditions with a permanent oil film between rolling elements and rings, the factor a_3=1.
In unfavourable conditions ($d_m\cdot n \leqq 10{,}000$), a factor $a_3 < 1$ must be selected.d_m = mean bearing diameter = (D+d)/2 , n = operating speed.
At temperatures above 120℃, greater dimensional changes occur and the material hardness deteriorates which affects the bearing life.
The operating factor f_t for temperature can be taken from the following figure:

●OPERATING TEMPERATURE AND LIFE COMPENSATION FACTOR f_t



Note:These factors are not applicable to the dimensionailly stabilized bearings.

At temperatures above 120℃, greater dimensional changes occur. With dimensional stabilization treatment, dimensional changes can be suppressed even under higher temperatures while the basic dynamic load ratings would be reduced due to the decline in hardness.

BASIC STATIC LOAD RATING "Cor"

The Basic Static Load Rating applies to bearings where rotating motion does not occur or occurs only infrequently. Excessive static load causes brinelling at the contact point between the rolling element and raceway.
As a standard of permissible static load, the basic load rating Cor for radial bearings is specified as follows: Maximum contact pressure at the contact point between rolling element and bearing ring to be 4200 MPa and total permanent deformation of the bearing of appr. 1/10000th of the rolling element's diameter.
Basic Static Load Rating for stainless steel is 80% of that for standard bearing steel.

EQUIVALENT DYNAMIC BEARING LOAD "P"

Load conditions on bearings are usually a combination of radial and axial loads. In order to establish the equivalent radial load with definite force and direction we use the following formula:

●RADIAL LOAD FACTOR AND AXIAL LOAD FACTOR

Fa/(ZD²)	e	Fa/Fr≦e		Fa/Fr>e	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

P=XFr+YFa(N)

Fr=RADIAL LOAD(N)
Fa=AXIAL LOAD(N)

X=RADIAL LOAD FACTOR
Y=AXIAL LOAD FACTOR
D=BALL DIAMETER(mm)

EQUIVALENT STATIC RADIAL LOAD "Po"

For ball bearings subject to both radial and axial loads, the static radial load with definite force and direction is called the Equivalent Static Radial Load.
The higher value from the two formula shown below should be used.

Po=0.6×Fr+0.5×Fa(N)、Po=Fr(N)

SAFETY MODULUS"fs"

Permissible equivalent static load depends on basic static load rating.
But using limit of bearing charge by using condition. Accordingly we use safety modulus which is experimental value.

fs=Cor/Po

fs=SAFETY MODULUS
Cor=BASIC STATIC LOAD RATING(N)
Po=EQUIVALENT STATIC RADIAL LOAD(N)

USING CONDITION	fs
NORMAL OPERATION	1.0
SHOCK LOAD	1.5
SILENT AND HIGH ACCURATE ROTATION	2.0

Fitting of bearings

THE IMPORTANCE OF CORRECT FITTING

A bearing can only perform to its full capacity when it is correctly fitted on the shaft and in the housing. Insufficient interference on fitting surfaces could cause bearing rings to creep in a circumferential direction. Once this happens, considerable wear occurs on the fitting surface and both shaft and housing are damaged. Furthermore, abrasive particles may enter the bearing causing vibration, excessive heat and damage to raceways. It is therefore necessary to provide bearing rings under rotating load with an adequate interference fit to prevent creep. When using thin-type bearings under low load, the bearings should be fastened by a nut. Statically loaded bearings generally do not need to be fitted with an interference fit. Only when subject to a high degree of vibration do both inner and outer rings require fitting with an interference fit.

●FITTING OF BEARING AND SHAFT

CONDITION (STEEL SHAFT)		SHAFT BORE DIAMETER	SHAFT TOLERANCE CLASS	
			THIN TYPE	OTHERS
INNER RING ROTATING LOAD OR INDETERMINATE LOAD DIRECTION	LIGHT LOAD<= 0.06Cr OR FLUCTUATING LOAD	10≦d≦18 18≦d≦30 30≦d≦100	h5 h5 h5	js5 js5 js5
	STANDARD LOAD=0.06～0.12Cr	10≦d≦18 18≦d≦30 30≦d≦100	js5 js5 js5	j5 k5 k5
OUTER RING ROTATING LOAD	NECESSARY FOR INNER RING TURNING EASILY AROUND SHAFT	ALL BORE DIAMETERS	g5	g6
	UNNECESSARY FOR INNER RING TURNING EASILY AROUND SHAFT	ALL BORE DIAMETERS	h5	h6

●FITTING OF BEARING AND HOUSING

CONDITION (ONE-PIECE HOUSING)		AXIAL DIRECTIONAL MOVEMENT OF OUTER RING	TOLERANCE CLASS OF SHAFT HOUSING SEATS	
			THIN TYPE	OTHERS
INNER RING ROTATING LOAD	VARYING LOADS	EASY TO MOVE	H6	H7
	LIGHT OR STANDARD LOAD	EASY TO MOVE	H7	H8
	HIGH TEMPERATURE OF INNER RING AND SHAFT	EASY TO MOVE	G6	G7
	LIGHT OR STANDARD LOAD PRECISE ROTATION	AS A RULE, IMPOSSIBLE TO MOVE	K5	K6
		POSSIBLE TO MOVE	JS6	J6
	QUIET OPERATION	EASY TO MOVE	H6	H6
INDETERMINATE LOAD DIRECTION	LIGHT OR STANDARD LOAD	IN GENERAL, POSSIBLE TO MOVE	JS6	J7
	STANDARD OR HEAVY LOAD	AS A RULE, IMPOSSIBLE TO MOVE	K5	K7
	LARGE SHOCK LOAD	IMPOSSIBLE TO MOVE	M5	M7
	LIGHT OR FLUCTUATING LOAD	IMPOSSIBLE TO MOVE	M5	M7
OUTER RING ROTATING LOAD	STANDARD OR HEAVY LOAD	IMPOSSIBLE TO MOVE	N5	N7
	THIN-TYPE HOUSING SEATS HEAVY LOAD OR LARGE SHOCK LOAD	IMPOSSIBLE TO MOVE	P6	P7

●CHARACTERISTICS OF LOAD AND FITTING

ROTATING RING	LOAD	LOAD CONDITION	FITTING
INNER RING	STATIC	INNER RING ROTATING LOAD	INTERFERENCE FIT FOR INNER RING
OUTER RING	ROTATING	OUTER RING STATIC LOAD	CLEARANCE FIT FOR OUTER RING
OUTER RING	STATIC	OUTER RING ROTATING LOAD	CLEARANCE FIT FOR INNER RING
INNER RING	ROTATING	INNER RING STATIC LOAD	INTERFERENCE FIT FOR OUTER RING
IN THE CASE OF FLUCTUATING LOAD DIRECTION OR UNBALANCED LOAD	ROTATING OR STATIC	INDETERMINATE LOAD DIRECTION	INTERFERENCE FIT FOR INNER AND OUTER RING

CALCULATIONS OF FITS

(1) FITTING PRESSURE AND DIMENSIONAL CHANGES OF INNER AND OUTER RING

The right fit for each application is established taking various conditions into consideration such as load, speed, temperature, mounting dismounting of the bearing. The interference fit should be greater than normal in thin housings, housings of soft material or on hollow shafts.

(2) LOAD OF INTERFERENCE

The interference fit of shaft and inner ring decreases under radial load. The decrease in fit of shaft and inner ring is calculated by the following formula:
The higher value from the two formula shown below should be used.

$$\Delta dF=0.08\times\sqrt{d/B\cdot Fr}\times10^{-3}\ (mm) \qquad Fr\leqq0.3\times Cor$$
$$\Delta dF=0.02\times Fr/B\times10^{-3}(mm) \qquad Fr>0.3\times Cor$$

(3) INFLUENCE OF TEMPERATURE ON BEARINGS, SHAFTS AND HOUSINGS

Each inner ring, outer ring or rolling element of a bearing rotating under load generates heat which will affect the interference fits of the shaft and the housing. Assuming a temperature difference within the bearing and the housing of $\Delta T(℃)$, that of the mating surface of the shaft and of the bearing is (0.10～0.15)ΔT.
Consequently, ΔdT, the decrease of the inner ring interference fit due to temperature change, is calculated from the following formula:

$$\Delta dT=(0.10\sim0.15)\times\Delta T\cdot a\cdot d\fallingdotseq0.0015\times\Delta T\cdot d\times10^{-3}(mm)$$

ΔdT : DECREASE OF INTERFERENCE DUE TO TEMPERATURE DIFFERENCE(mm)

ΔT : TEMPERATURE DIFFERENCE BETWEEN BEARING AND SURROUNDING HOUSING(℃)

a : COEFFICIENT OF THERMAL EXPANSION FOR BEARING STEEL$\fallingdotseq12.5\times10^{-6}$(l/℃)

COEFFICIENT OF THERMAL EXPANSION FOR STAINLESS STEEL$\fallingdotseq10.3\times10^{-6}$(l/℃)

d : NOMINAL BORE DIAMETER OF BEARING(mm)

It should also be noted that fit can increase due to temperature changes.

(4) EFFECTIVE INTERFERENCE, SURFACE ROUGHNESS AND ACCURACY

The surface roughness is smoothed during fitting and the effective interference becomes smaller than the theoretical interference. The surface roughness quality of a mating surface has an influence on how much this theoretical interference decreases. Effective interference can usually be calculated as follows:

Ground Shaft : $\Delta d=d/(d+2)\cdot\Delta da$(mm)
Turned Shaft : $\Delta d=d/(d+3)\cdot\Delta da$(mm)
Δd : EFFECTIVE INTERFERENCE(mm)
Δda : THEORETICAL INTERFERENCE(mm)
d : NOMINAL BORE DIAMETER OF BEARING(mm)

By combining these factors, the theoretical interference fit required for inner ring and shaft where the inner ring is subjected to rotating load is calculated as follows:

$$\Delta da\geqq(\Delta dF+\Delta dT)\ ((d+3)/d \text{ or } (d+2)/d)\ (mm)$$

Normally, shaft and housing seats have to meet the accuracy and roughness requirements as given below.

●ACCURACY AND ROUGHNESS OF SHAFT AND HOUSING SEATS

	SHAFT	HOUSING
ROUNDNESS	BELOW 50% OF SHAFT DIAMETER TOLERANCE	BELOW 50% OF HOUSING BORE DIAMETER TOLERANCE
CYLINDRICITY	BELOW 50% OF SHAFT DIAMETER TOLERANCE WITHIN BEARING WIDTH	BELOW 50% OF HOUSING BORE DIAMETER TOLERANCE WITHIN BEARING WIDTH
SQUARENESS	≦3/10000(0.017°)	
ROUGHNESS OF MATING SURFACE	Rmax 3.2	Rmax 6.3

Mounting bearings with extra tight or light interference fits can lead to early bearing failure. In order to ensure safe operating conditions the tolerance variations of shaft seats, housing bores and bearing bore and outside diameter need to be reduced.
We recommend the tolerance zones are divided into two bands and selective assembly is applied. Bearings sorted into two tolerance bands for inner and outer rings are available on request. These bearings are marked as follows:

●SELECTIVE CLASSIFICATION OF OUTER AND BORE DIAMETER TOLERANCES AND INDICATION MARK

TOLERANCE OF BORE DIAMETER / TOLERANCES OF OUTER DIAMETER	MARK	0～-D/2	-D/2～-D	0～-D
0～-d/2	1	C11	C12	C10
-d/2～-d	2	C21	C22	C20
0～-d	0	C01	C02	

ZC3 : C11, C12, C21, C22
ZC2 : C01, C02
ZC1 : C10, C20

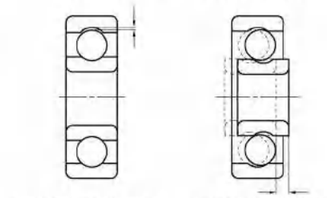
NOTE: 1.THIS IS APPLIED TO BOTH BEARINGS OF ABEC 5P AND P5.
2.UPON YOUR REQUEST, PLEASE SPECIFY THE MARK LISTED BELOW.
ZC1.... 2 SELECTIVE CLASSIFICATIONS FOR BORE DIAMETER TOLERANCE (0～-d/2、-d/2～-d)
1 SELECTIVE CLASSIFICATION FOR OUTER DIAMETER TOLERANCE (0～-D)
ZC2.... 1 SELECTIVE CLASSIFICATION FOR BORE DIAMETER TOLERANCE (0～-d)
2 SELECTIVE CLASSIFICATIONS FOR OUTER DIAMETER TOLERANCE (0～-D/2、-D/2～-D)
ZC3.... 4 SELECTIVE CLASSIFICATIONS FOR BOTH BORE AND OUTER DIAMETER TOLERANCE (0～-d/2～,-d/2～-d,0～-D/2～,-D/2～-D)
D.... MINIMUM VALUE OF OUTER DIAMETER TOLERANCE
d.... MINIMUM VALUE OF BORE DIAMETER TOLERANCE

Internal clearance

INTERNAL CLEARANCE AND STANDARD VALUES

Internal clearance is the play between outer ring, inner ring and rolling element. Generally, the amount of up and down movement of the outer ring with respect to the fixed inner ring is called the radial internal clearance and its right and left movement the axial internal clearance. Bearing internal clearance in operation is an important factor that has a significant influence on other factors such as noise, vibration, heat and fatigue life. Radial ball bearings are usually classified by their internal radial clearance. When measuring the internal clearance, the bearing is subjected to a standard load in order to ensure full contact between all bearing components. Under such a load, the measured value is larger than the actual value stated for radial clearance; this is due to elastic deformation. The difference is compensated by the factors given in the tables below.

BEARING INTERNAL CLEARANCE



●RADIAL INTERNAL CLEARANCE OF SMALL AND MINIATURE BEARINGS

Unit μm

CLEARANCE SYMBOL		MC1	MC2	MC3	MC4	MC5	MC6
CLEARANCE	min	0	3	5	8	13	20
	max	5	8	10	13	20	28

NOTE: 1.STANDARD CLEARANCE IS MC3.
2.FOR MEASURING CLEARANCE, OFFSET BY COMPENSATION FACTOR LISTED BELOW.

Unit μm

CLEARANCE SYMBOL	MC1	MC2	MC3	MC4	MC5	MC6
COMPENSATION FACTOR	1	1	1	1	2	2

MEASURING LOAD IS AS FOLLOWS.
MINIATURE BEARINGS 2.5N (0.25kgf)
SMALL BEARINGS 4.4N (0.45kgf)

●RADIAL INTERNAL CLEARANCE OF STANDARD RADIAL BALL BEARINGS

Unit μm

NOMINAL BORE DIAMETER d(mm)		CLEARANCE									
		C2		CN(C0)		C3		C4		C5	
OVER	INCL.	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
10(ONLY)		0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73
50	65	1	15	8	28	23	43	38	61	55	90
65	80	1	15	10	30	25	51	46	71	65	105
80	100	1	18	12	36	30	58	53	84	75	120

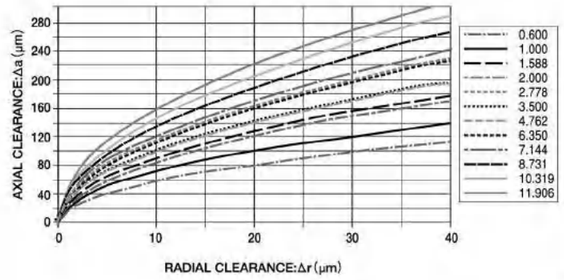
NOTE: 1.FOR MEASURING CLEARANCE, OFFSET BY COMPENSATION FACTOR LISTED BELOW.
2.STANDARD CLEARANCE IS CN (C0).

Unit μm

BORE DIAMETER OF NOMINAL BEARING d(mm)		MEASURING LOAD	COMPENSATION FACTOR				
OVER	INCL.	N (kgf)	C2	CN (C0)	C3	C4	C5
10(INCLUDED)	18	24.5 (2.5)	3~4	4	4	4	4
18	50	49 (5)	4~5	5	6	6	6
50	100	147 (15)	6~8	8	9	9	9

RELATIONSHIP BETWEEN RADIAL INTERNAL CLEARANCE AND AXIAL INTERNAL CLEARANCE

The axial internal clearance is established from the ball diameter, outer and inner ring raceway radius and the radial internal clearance. Usually it is about 10 times the value of the standard internal radial clearance. Selection of a small internal radial clearance or an extra large interference fit in order to reduce the internal axial clearance after mounting is not recommended.



$$\Delta a=2\sqrt{\Delta r(r_o+r-Da)}\ \ (mm)$$

Δa:AXIAL INTERNAL CLEARANCE(mm)
r_o:OUTER RING RACEWAY RADIUS(mm)
Da:BALL DIAMETER(mm)
Δr:RADIAL INTERNAL CLEARANCE(mm)
r:INNER RING RACEWAY RADIUS(mm)

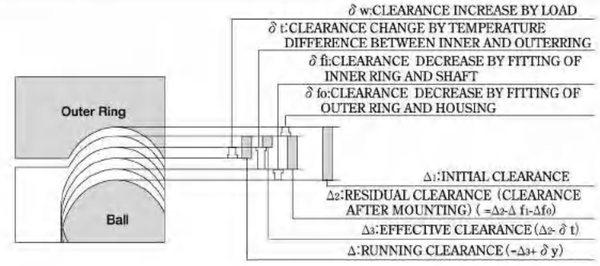
SELECTION OF BEARING CLEARANCE

Theoretically, maximum bearing life is with very slight preload. However, even a slight increase in this theoretical preload can have a considerably detrimental effect on the bearing life. Positive clearance should therefore be selected. MC3 is usually used for miniature or small bearings, standard clearance for general bearings and the clearance for thin section bearings should never be greater than "standard".

●SELECTION OF RADIAL INTERNAL CLEARANCE

Operating Condition	Clearance
Clearance fit for inner and outer ring. Low axial load. No axial load carrying requirement. Select bearing with reduced radial clearance. Lower vibration and noise. Low speeds.	MC1、MC2、C2
Lower frictional torque. Standard axial load. Average axial load carrying requirements. Slight interference fit for inner ring. Clearance fit for outer ring. Average/low speeds.	MC3、MC4、CN(C0)
Extremely low frictional torque. High axial load. High axial load carrying requirements. Heavy interference fit to support high loads or shock loads. Large temperature gradient from inner ring to outer ring. High degree of shaft deflection.	MC5、MC6、C3、C4、C5

CALCULATION OF CLEARANCE



(1) RUNNING CLEARANCE

Running clearance is the resultant clearance after load, temperature difference and fitting are taken into consideration.

$$\Delta=\Delta_1-(\delta t+\delta f)+\delta w(mm)$$

(2) CLEARANCE REDUCTION BY TEMPERATURE DIFFERENCE BETWEEN INNER AND OUTER RING

In a bearing, the highest temperature is generated in the rolling element followed by the inner ring, with the outer ring having the lowest temperature. Since it is impossible to measure the temperature of a rolling element, in practice, the temperature of the inner ring is used.

$$\delta t\fallingdotseq a\times\Delta T\times Do(mm)$$

(3) CLEARANCE REDUCTION BY FITTING

When a bearing is fitted onto a shaft or into a housing with an interference fit, the internal clearance of the bearing reduces.

$$\delta f = \delta fi + \delta fo =$$
$$\Delta db \times d/db \times ((1-(do/d)^2))/(1-(do/db)^2)) +$$
$$\Delta Da \times Da/D \times ((1-(D/Dh)^2)/(1-(Da/Dh)^2)) \quad (mm)$$

(4) CLEARANCE INCREASE BY LOAD

Load on a bearing deforms it elastically and increases the internal clearance.

$$\delta w = C \times ((5 \times Fr)/(Z \times \cos \alpha))^{(2/3)} \times (1/dw)^{(1/3)} \quad (mm)$$

The initial contact angle α_0 is calculated from the following two formulae:

$$\cos \alpha_0 / \cos \alpha = 1 + C/(2 \times m\text{-}1) \times (Fa/(9.8 \times Z \times Dw^2 \times \sin \alpha)^{(2/3)}$$
$$1 - \cos \alpha_0 = \Delta r/(2 \times DW \times (2 \times m\text{-}1))$$

SYMBOLS

- **ΔT :** TEMPERATURE DIFFERENCE BETWEEN INNER AND OUTER RING
- **D₀ :** OUTER RING RACEWAY DIAMETER
- **Δdb :** CLEARANCE OF INNER RING ON SHAFT
- **do :** BORE DIAMETER OF HOLLOW SHAFT
- **Dn :** OUTSIDE DIAMETER OF HOUSING SEAT
- **ΔDa :** CLEARANCE OF OUTER RING IN HOUSING
- **db :** AVERAGE OUTSIDE DIAMETER OF INNER RING
- **Da :** AVERAGE OUTSIDE DIAMETER OF OUTER RING
- **a :** COEFFICENT OF THERMAL EXPANSION FOR BEARING STEEL
- **m :** OSCULATION
- **Z :** NUMBER OF BALLS
- **Dw :** BALL DIAMETER
- **α :** CONTACT ANGLE
- **α₀ :** INITIAL CONTACT ANGLE
- **Fa :** AXIAL LOAD
- **Fr :** RADIAL LOAD
- **Δr :** RADIAL INTERNAL CLEARANCE
- **C :** MATERIAL ELASTICITY FACTOR

General Bearing	C=0.00218	m=0.525
Instrument Bearing	C=0.00287	m=0.560

Lubrication

OBJECT OF LUBRICATION

The lubrication method and the lubricant have a direct effect on the bearing life; the most suitable lubrication must therefore be selected for each application. Effects of lubrication are described as follows:

(1) DECREASE OF FRICTION AND ABRASION

It decreases rolling friction between the raceway and the rolling elements, sliding friction between rolling element and cage and sliding friction of guide surface between the cage and the bearing ring.

(2) REDUCTION OF HEAT GENERATION

It dissipates heat generated inside the bearing as well as heat conducted from the outside thus preventing overheating of the bearing and deterioration of the lubricant.

(3) PROTECTION FROM CORROSION AND CONTAMINANTS

It prevents corrosion of rolling elements, bearing rings and cages and also prevents the ingress of contaminants and moisture into the bearing.

REQUIRED CHARACTERISTICS OF THE LUBRICANT

(1) LOW FRICTION AND ABRASION
(2) HIGH STABILITY AGAINST HEAT, GOOD THERMAL CONDUCTIVITY
(3) STRONG OIL FILM
(4) NON-CORROSIVE
(5) PROVIDE A GOOD BARRIER AGAINST DUST AND MOISTURE
(6) MAINTAIN A STABLE VISCOSITY

STANDARD LUBRICANT

Lubricant	Brand	EZO CODE	Manufacturer	MIL STANDARD	Operating Temperature(℃)	specific gravity
STD.GREASE	Multemp SRL	SRL	Kyodo Yushi		-50～+150	0.93
STD. OIL	AeroShell Fluid 12	AF2	Shell Oil Co.	MIL-PRF-6085D	-54～+135	0.92

LUBRICATION METHOD

There are two types of lubricant: oil or grease. It is important to select the correct lubricant and lubrication method for each application and its conditions.

●LUBRICATING OIL AND GREASE

	LUBRICATING OIL	LUBRICATING GREASE
ROTATING SPEED	LOW・MEDIUM・HIGH SPEED	LOW・MEDIUM SPEED
LUBRICANT EFFICIENCY	EXCELLENT	GOOD
COOLING EFFECT	GOOD	NONE
TORQUE	COMPARATIVELY LOW	COMPARATIVELY HIGH
LUBRICANT LIFE	LONG	COMPARATIVELY SHORT
LUBRICANT REPLACEMENT	EASY	DIFFICULT
LUBRICANT LEAKAGE	SHOULD NOT BE USED WHERE OIL LEAKAGE IS UNACCEPTABLE	LITTLE GREASE LEAKAGE
IMPURITIES FILTRATION	EASY	DIFFICULT
SEALING EQUIPMENT	COMPLEX	SIMPLE

●GREASE FILLING VOLUME

SYMBOL	FILLING VOLUME(%)	OPERATING CONDITION	
		SPEED	LOAD
M	70±10	LOW	HEAVY
S	50±10	LOW	MEDIUM
G	40±10	MEDIUM	MEDIUM
L	30±10	MEDIUM	MEDIUM
Q	25±5	MEDIUM	MEDIUM
K	20±5	HIGH	LIGHT
X	10±5	HIGH	LIGHT

NOTE: LIGHT LOAD (≦0.06Cr)
MEDIUM LOAD (≦0.12Cr)

●CRITERIA FOR LUBRICATING OIL SELECTION

OPERATING TEMPERATURE OF BEARING (℃)	dn	ISO VISCOSITY GRADE OF LUBRICATING OIL(VG)	
		MEDIUM LOAD	HEAVY LOAD/SHOCK LOAD
-30~0	UP TO PERMISSIBLE ROTATING SPEED	15,22,32	32,46
0~+60	UP TO 15000	32,46,68	100
	15000~80000	32,46	68
	80000~150000	22,32	32
	150000~500000	10	22,32
+60~+100	UP TO 15000	150	220
	15000~80000	100	150
	80000~150000	68	100,150
	150000~500000	32	68
+100~+150	UP TO PERMISSIBLE ROTATING SPEED	320	

NOTE: 1.IF HEAVY LOADS OCCUR AT LOW SPEEDS, A HIGHER VISCOSITY LUBRICATING OIL SHOULD BE USED.
2.THIS TABLE IS FOR OIL BATH LUBRICATION SYSTEM AND RECIRCULATING OIL SYSTEMS.
3.dn = BEARING BORE DIAMETER d(mm) × ROTATING SPEED n(r.p.m)

●COMMON OIL BRANDS AND EFFICIENCY

Manufacturer	Brand	Code	Lubricant Base Oil	Flash Point (℃)	Viscosity (m^2/s)	Operating Temperature (℃)	Approved Standard
Shell Oil Co.	AeroShell Fluid 12 (standard oil)	AF2	Diester	220	11000 (-54℃),8.2 (54℃)	-54~+135	MIL-PRF-6085D
	AeroShell Fluid 3	AF3	Mineral	155	4000 (-40℃),10 (38℃)	-54~+121	MIL-PRF-7870D
Fuchs Lubritech	Winsor Lube L-245X	WL2	Diester	227	11.8 (40℃)	-55~+175	MIL-PRF-6085D
Chemours Company	Krytox 143AZ	KAZ	Fluorinated	-	40 (20℃),12.4 (40℃)	-54~+149	-
Kluber Lub.	Isoflex PDB38	PD8	Diester	210	12.0 (40℃),3.2 (100℃)	-65~+100	-

●COMMON GREASE BRANDS AND EFFICIENCY

Manufacturer	Brand	Code	Lubricant Base Oil	Thickening Agent	Drop Point (℃)	Cone Penetration: Worked (60 strokes)	Operating Temperature (℃)	Approved Standard (MIL. & NSF)
Kyodo Yushi	Multemp SRL (standard grease)	SRL	Diester, Polyol ester	Lithium	192	250	-50~+150	
	Multemp ET-100K	ETK	Phenyl ether	Diurea	260	280	-40~+200	
	Multemp PS No.1	PS1	Diester, Mineral	Lithium	185	320	-50~+130	
	Multemp PS No.2	PS2	Diester, Mineral	Lithium	190	275	-50~+130	
	Multemp SB-M	SBM	Synthetic hydrocarbon	Diurea	260	220	-40~+200	
	Raremax Super	RMS	Mineral, Synthetic hydrocarbon	Diurea	255	260	-40~+180	
Shell Oil Co.	Shell Alvania Grease S1	AV1	Mineral	Lithium	180	323	-35~+120	
	Shell Alvania Grease S2	AV2	Mineral	Lithium	181	283	-25~+120	
	Shell Alvania Grease S3	AV3	Mineral	Lithium	182	242	-20~+135	
	AeroShell Grease 7	AG7	Synthetic ester (Diester)	Microgel	260	296	-73~+149	MIL-PRF-23827C (Type I)
	AeroShell Grease 22	AG2	Synthetic hydrocarbon	Microgel	260	275	-65~+204	MIL-PRF-81322G
	Shell Gadus S2 V100Q 2	2VQ	Mineral	Lithium hydroxystearate	180	280	~+135	
	Shell Gadus S2 V100 3	2V3	Mineral	Lithium hydroxystearate	180	235	~+130	
	Shell Stamina Grease RL2	ST2	Mineral	Diurea	271	278	-20~+180	
Fuchs Lubritech	Cassida Grease RLS2	RL2	Synthetic	Aluminum complex	240	280	-35~+120	NSF-H1
Kluber Lub.	Asonic GHY72	GHY	Ester	Polyurea	250	280	-40~+180	
	Asonic GLY32	GLY	Ester,Synthetic hydrocarbon	Lithium	190	280	-50~+140	
	Asonic HQ72-102	HQ7	Ester	Polyurea	240	265	-40~+180	
	Isoflex Alltime SL2	AS2	Synthetic hydrocarbon, Ester	Lithium	180	280	-50~+150	
	Isoflex TOPAS NB52	B52	Synthetic hydrocarbon	Barium	240	280	-50~+120	
	Isoflex LDS18 Special A	L8A	Ester, Mineral	Lithium	190	280	-50~+120	MIL-G-23827B
	Isoflex Super LDS18-R	SL8	Ester, Mineral	Lithium	190	280	-50~+120	MIL-G-7118A
	Isoflex NBU15	NB5	Synthetic hydrocarbon, Mineral, Ester	Barium	220	280	-40~+130	MIL-G-25760A
	Staburags NBU12	NB2	Mineral	Barium	220	260	-30~+150	NSF-H2
	Staburags NBU12/300KP	NB3	Mineral	Barium	220	300	-35~+150	
	Barrierta IEL	IEL	PFPE	PTFE	-	280	-50~+180	
	Barrierta IMI	IMI	PFPE	PTFE	-	280	-45~+220	
	Barrierta L55/2 H1	L55	PFPE	PTFE	-	280	-40~+260	NSF-H1
	Barrierta JFE 552	E55	PFPE	PTFE	-	280	-35~+260	
	Klubersynth UH1 64-62	UH6	Synthetic hydrocarbon, Ester	Silicate	-	280	-40~+140	NSF-H1
Chemours Company	Krytox 240AC	K24	PFPE	PTFE	-	280	-34~+288	MIL-PRF-27617 (Type II),NSF-H1
	Krytox 240AB	K2B	PFPE	PTFE	-	280	-40~+232	MIL-PRF-27617 (Type II),NSF-H1
	Krytox 240AZ	K2Z	PFPE	PTFE	-	280	-57~+149	MIL-PRF-27617 (Type I)
	Krytox GPL224	PL4	PFPE	PTFE	-	280	-51~+179	
Dow Corning Toray Co.	Molykote 33L	M3L	Silicone	Lithium	210	320	-70~+180	
	Molykote 33M	M3M	Silicone	Lithium	210	280	-70~+180	
	Molykote 44M	M4M	Silicone	Lithium	204	260	-40~+200	
ExxonMobil	Mobilgrease 28	MG2	PAO	Clay	315	295	-54~+177	MIL-PRF-81322G
	Unirex N3	UN3	Synthetic hydrocarbon	Lithium complex	230	235	-30~+160	
	Beacon 325J	B32	Synthetic	Lithium	180	285	-50~+120	
	Polyree EM (Polyrex EM)	PEM	Mineral	Polyurea	260	285	-20~+180	
Nye Lubricants	Rheotemp 500	LT5	Ester	Sodium Complex	202	302	-54~+175	
	NYOGEL 756G	NL7	PAO	Silica	-	286	-40~+125	
	NYERHEOLUBE 374C	CGA	PAO	Lithium	260	193	-40~+150	
THK	AFE-CA Grease	AFE	Synthetic	Urea	260	280	-40~+180	
	AFF Grease	AFF	Synthetic	Lithium	220	315	-40~+120	
Nippon Grease Co.	NIGACE W	NAW	Mineral,Synthetic	Urea	250	258	-20~+150	
Daikin Industries	Demnum Grease L200	L20	PFPE	PTFE	-	280	-60~+300	
Anderol	ROYCO 27	RY7	Ester	Lithium	184	288	-73~+121	MIL-PRF-23827C (Type I)
Shin-Etsu Chemical	Shin-Etsu silicone G-40M	S4M	Silicone	Lithium	200	260	-30~+200	
Chevron	Chevron SRI Grease 2	SRI2	Mineral	Polyurea	243	280	-30~+177	NSF-H2

Note: Please let us know when you use a bearing filled with NSF H1 or H2 registered greases for food machineries.

Maximum permissible bearing speed

Each bearing type has its own limiting speed. The theoretical speed that bearings can run at safely, even if heat generation by internal friction occurs, is called the maximum permissible speed.
The permissible speed is related to bearing type, type of cage, lubricant type, load and cooling conditions to which the bearing is subjected.
For contact rubber seals(2RS type), the permissible speeds are limited by the peripheral velocity of the seal lip. Normally, this is approximately 50 - 60% of that of non-contact rubber seals. If light contact rubber seals are required, this must be stipulated with the order.
If high loads occur, the permissible speed values must be reduced and the following supplementary factors applied, except under standard operating conditions(Cr/P<12, Fa/Fr>0.2)

●COMPENSATION FOR MAXIMUM PERMISSIBLE SPEED DEPENDENT ON LOAD RATIO

Cr/P	5	6	7	8	9	10	11	12
COMPENSATION FACTOR	0.72	0.79	0.85	0.90	0.93	0.96	0.98	1.00

●COMPENSATION FOR MAXIMUM PERMISSIBLE SPEED UNDER COMBINED AXIAL AND RADIAL LOAD

Fa/Fr	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
COMPENSATION FACTOR	1.00	0.95	0.93	0.91	0.89	0.88	0.87	0.86

If the bearing operates at over 70% of the permissible speed value, a lubricant for high speed should be selected.
The values for the permissible speed are for applications with horizontal shafts and with appropriate lubrication. With vertical shafts, only 80% of the maximum speed value should be used. This is necessary due to the reduced cage guidance and reduced lubricant retention in this type of application.

Frictional torque and temperature

FRICTIONAL TORQUE

Frictional torque of rolling bearings varies under changing load and lubrication conditions. When grease is used as a lubricant, the grease resistance must be added to the bearing frictional torque.
When adequate lubrication under normal loading conditions(Cr/P>12,Fa/Fr<0.2), the frictional torque of a bearing can be expressed as follows:

$M = \mu \cdot F \cdot d/2 (N \cdot mm)$	M:FRICTIONAL TORQUE(N·mm) F:BEARING LOAD (N) d:SHAFT DIAMETER(mm) μ:=0.0015 COEFFICIENT OF FRICTION

TEMPERATURE INCREASE

Friction and grease resistance can increase the bearing temperature. In the initial stages of operation, the internal bearing temperature rises rapidly: as the heat dissipates to the shaft and housing and the cooling effect of the lubricant begins to take effect, the temperature stabilizes. Constant high temperatures lead to a reduction in bearing clearance, a deterioration of the running accuracy and of the lubricant and thereby a reduction in bearing life. It is important to consider the effect of temperature increases when selecting the bearing.

Basic rules for selecting and handling of bearings

NOTES ON SELECTING

- The efficiency of thin type bearings can be greatly affected by the precision of shaft and housing seats. The accuracy of the surrounding structure must be such that it will not adversely affect the operation of the bearing. If you have any questions, in particular regarding series 670 and 680, please contact us.
- In applications with steel crown type cages (w type), where high acceleration, heavy loads, shock loads or vertical shafts occur or where oil is the only lubricant available, please contact us.
- Selection of fitting clearance and grease type requires a careful consideration of rotating speed, load conditions and temperature in order to prevent premature bearing failure.
- Full complement ball bearings are suitable for low speed and heavy radial load conditions. There is a danger of balls being pushed out of the bearing through the filling slot, even under light axial load. For this reason, full complement ball bearings are not suitable for supporting axial loads.

NOTES ON HANDLING

- The actual assembly area should be kept free from dust as any contamination has a detrimental effect on the operation and life of rolling bearings. If there is any doubt concerning the cleanliness of a bearing, it can be washed with a suitable agent and then relubricated.
- When fitting bearings, the fitting forces must not be transmitted via the rolling elements. If it is necessary to heat the bearing to facilitate fitting, the temperature should not exceed +120℃.

- After assembly, the bearing should be rotated to check its correct operation. If the bearing does not appear to be functioning correctly, it should be re-examined to establish the cause of the malfunction.
- It is not advisable to mix oils and greases as this will affect the efficiency of the bearing.
- Bearings must be stored in a clean environment with stable temperature. They should be handled with care to avoid the possibility of corrosion and rusting.
- Lint-free cloth must be used to wipe shaft and housing seats to avoid the ingress of contaminants into the bearing.

Problem, Cause, Remedy

PROBLEM		CAUSE	REMEDY
Noise	High pitched metallic noise	Poor lubrication	Improve lubrication
		Clearance too small	Correct clearance
		Poor fitting	Investigate mounting method and seating
		Excessive load	Examine shaft and housing tolerances for closing effect
	Low pitched metallic noise	Brinelled raceway surface	Avoid shock loads
	Regular noise	Rust and damage	Check and replace seals and relubricate
		Flaking of raceway surface	Improve lubrication and check fitting, clearance and fixing method
	Irregular noise	Ingress of foreign matter	Check and replace seals and relubricate
		Excessive clearance	Correct clearance
		Damege and flaking of rolling element	Reduce loads and/or clearance
	Variable noise	Variable clearance due to temperature changes	Check fits taking housing material and temperature into consideration
		Damage to raceways	Improve lubrication and check fitting, clearance and fixing method
Heavy vibration		Flaking of raceway and rolling element	Improve lubrication and check fitting, clearance and fixing method
		Ingress of foreign matter	Check and replace seals and relubricate
		Excessive clearance	Correct clearance
		Poor location	Ensure abutment face and fitting diameter are perpendicular
Excessive heat generation		Clearance too small	Correct clearance
		Poor location	Ensure abutment face and fitting diameter are perpendicular
		Excessive load	Examine shaft and housing tolerances for closing effect
		Poor lubrication	Improve lubrication
		Creep	Maintain recommended shaft and housing fits
Lubrication failure		Too much grease	Use correct lubricant quantity
		Ingress of foreign matter	Check and replace seals and relubricate

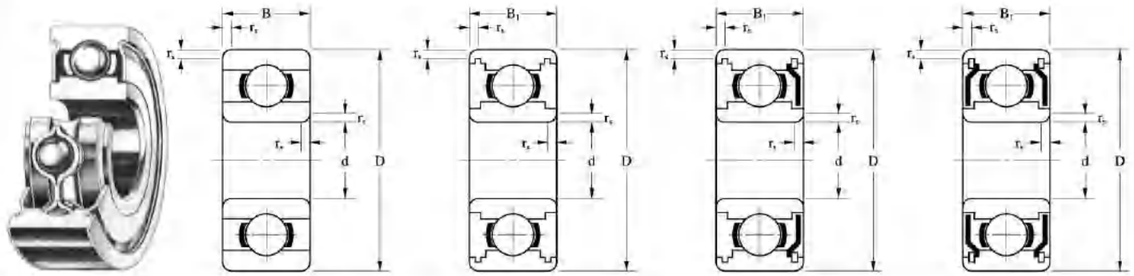
Damage, Cause, Remedy

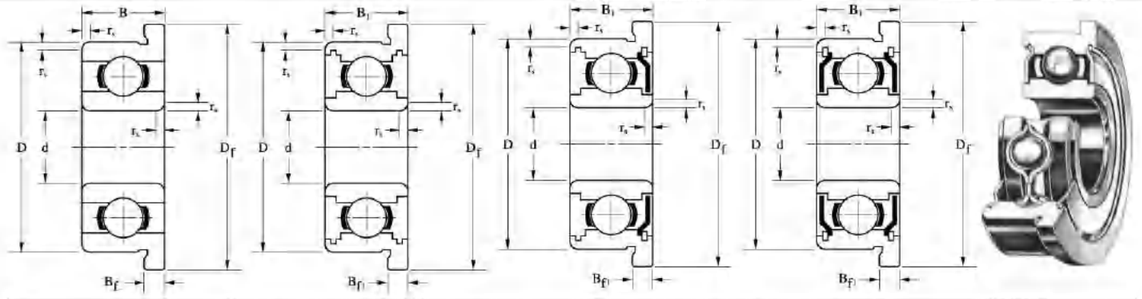
Incorrect handling of bearing can cause damage and shorten the life. The following list shows typical causes and suggested remedies.

PROBLEM	DAMAGE	CAUSE	REMEDY
Flaking	Flaking on one side of entire raceway	Excessive axial load by poor fitting or linear expansion	Use clearance fit on non-rotating bearing outer ring
	Flaking at rolling element pitch on raceways	Raceways brinelled during fitting	Careful fitting
		Corrosion during down time	Apply corrosion protective
	Premature flaking of raceway and rolling element surfaces	Excessive load	Check fitting Correct clearance Use correct lubricant quantity
		Clearance too small	
		Poor lubrication	
		Poor fitting	
		Corrosion	
	Flaking across the raceway	Poor fitting and eccentricity	Fitting and centering with care
		Shaft deflection	Use bearing with larger internal clearance
		Geometric inaccuracy of shaft and housing	Shaft and abutments to be square
	Flaking around raceway	Poor housing accuracy	Check geometric accuracy of housing bore
Indentations	Indentations on raceway at rolling element pitch	Shock loads during fitting or poor handling	Handling with care
		Excessive static load	Check static load
	Overrolling	Ingress of foreign matter	Ensure cleanliness of components and integrity of seals
Pick-up	Discolouration of raceway and rolling element surface Softening of surfaces	Excessive load	Check fitting
		Clearance too small	Correct clearance
		Poor lubrication	Use correct lubricant quantity
		Poor fitting	Check fitting method
Electrical erosion	Raceway eroded at regular intervals	Arcing due to bearing conducting electricity	Ground the bearing, Insulate the bearing
Fracture	Raceway surface fracture	Excessive shock loads	Correct loading
		High interference fit	Proper fitting
		Increase of flaking and softening;welding of inner ring to shaft	Ensure correct geometry of shaft and housing
		Corner fillet radii too large	Correct fillet radii
	Rolling element fracture	Excessive shock loads	Correct loading
		Excessive internal clearance	Check fitting and clearance
	Cage fracture	Tilting moments	Fit with care
		High speed impulse and high acceleration	Ensure uniform rotation
		Incorrect lubrication	Check lubricant and lubrication method
		Ingress of foreign matter in bearing	Improve sealing
Skidding	Scoring of raceway and rolling element surfaces	Hard grease	Use soft grease
		High start-up acceleration	Control acceleration
Abrasion	Extreme abrasion of raceway, rolling element and cage	Ingress of foreign matter	Improve sealing Improve lubrication
		Corrosion	
		Poor lubrication	
	Creep	Loose fit	Correct tolerances and fitting
		Incorrectly fixed	Correct fixing
	Fretting corrosion	Small movements between surfaces	Increase interference fit
	False brinelling	Vibration in non-rotating bearing	Insulate bearing from vibration Use oil as lubricant Apply preload
		Small oscillations in application	
Corrosion	Rust inside bearing	Poor storage	Careful storage and handling
		Condensation	
	Rust on fitting surface	Fretting	Increase interference fit
		Fluctuating load	Use oil as lubricant
	Corrosion	Ingress of acid, alkali or gas	Check sealing
		Chemical reaction with lubricant	Use correct lubricant

Dimension Contents

Metric series (0.6≦d≦4mm)



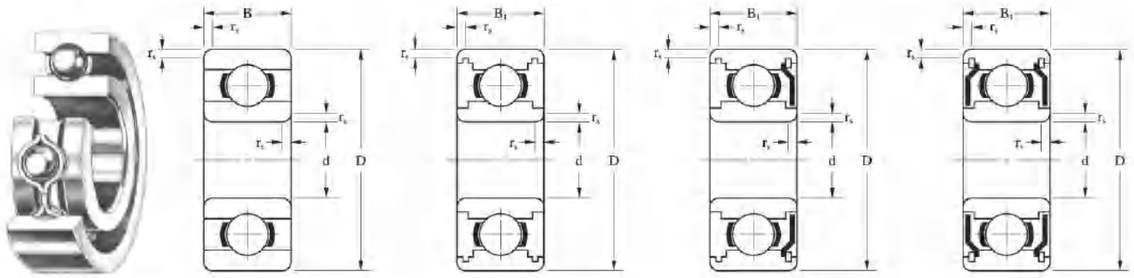


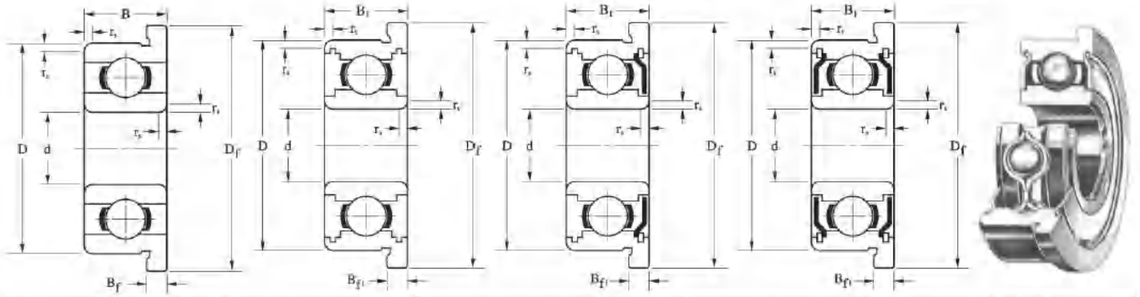
Bore Diameter: d		Outer Diameter: D		Flange Diameter: Df		Chamfer r's(min)		Open Bearings						Seal, Shield Bearings				
								Width: B		Flange Width: Bf		Bearing Reference						
												Open	Flange Open	2 Shields	Flange 2 Shields	2 Seals		
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch					2RS	2RU	TTS
0.6	0.0236	2.5	0.0984	–	–	0.05	0.0020	1.0	0.0394	–	–	68/0.6	–	–	–	–	–	–
1.0	0.0394	3.0	0.1181	3.8	0.1496	0.05	0.0020	1.0	0.0394	0.3	0.0118	681	F681	–	–	–	–	–
		3.0	0.1181	–	–	0.05	0.0020	1.5	0.0591	–	–	MR31	–	–	–	–	–	–
		4.0	0.1575	5.0	0.1969	0.10	0.0039	1.6	0.0630	0.5	0.0197	691	F691	–	–	–	–	–
1.2	0.0472	4.0	0.1575	4.8	0.1890	0.10	0.0039	1.8	0.0709	0.4	0.0157	MR41X	MF41X	MR41XZZ	–	–	–	–
1.5	0.0591	4.0	0.1575	5.0	0.1969	0.05	0.0020	1.2	0.0472	0.4	0.0157	681X	F681X	681XZZ	F681XZZ	–	–	–
		5.0	0.1969	6.5	0.2559	0.15	0.0059	2.0	0.0787	0.6	0.0236	691X	F691X	691XZZ	F691XZZ	–	–	–
		6.0	0.2362	7.5	0.2953	0.15	0.0059	2.5	0.0984	–	–	601X	–	601XZZ	F601XZZ	–	–	–
2.0	0.0787	4.0	0.1575	–	–	0.05	0.0020	1.2	0.0472	–	–	672	–	672ZZ	–	–	–	–
		5.0	0.1969	6.1	0.2402	0.08	0.0031	1.5	0.0591	0.5	0.0197	682	F682	682ZZ	F682ZZ	–	–	–
		5.0	0.1969	6.2	0.2441	0.10	0.0039	2.0	0.0787	0.6	0.0236	MR52	MF52	MR52ZZ	MF52ZZ	–	–	–
		6.0	0.2362	7.5	0.2953	0.15	0.0059	2.3	0.0906	0.6	0.0236	692	F692	692ZZ	F692ZZ	–	–	TTS
		6.0	0.2362	7.2	0.2835	0.15	0.0059	2.5	0.0984	0.6	0.0236	MR62	MF62	MR62ZZ	MF62ZZ	–	–	–
		7.0	0.2756	8.2	0.3228	0.15	0.0059	2.5	0.0984	–	–	MR72	–	MR72ZZS	MF72ZZS	–	–	TTS
		7.0	0.2756	8.5	0.3346	0.15	0.0059	2.8	0.1102	–	–	602	–	602ZZS	F602ZZS	–	–	TTS
2.5	0.0984	6.0	0.2362	7.1	0.2795	0.08	0.0031	1.8	0.0709	0.5	0.0197	682X	F682X	682XZZ	F682XZZ	–	–	–
		7.0	0.2756	8.5	0.3346	0.15	0.0059	2.5	0.0984	–	–	692X	–	692XZZS	F692XZZS	–	–	TTS
		8.0	0.3150	–	–	0.20	0.0079	2.5	0.0984	–	–	MR82X	–	–	–	–	–	–
		8.0	0.3150	9.5	0.3740	0.15	0.0059	2.8	0.1102	0.7	0.0276	602X	F602X	602XZZ	F602XZZ	–	–	–
3.0	0.1181	6.0	0.2362	7.2	0.2835	0.10	0.0039	2.0	0.0787	0.6	0.0236	MR63	MF63	MR63ZZ	MF63ZZ	–	–	–
		7.0	0.2756	8.1	0.3189	0.10	0.0039	2.0	0.0787	0.5	0.0197	683	F683	683ZZ	F683ZZ	2RS	2RU	–
		7.0	0.2756	8.1	0.3189	0.10	0.0039	3.0	0.1181	0.8	0.0315	–	F683 (3)	–	–	–	–	TTS
		8.0	0.3150	9.2	0.3622	0.15	0.0059	2.5	0.0984	0.6	0.0236	MR83	MF83	MR83ZZ	MF83ZZ	–	–	–
		8.0	0.3150	9.5	0.3740	0.15	0.0059	3.0	0.1181	0.7	0.0276	693	F693	693ZZ	F693ZZ	2RS	–	–
		9.0	0.3543	10.2	0.4016	0.20	0.0079	2.5	0.0984	0.6	0.0236	MR93	MF93	–	–	–	–	–
		9.0	0.3543	10.6	0.4173	0.15	0.0059	–	–	–	–	–	–	MR93ZZ	MF93ZZ	–	–	–
		9.0	0.3543	10.5	0.4134	0.15	0.0059	3.0	0.1181	0.7	0.0276	603	F603	603ZZ	F603ZZ	–	–	–
		10.0	0.3937	11.5	0.4528	0.15	0.0059	4.0	0.1575	1.0	0.0394	623 (1)	F623 (1)	623ZZ	F623ZZ	2RS	2RU	TTS
		13.0	0.5118	–	–	0.20	0.0079	5.0	0.1969	–	–	633 (1)	–	633ZZ	–	2RS	2RU	–
4.0	0.1575	7.0	0.2756	8.2	0.3228	0.10	0.0039	2.0	0.0787	0.6	0.0236	MR74	MF74	–	–	–	–	–
		7.0	0.2756	8.2	0.3228	0.10	0.0039	–	–	–	–	–	–	MR74ZZ	MF74ZZ	–	–	–
		8.0	0.3150	9.2	0.3622	0.15	0.0059	2.0	0.0787	0.6	0.0236	MR84	MF84	–	–	–	–	–
		8.0	0.3150	9.2	0.3622	0.10	0.0039	–	–	–	–	–	–	MR84ZZ	MF84ZZ	–	–	TTS
		9.0	0.3543	10.3	0.4055	0.10	0.0039	2.5	0.0984	0.6	0.0236	684	F684	684ZZ	F684ZZ	2RS	2RU	TTS
		10.0	0.3937	11.2	0.4409	0.20	0.0079	3.0	0.1181	0.6	0.0236	MR104	MF104	–	–	–	–	–
		10.0	0.3937	11.6	0.4567	0.20	0.0079	–	–	–	–	–	–	MR104ZZ	MF104ZZ	2RS	2RU	–
		11.0	0.4331	12.5	0.4921	0.15	0.0059	4.0	0.1575	1.0	0.0394	694 (1)	F694 (1)	694ZZ	F694ZZ	2RS	2RU	–
		12.0	0.4724	13.5	0.5315	0.20	0.0079	4.0	0.1575	1.0	0.0394	604 (1)	F604 (1)	604ZZ	F604ZZ	2RS	2RU	–
		13.0	0.5118	15.0	0.5906	0.20	0.0079	5.0	0.1969	1.0	0.0394	624 (1)	F624 (1)	624ZZ	F624ZZ	2RS	2RU	–
		16.0	0.6299	18.0	0.7087	0.30	0.0118	5.0	0.1969	1.0	0.0394	634 (1)	F634 (1)	634ZZ	F634ZZ	2RS	2RU	TTS

(1) Open type bearings have shield/seal grooves. (2) Single shield or single seal types are also available; suffix Z, RS, RU or TS.
(3) Prefix S or suffix H is added for stainless material types. Load ratings of stainless material types are calculated by Cr×0.85 and Cor×0.80 of SUJ2 material types.
(4) Applicable only for open, single Z, ZZ, single RU and 2RU types in inner ring rotating conditions. Max. speeds for the contact rubber seal(s) types will be around 50-60% of above values.

Width: B_1		Flange Width: B_{f1}		Load Rating		Max. Speed		Cage Type	Ball Complement			Weight (Reference)			
				Cr(N)	Cor(N)	Grease	Oil		Qty.:Z	Size:Dw		Open	Flange Open	2 Shields	Flange 2 Shields
mm	inch	mm	inch	(N)		x1000min⁻¹			pcs.	mm	inch	g			
–	–	–	–	59	14	128	152	W	5	0.500	0.0197	0.02	–	–	–
–	–	–	–	96	25	117	139	W	6	0.600	0.0236	0.03	0.04	–	–
–	–	–	–	96	25	117	139	W	6	0.600	0.0236	0.04	–	–	–
–	–	–	–	141	37	105	124	W	5	0.800	0.0315	0.09	0.12	–	–
2.5	0.0984	–	–	112	33	105	124	W	7	0.600	0.0236	0.11	0.12	0.14	–
2.0	0.0787	0.6	0.0236	112	33	105	124	W	7	0.600	0.0236	0.07	0.09	0.10	0.13
2.6	0.1024	0.8	0.0315	238	69	94	111	W	6	1.000	0.0394	0.18	0.24	0.23	0.30
3.0	0.1181	0.8	0.0315	330	99	86	101	W	6	1.200	0.0472	0.32	–	0.38	0.46
2.0	0.0787	–	–	124	40	98	116	W	8	0.600	0.0236	0.05	–	0.08	–
2.3	0.0906	0.6	0.0236	169	50	94	111	W	6	0.800	0.0315	0.13	0.16	0.18	0.22
2.5	0.0984	0.6	0.0236	169	50	94	111	W	6	0.800	0.0315	0.17	0.21	0.19	0.24
3.0	0.1181	0.8	0.0315	330	99	86	101	W,J	6	1.200	0.0472	0.28	0.35	0.34	0.43
2.5	0.0984	0.6	0.0236	330	99	86	101	W,J	6	1.200	0.0472	0.30	0.35	0.29	0.42
3.0	0.1181	0.6	0.0236	386	128	76	90	W	7	1.200	0.0472	0.46	–	0.51	0.58
3.5	0.1378	0.9	0.0354	386	128	76	90	W	7	1.200	0.0472	0.50	–	0.60	0.71
2.6	0.1024	0.8	0.0315	209	73	81	96	W	8	0.800	0.0315	0.22	0.26	0.31	0.37
3.5	0.1378	0.9	0.0354	386	128	76	90	W	7	1.200	0.0472	0.42	–	0.56	0.68
–	–	–	–	559	179	70	82	W	6	1.588	0.0625	0.52	–	–	–
4.0	0.1575	0.9	0.0354	551	175	72	85	W	6	1.588	0.0625	0.63	0.74	0.86	0.99
2.5	0.0984	0.6	0.0236	209	73	81	96	W	8	0.800	0.0315	0.21	0.27	0.26	0.31
3.0	0.1181	0.8	0.0315	311	112	74	88	W	8	1.000	0.0394	0.33	0.37	0.44	0.52
3.0	0.1181	0.8	0.0315	255	107	71	83	W	11	0.800	0.0315	–	0.55	–	0.57
3.0	0.1181	0.6	0.0236	395	140	67	79	J	7	1.200	0.0472	0.55	0.63	0.65	0.71
4.0	0.1575	0.9	0.0354	559	179	70	82	W,J,TW	6	1.588	0.0625	0.60	0.71	0.78	0.91
–	–	–	–	572	188	66	78	W	6	1.588	0.0625	0.71	0.79	–	–
4.0	0.1575	0.8	0.0315	572	188	66	78	W	6	1.588	0.0625	–	–	1.09	1.23
5.0	0.1969	1.0	0.0394	572	188	66	78	W	6	1.588	0.0625	0.85	0.97	1.35	1.52
4.0	0.1575	1.0	0.0394	633	218	66	78	J	7	1.588	0.0625	1.59	1.78	1.67	1.86
5.0	0.1969	–	–	1 300	485	51	60	J	7	2.381	0.0937	2.95	–	3.12	–
–	–	–	–	312	115	70	82	W	8	1.000	0.0394	0.22	0.28	–	–
2.5	0.0984	0.6	0.0236	255	107	71	83	W	11	0.800	0.0315	–	–	0.31	0.37
–	–	–	–	395	140	67	79	J,TW	7	1.200	0.0472	0.36	0.43	–	–
3.0	0.1181	0.6	0.0236	395	140	67	79	J,TW	7	1.200	0.0472	–	–	0.51	0.58
4.0	0.1575	1.0	0.0394	641	226	63	75	W,J,TW	7	1.588	0.0625	0.63	0.71	0.95	1.09
–	–	–	–	711	270	59	70	J	8	1.588	0.0625	1.00	1.09	–	–
4.0	0.1575	0.8	0.0315	711	270	59	70	J	8	1.588	0.0625	–	–	1.30	1.47
4.0	0.1575	1.0	0.0394	959	347	57	67	J	7	2.000	0.0787	1.49	1.69	1.61	1.81
4.0	0.1575	1.0	0.0394	959	347	57	67	J	7	2.000	0.0787	2.02	2.25	2.14	2.37
5.0	0.1969	1.0	0.0394	1 300	485	51	60	J	7	2.381	0.0937	2.71	3.05	2.89	3.22
5.0	0.1969	1.0	0.0394	1 340	517	46	54	J	7	2.381	0.0937	4.86	5.29	5.20	5.63

Metric series (5≦d≦9mm)



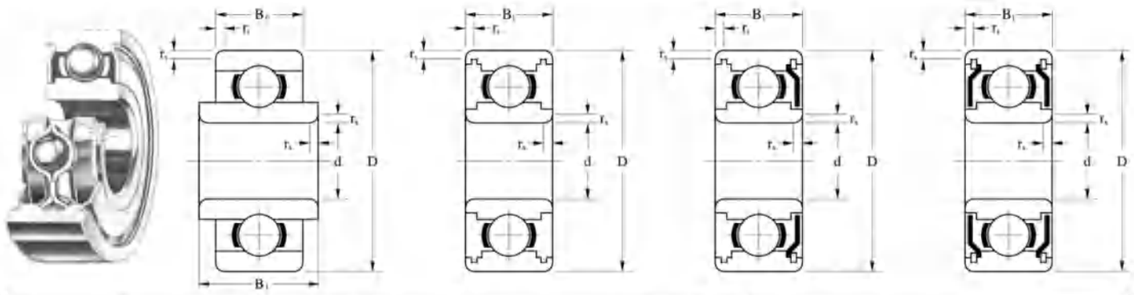


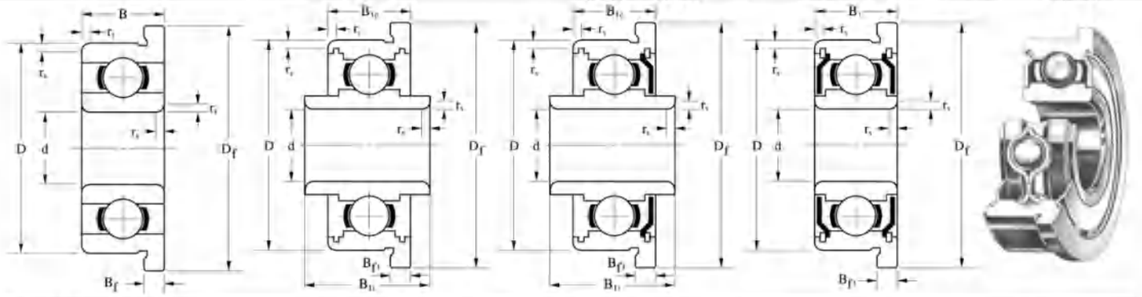
Bore Diameter: d		Outer Diameter: D		Flange Diameter: Df		Chamfer r's(min)		Open Bearings				Seal, Shield Bearings				
								Width: B		Flange Width: Bf		Bearing Reference				
												Open	Flange Open	2 Shields	Flange 2 Shields	2 Seals
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch					2RS / 2RU / TTS
5	0.1969	8	0.3150	9.2	0.3622	0.10	0.0039	2.0	0.0787	0.6	0.0236	MR85	MF85	–	–	– – –
		8	0.3150	9.2	0.3622	0.10	0.0039	–	–	–	–	–	–	MR85ZZ	MF85ZZ	– – TTS
		9	0.3543	10.2	0.4016	0.15	0.0059	2.5	0.0984	0.6	0.0236	MR95	MF95	MR95ZZ	MF95ZZ	– – TTS
		10	0.3937	11.2	0.4409	0.15	0.0059	3.0	0.1181	0.6	0.0236	MR105	MF105	–	–	– – –
		10	0.3937	11.6	0.4567	0.15	0.0059	–	–	–	–	–	–	MR105ZZ	MF105ZZ	2RS 2RU –
		11	0.4331	12.6	0.4961	0.15	0.0059	–	–	–	–	–	–	MR115ZZ	MF115ZZ	2RS 2RU –
		11	0.4331	12.5	0.4921	0.15	0.0059	3.0	0.1181	0.8	0.0315	685	F685	685ZZ	F685ZZ	2RS 2RU –
		13	0.5118	15.0	0.5906	0.20	0.0079	4.0	0.1575	1.0	0.0394	695(1)	F695(1)	695ZZ	F695ZZ	2RS 2RU –
		14	0.5512	16.0	0.6299	0.20	0.0079	5.0	0.1969	1.0	0.0394	605(1)	F605(1)	605ZZ	F605ZZ	2RS 2RU –
		16	0.6299	18.0	0.7087	0.30	0.0118	5.0	0.1969	1.0	0.0394	625(1)	F625(1)	625ZZ	F625ZZ	2RS 2RU –
		19	0.7480	22.0	0.8661	0.30	0.0118	6.0	0.2362	1.5	0.0591	635(1)	F635(1)	635ZZ	F635ZZ	2RS 2RU –
6	0.2362	10	0.3937	11.2	0.4409	0.15	0.0059	2.5	0.0984	0.6	0.0236	MR106	MF106	–	–	– – –
		10	0.3937	11.2	0.4409	0.10	0.0039	–	–	–	–	–	–	MR106ZZ	MF106ZZ	– – –
		10	0.3937	–	–	0.10	0.0039	3.0	0.1181	–	–	676(TTS)	–	–	–	– – TTS
		12	0.4724	13.2	0.5197	0.20	0.0079	3.0	0.1181	0.6	0.0236	MR126	MF126	–	–	– – –
		12	0.4724	13.6	0.5354	0.20	0.0079	–	–	–	–	–	–	MR126ZZ	MF126ZZ	2RS 2RU –
		13	0.5118	15.0	0.5906	0.15	0.0059	3.5	0.1378	1.0	0.0394	686	F686	686ZZ	F686ZZ	2RS 2RU TTS
		15	0.5906	17.0	0.6693	0.20	0.0079	5.0	0.1969	1.2	0.0472	696(1)	F696(1)	696ZZ	F696ZZ	2RS 2RU TTS
		16	0.6299	–	–	0.20	0.0079	5.0	0.1969	–	–	696A(1)	–	696AZZ	–	2RS 2RU –
		17	0.6693	19.0	0.7480	0.30	0.0118	6.0	0.2362	1.2	0.0472	606(1)	F606(1)	606ZZ	F606ZZ	2RS 2RU –
		19	0.7480	22.0	0.8661	0.30	0.0118	6.0	0.2362	1.5	0.0591	626(1)	F626(1)	626ZZ	F626ZZ	2RS 2RU –
		19	0.7480	–	–	0.30	0.0118	6.0	0.2362	–	–	626(TTS)	–	–	–	– – TTS
		22	0.8661	–	–	0.30	0.0118	7.0	0.2756	–	–	636(1)	–	636ZZ	–	2RS 2RU –
7	0.2756	11	0.4331	12.2	0.4803	0.15	0.0059	2.5	0.0984	0.6	0.0236	MR117	MF117	MR117ZZS	MF117ZZS	– – TTS
		13	0.5118	14.2	0.5591	0.20	0.0079	3.0	0.1181	0.6	0.0236	MR137	MF137	–	–	– – –
		13	0.5118	14.6	0.5748	0.15	0.0059	–	–	–	–	–	–	MR137ZZ	MF137ZZ	– – TTS
		14	0.5512	16.0	0.6299	0.15	0.0059	3.5	0.1378	1.0	0.0394	687	F687	687ZZ	F687ZZ	2RS 2RU TTS
		17	0.6693	19.0	0.7480	0.30	0.0118	5.0	0.1969	1.2	0.0472	697(1)	F697(1)	697ZZ	F697ZZ	2RS 2RU –
		19	0.7480	22.0	0.8661	0.30	0.0118	6.0	0.2362	1.5	0.0591	607(1)	F607(1)	607ZZ	F607ZZ	2RS 2RU –
		19	0.7480	–	–	0.30	0.0118	6.0	0.2362	–	–	607(TTS)	–	–	–	– – TTS
		22	0.8661	25.0	0.9843	0.30	0.0118	7.0	0.2756	1.5	0.0591	627(1)	F627(1)	627ZZ	F627ZZ	2RS 2RU TTS
		26	1.0236	–	–	0.30	0.0118	9.0	0.3543	–	–	637(1)	–	637ZZ	–	2RS 2RU –
8	0.3150	12	0.4724	13.2	0.5197	0.15	0.0059	2.5	0.0984	0.6	0.0236	MR128	MF128	–	–	– – –
		12	0.4724	13.6	0.5354	0.10	0.0039	–	–	–	–	–	–	MR128ZZ	MF128ZZ	2RS 2RU TTS
		14	0.5512	15.6	0.6142	0.20	0.0079	3.5	0.1378	0.8	0.0315	MR148	MF148	–	–	– – –
		14	0.5512	15.6	0.6142	0.15	0.0059	–	–	–	–	–	–	MR148ZZ	MF148ZZ	2RS 2RU –
		16	0.6299	18.0	0.7087	0.20	0.0079	4.0	0.1575	1.0	0.0394	688	F688	688ZZ	F688ZZ	2RS 2RU TTS
		19	0.7480	22.0	0.8661	0.30	0.0118	6.0	0.2362	1.5	0.0591	698(1)	F698(1)	698ZZ	F698ZZ	2RS 2RU –
		22	0.8661	25.0	0.9843	0.30	0.0118	7.0	0.2756	1.5	0.0591	608(1)	F608(1)	608ZZ	F608ZZ	2RS 2RU TTS
		24	0.9449	–	–	0.30	0.0118	8.0	0.3150	–	–	628(1)	–	628ZZ	–	2RS 2RU –
		28	1.1024	–	–	0.30	0.0118	9.0	0.3543	–	–	638(1)	–	638ZZ	–	2RS 2RU –
9	0.3543	14	0.5512	–	–	0.10	0.0039	3.0	0.1181	–	–	679	–	679ZZS	–	– – TTS
		17	0.6693	19.0	0.7480	0.20	0.0079	4.0	0.1575	1.0	0.0394	689	F689	689ZZ	F689ZZ	2RS 2RU –
		20	0.7874	23.0	0.9055	0.30	0.0118	6.0	0.2362	1.5	0.0591	699(1)	F699(1)	699ZZ	F699ZZ	2RS 2RU –
		24	0.9449	27.0	1.0630	0.30	0.0118	7.0	0.2756	1.5	0.0591	609(1)	F609(1)	609ZZ	F609ZZ	2RS 2RU –
		26	1.0236	–	–	0.60(4)	0.0236(4)	8.0	0.3150	–	–	629(1)	–	629ZZ	–	2RS 2RU –
		30	1.1811	–	–	0.60	0.0236	10.0	0.3937	–	–	639(1)	–	639ZZ	–	2RS 2RU –

Width: B1		Flange Width:Bf1		Load Rating		Max. Speed		Cage Type	Ball Complement			Weight (Reference)			
				Cr(N)	Cor(N)	Grease	Oil		Qty.:Z	Size:Dw		Open	Flange Open	2 Shields	Flange 2 Shields
mm	inch	mm	inch	(N)		x1000min⁻¹			pcs.	mm	inch	g			
–	–	–	–	309	121	62	74	W	8	1.000	0.0394	0.26	0.33	–	–
2.5	0.0984	0.6	0.0236	218	91	63	75	W	9	0.800	0.0315	–	–	0.36	0.42
3.0	0.1181	0.6	0.0236	432	168	60	71	W	8	1.200	0.0472	0.50	0.58	0.58	0.65
–	–	–	–	432	168	60	71	W	8	1.200	0.0472	0.94	1.03	–	–
4.0	0.1575	0.8	0.0315	432	168	60	71	W	8	1.200	0.0472	–	–	1.23	1.38
4.0	0.1575	0.8	0.0315	716	283	54	64	J	8	1.588	0.0625	–	–	1.54	1.71
5.0	0.1969	1.0	0.0394	716	283	54	64	J,TW	8	1.588	0.0625	1.18	1.34	1.83	2.03
4.0	0.1575	1.0	0.0394	1 080	430	50	59	J	8	2.000	0.0787	2.13	2.47	2.28	2.62
5.0	0.1969	1.0	0.0394	1 330	507	48	56	J,TW	7	2.381	0.0937	3.09	3.52	3.36	3.79
5.0	0.1969	1.0	0.0394	1 730	670	44	52	J,TW	7	2.778	0.1094	4.30	4.71	4.53	4.94
6.0	0.2362	1.5	0.0591	2 340	889	38	45	J	6	3.500	0.1378	7.57	8.68	8.11	9.21
–	–	–	–	497	219	54	64	W	10	1.200	0.0472	0.58	0.66	–	–
3.0	0.1181	0.6	0.0236	497	218	55	64	W	10	1.200	0.0472	–	–	0.71	0.78
3.0	0.1181	–	–	373	172	55	65	W	11	1.000	0.0394	0.73	–	0.78	–
–	–	–	–	716	293	50	59	W,J	8	1.588	0.0625	1.24	1.35	–	–
4.0	0.1575	0.8	0.0315	716	293	50	59	W,J	8	1.588	0.0625	–	–	1.57	1.77
5.0	0.1969	1.1	0.0433	1 080	438	48	56	J,TW	8	2.000	0.0787	1.85	2.17	2.50	2.86
5.0	0.1969	1.2	0.0472	1 340	517	46	54	J	7	2.381	0.0937	3.52	3.98	3.82	4.28
5.0	0.1969	–	–	1 340	517	46	54	J	7	2.381	0.0937	4.46	–	4.76	–
6.0	0.2362	1.2	0.0472	2 260	836	42	49	J	6	3.500	0.1378	5.43	5.97	5.94	6.47
6.0	0.2362	1.5	0.0591	2 340	889	38	45	J,TW	6	3.500	0.1378	7.18	8.31	7.70	8.84
6.0	0.2362	–	–	2 240	912	37	44	J	7	3.175	0.1250	7.50	–	7.72	–
7.0	0.2756	–	–	3 300	1 370	33	39	J	7	3.969	0.1563	12.2	–	12.8	–
3.0	0.1181	0.6	0.0236	456	201	50	59	W	9	1.200	0.0472	0.61	0.70	0.75	0.84
–	–	–	–	541	276	45	53	W	12	1.200	0.0472	1.55	1.67	–	–
4.0	0.1575	0.8	0.0315	541	276	45	53	W	12	1.200	0.0472	–	–	2.00	2.25
5.0	0.1969	1.1	0.0433	1 180	511	44	52	J	9	2.000	0.0787	2.04	2.39	2.77	3.15
5.0	0.1969	1.2	0.0472	1 610	716	40	47	J,TW	9	2.381	0.0937	4.81	5.35	5.03	5.57
6.0	0.2362	1.5	0.0591	2 340	889	38	45	J,TW	6	3.500	0.1378	6.76	7.90	7.26	8.40
6.0	0.2362	–	–	2 240	912	37	44	J	7	3.175	0.1250	6.91	–	7.13	–
7.0	0.2756	1.5	0.0591	3 300	1 370	33	39	J,TW	7	3.969	0.1563	11.6	13.0	12.2	13.6
9.0	0.3543	–	–	4 580	1 970	28	33	J	7	4.762	0.1875	22.1	–	23.2	–
–	–	–	–	544	275	46	54	W	12	1.200	0.0472	0.71	0.80	–	–
3.5	0.1378	0.8	0.0315	544	275	46	54	W	12	1.200	0.0472	–	–	1.01	1.20
–	–	–	–	818	386	42	50	J	10	1.588	0.0625	1.80	2.01	–	–
4.0	0.1575	0.8	0.0315	818	386	42	50	J,TW	10	1.588	0.0625	–	–	2.00	2.22
5.0	0.1969	1.1	0.0433	1 260	590	40	47	J	10	2.000	0.0787	3.16	3.57	3.79	4.25
6.0	0.2362	1.5	0.0591	2 240	912	37	44	J	7	3.175	0.1250	6.21	7.34	6.72	7.85
7.0	0.2756	1.5	0.0591	3 300	1 370	33	39	J,TW	7	3.969	0.1563	11.0	12.3	11.6	12.9
8.0	0.3150	–	–	3 330	1 410	31	37	J	7	3.969	0.1563	16.5	–	17.2	–
9.0	0.3543	–	–	4 580	1 970	28	33	J	7	4.762	0.1875	27.2	–	28.4	–
4.5	0.1772	–	–	919	467	41	48	W	12	1.588	0.0625	1.29	–	1.84	–
5.0	0.1969	1.1	0.0433	1 330	664	37	44	J	11	2.000	0.0787	3.43	3.86	4.12	4.58
6.0	0.2362	1.5	0.0591	2 470	1 070	35	42	J	8	3.175	0.1250	7.09	8.27	7.59	8.77
7.0	0.2756	1.5	0.0591	3 350	1 430	30	36	J	7	3.969	0.1563	13.3	14.7	14.0	15.5
8.0	0.3150	–	–	4 580	1 970	28	33	J	7	4.762	0.1875	17.8	–	18.9	–
10.0	0.3937	–	–	5 110	2 390	25	30	RJ	8	4.762	0.1875	33.3	–	34.8	–

(1) Open type bearings have shield/seal grooves. (2) Single shield or single seal types are also available; suffix Z, RS, RU or TS.
(3) Prefix S or suffix H is added for stainless material types. Load ratings of stainless material types are calculated by Cr×0.85 and Cor×0.80 of SUJ2 material types.
(4) Chamfer dimension (4) is not based on JIS B 1521.
(5) Applicable only for open, single Z, ZZ, single RU and 2RU types in inner ring rotating conditions. Max. speeds for the contact rubber seal(s) types will be around 50-60% of above values.

Inch series



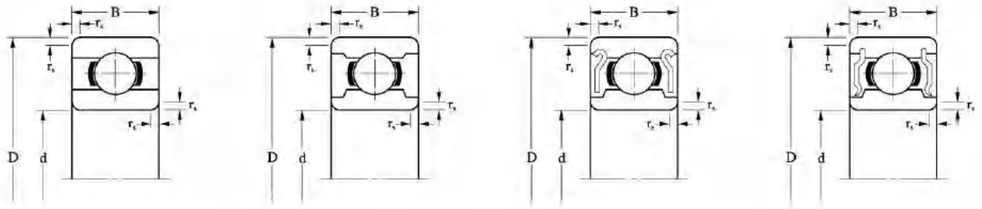


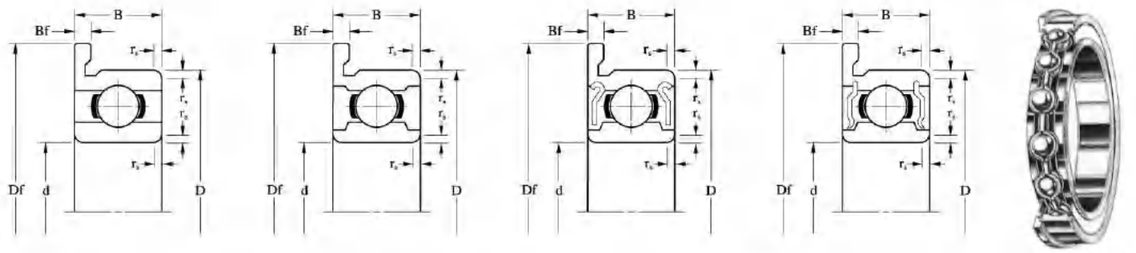
Bore Diameter: d		Outer Diameter: D		Flange Diameter: Df		Chamfer r's(min)		Open Bearings									
								IR Width: Bi		OR Width: Be		Flange Width:Bf		Bearing Reference			
														Open	Flange Open	2 Shields	Flange 2 Shields
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
1.016	0.0400	3.175	0.1250	4.343	0.1710	0.10	0.0039	1.191	0.0469	1.191	0.0469	0.330	0.0130	R09	FR09	–	–
1.191	0.0469	3.967	0.1562	5.156	0.2030	0.10	0.0039	1.588	0.0625	1.588	0.0625	0.330	0.0130	R0	FR0	R0ZZ	FR0ZZ
		3.967	0.1562	5.156	0.2030	0.10	0.0039	2.380	0.0937	1.588	0.0625	0.330	0.0130	RW0	FRW0	RW0ZZ	FRW0ZZ
1.397	0.0550	4.762	0.1875	5.944	0.2340	0.10	0.0039	1.984	0.0781	1.984	0.0781	0.584	0.0230	R1	FR1	R1ZZ	FR1ZZ
		4.762	0.1875	5.944	0.2340	0.10	0.0039	2.779	0.1094	1.984	0.0781	0.584	0.0230	RW1	FRW1	RW1ZZ	FRW1ZZ
1.984	0.0781	6.350	0.2500	7.518	0.2960	0.10	0.0039	2.380	0.0937	2.380	0.0937	0.584	0.0230	R1-4	FR1-4	R1-4ZZ	FR1-4ZZ
		6.350	0.2500	7.518	0.2960	0.10	0.0039	3.175	0.1250	2.380	0.0937	0.584	0.0230	RW1-4	FRW1-4	RW1-4ZZ	FRW1-4ZZ
2.380	0.0937	4.762	0.1875	5.944	0.2340	0.10	0.0039	1.588	0.0625	1.588	0.0625	0.457	0.0180	R133	FR133	–	–
		4.762	0.1875	5.944	0.2340	0.10	0.0039	2.380	0.0937	1.588	0.0625	0.457	0.0180	RW133	FRW133	–	–
		4.762	0.1875	5.944	0.2340	0.10	0.0039	–	–	–	–	–	–	–	–	R133ZZS	FR133ZZS
		4.762	0.1875	5.944	0.2340	0.10	0.0039	–	–	–	–	–	–	–	–	RW133ZZS	FRW133ZZS
		7.938	0.3125	9.119	0.3590	0.15	0.0059	2.779	0.1094	2.779	0.1094	0.584	0.0230	R1-5	FR1-5	R1-5ZZ	FR1-5ZZ
		7.938	0.3125	9.119	0.3590	0.15	0.0059	3.571	0.1406	2.779	0.1094	0.584	0.0230	RW1-5	FRW1-5	RW1-5ZZ	FRW1-5ZZ
3.175	0.1250	6.350	0.2500	7.518	0.2960	0.10	0.0039	2.380	0.0937	2.380	0.0937	0.584	0.0230	R144J	FR144J	R144JZZS	FR144JZZS
		6.350	0.2500	7.518	0.2960	0.10	0.0039	2.380	0.0937	2.380	0.0937	0.584	0.0230	R144	FR144	R144ZZ	FR144ZZ
		6.350	0.2500	7.518	0.2960	0.10	0.0039	3.175	0.1250	2.380	0.0937	0.584	0.0230	RW144	FRW144	RW144ZZ	FRW144ZZ
		7.938	0.3125	9.119	0.3590	0.10	0.0039	2.779	0.1094	2.779	0.1094	0.584	0.0230	R2-5	FR2-5	R2-5ZZ	FR2-5ZZ
		7.938	0.3125	9.119	0.3590	0.10	0.0039	3.571	0.1406	2.779	0.1094	0.584	0.0230	RW2-5	FRW2-5	RW2-5ZZ	FRW2-5ZZ
		9.525	0.3750	10.719	0.4220	0.15	0.0059	2.779	0.1094	2.779	0.1094	0.584	0.0230	R2-6	FR2-6	R2-6ZZ	FR2-6ZZ
		9.525	0.3750	10.719	0.4220	0.15	0.0059	3.571	0.1406	2.779	0.1094	0.584	0.0230	RW2-6	FRW2-6	RW2-6ZZ	FRW2-6ZZ
		9.525	0.3750	11.176	0.4400	0.30	0.0118	3.967	0.1562	3.967	0.1562	0.762	0.0300	R2(1)	FR2(1)	R2ZZ	FR2ZZ
		9.525	0.3750	11.176	0.4400	0.30	0.0118	4.762	0.1875	3.967	0.1562	0.762	0.0300	RW2(1)	FRW2(1)	RW2ZZ	FRW2ZZ
		12.700	0.5000	–	–	0.30	0.0118	4.366	0.1719	4.366	0.1719	–	–	R2A(1)	–	R2AZZ	–
3.967	0.1562	7.938	0.3125	9.119	0.3590	0.10	0.0039	2.779	0.1094	2.779	0.1094	0.584	0.0230	R155	FR155	R155ZZS	FR155ZZS
		7.938	0.3125	9.119	0.3590	0.10	0.0039	3.571	0.1406	2.779	0.1094	0.584	0.0230	RW155	FRW155	RW155ZZS	FRW155ZZS
4.762	0.1875	7.938	0.3125	9.119	0.3590	0.10	0.0039	2.779	0.1094	2.779	0.1094	0.584	0.0230	R156	FR156	R156ZZS	FR156ZZS
		7.938	0.3125	9.119	0.3590	0.10	0.0039	3.571	0.1406	2.779	0.1094	0.584	0.0230	RW156	FRW156	RW156ZZS	FRW156ZZS
		9.525	0.3750	10.719	0.4220	0.10	0.0039	3.175	0.1250	3.175	0.1250	0.584	0.0230	R166(1)	FR166	R166ZZ	FR166ZZ
		9.525	0.3750	10.719	0.4220	0.10	0.0039	3.967	0.1562	3.175	0.1250	0.584	0.0230	RW166(1)	FRW166	RW166ZZ	FRW166ZZ
		12.700	0.5000	14.351	0.5650	0.30	0.0118	4.978	0.1960	4.978	0.1960	1.067	0.0420	–	FR3	–	–
		12.700	0.5000	14.351	0.5650	0.30	0.0118	3.967	0.1562	3.967	0.1562	–	–	R3	–	R3ZZ	FR3ZZ
		12.700	0.5000	14.351	0.5650	0.30	0.0118	5.771	0.2272	4.978	0.1960	1.067	0.0420	–	FRW3	–	–
		12.700	0.5000	14.351	0.5650	0.30	0.0118	4.762	0.1875	3.967	0.1562	–	–	RW3	–	RW3ZZ	FRW3ZZ
		15.875	0.6250	–	–	0.30	0.0118	4.978	0.1960	4.978	0.1960	–	–	R3A(1)	–	R3AZZ	–
6.350	0.2500	9.525	0.3750	10.719	0.4220	0.10	0.0039	3.175	0.1250	3.175	0.1250	0.584	0.0230	R168(1)	FR168	R168ZZS	FR168ZZS
		9.525	0.3750	10.719	0.4220	0.10	0.0039	3.967	0.1562	3.175	0.1250	0.584	0.0230	RW168(1)	FRW168	RW168ZZS	FRW168ZZS
		12.700	0.5000	13.894	0.5470	0.15	0.0059	3.175	0.1250	3.175	0.1250	0.584	0.0230	R188	FR188	R188ZZ	FR188ZZ
		12.700	0.5000	13.894	0.5470	0.15	0.0059	3.967	0.1562	3.175	0.1250	0.584	0.0230	RW188	FRW188	RW188ZZ	FRW188ZZ
		15.875	0.6250	17.526	0.6900	0.30	0.0118	4.978	0.1960	4.978	0.1960	1.067	0.0420	R4(1)	FR4(1)	R4ZZ	FR4ZZ
		15.875	0.6250	17.526	0.6900	0.30	0.0118	5.771	0.2272	4.978	0.1960	1.067	0.0420	RW4(1)	FRW4(1)	RW4ZZ	FRW4ZZ
		19.050	0.7500	–	–	0.40	0.0157	5.558	0.2188	5.558	0.2188	–	–	R4A	–	R4AZZ	–
7.938	0.3125	12.700	0.5000	13.894	0.5470	0.15	0.0059	3.967	0.1562	3.967	0.1562	0.787	0.0310	R1810(1)	FR1810(1)	R1810ZZS	FR1810ZZS
		12.700	0.5000	13.894	0.5470	0.15	0.0059	4.762	0.1875	3.967	0.1562	0.787	0.0310	RW1810(1)	FRW1810(1)	RW1810ZZS	FRW1810ZZS
9.525	0.3750	22.225	0.8750	24.613	0.9690	0.40	0.0157	5.558	0.2188	5.558	0.2188	1.575	0.0620	R6	FR6	R6ZZ	FR6ZZ
12.700	0.5000	28.575	1.1250	31.120	1.2252	0.40	0.0157	6.350	0.2500	6.350	0.2500	1.575	0.0620	R8	FR8	R8ZZ	FR8ZZ
15.875	0.6250	34.925	1.3750	37.846	1.4900	0.80	0.0315	7.142	0.2812	7.142	0.2812	–	–	R10	–	R10ZZ	FR10ZZ
19.050	0.7500	41.275	1.6250	–	–	0.80	0.0315	7.938	0.3125	7.938	0.3125	–	–	R12	–	–	–
		41.275	1.6250	–	–	0.80	0.0315	–	–	–	–	–	–	–	–	R12ZZ	–

Seal, Shield Bearings										Load Rating		Max. Speed		Cage Type	Ball Complement			Weight (Reference)			
2 Seals			IR Width: B_{1i}		OR Width: B_{1e}		Flange Width:Bf1			Cr	Cor	Grease	Oil		Qty.:Z	Size:Dw		Open	Flange Open	2 Shields	Flange 2 Shields
2RS	2RU	TTS	mm	inch	mm	inch	mm	inch		(N)		x1000min⁻¹			pcs.	mm	inch	g			
–	–	–	–	–	–	–	–	–		106	28	115	136	W	6	0.635	0.0250	0.04	0.05	–	–
–	–	–	2.380	0.0937	2.380	0.0937	0.787	0.0310		112	33	105	124	W	7	0.600	0.0236	0.09	0.11	0.13	0.18
–	–	–	3.175	0.1250	2.380	0.0937	0.787	0.0310		112	33	105	124	W	7	0.600	0.0236	0.11	0.13	0.14	0.19
–	–	–	2.779	0.1094	2.779	0.1094	0.787	0.0310		232	66	97	115	W	6	1.000	0.0394	0.15	0.20	0.20	0.26
–	–	–	3.571	0.1406	2.779	0.1094	0.787	0.0310		232	66	97	115	W	6	1.000	0.0394	0.17	0.21	0.22	0.28
–	–	TTS	3.571	0.1406	3.571	0.1406	0.787	0.0310		284	95	77	91	W	7	1.000	0.0394	0.35	0.40	0.50	0.58
–	–	–	4.336	0.1707	3.571	0.1406	0.787	0.0310		284	95	77	91	W	7	1.000	0.0394	0.40	0.46	0.56	0.63
–	–	–	–	–	–	–	–	–		189	60	90	106	W	7	0.800	0.0315	0.10	0.13	–	–
–	–	–	–	–	–	–	–	–		189	60	90	106	W	7	0.800	0.0315	0.11	0.14	–	–
–	–	TTS	2.380	0.0937	2.380	0.0937	0.787	0.0310		144	52	92	109	W	10	0.600	0.0236	–	–	0.16	0.21
–	–	TTS	3.175	0.1250	2.380	0.0937	0.787	0.0310		144	52	92	109	W	10	0.600	0.0236	–	–	0.17	0.23
–	–	TTS	3.571	0.1406	3.571	0.1406	0.787	0.0310		551	175	72	85	W	6	1.588	0.0625	0.61	0.68	0.76	0.85
–	–	–	4.366	0.1719	3.571	0.1406	0.787	0.0310		551	175	72	85	W	6	1.588	0.0625	0.67	0.74	0.81	0.90
–	–	TTS	2.779	0.1094	2.779	0.1094	0.787	0.0310		310	109	77	91	J	8	1.000	0.0394	0.26	0.32	0.30	0.37
–	–	TTS	2.779	0.1094	2.779	0.1094	0.787	0.0310		284	95	77	91	W	7	1.000	0.0394	0.26	0.31	0.28	0.36
–	–	TTS	3.571	0.1406	2.779	0.1094	0.787	0.0310		284	95	77	91	W	7	1.000	0.0394	0.28	0.34	0.31	0.38
–	–	TTS	3.571	0.1406	3.571	0.1406	0.787	0.0310		559	179	70	82	W,J	6	1.588	0.0625	0.54	0.60	0.66	0.75
–	–	–	4.366	0.1719	3.571	0.1406	0.787	0.0310		559	179	70	82	W,J	6	1.588	0.0625	0.58	0.64	0.70	0.79
–	–	TTS	3.571	0.1406	3.571	0.1406	0.787	0.0310		641	226	63	75	J	7	1.588	0.0625	0.95	1.03	1.15	1.26
–	–	TTS	4.366	0.1719	3.571	0.1406	0.787	0.0310		641	226	63	75	J	7	1.588	0.0625	1.03	1.07	1.20	1.31
2RS	2RU	TTS	3.967	0.1562	3.967	0.1562	0.762	0.0300		633	218	66	78	J	7	1.588	0.0625	1.32	1.49	1.39	1.56
2RS	2RU	–	4.762	0.1875	3.967	0.1562	0.762	0.0300		633	218	66	78	J	7	1.588	0.0625	1.38	1.55	1.45	1.62
–	–	–	4.366	0.1719	4.366	0.1719	–	–		641	226	63	75	J	7	1.588	0.0625	3.12	–	3.20	–
–	–	TTS	3.175	0.1250	3.175	0.1250	0.914	0.0360		360	149	64	76	W	10	1.000	0.0394	0.52	0.59	0.59	0.69
–	–	TTS	3.967	0.1562	3.175	0.1250	0.914	0.0360		360	149	64	76	W	10	1.000	0.0394	0.55	0.62	0.66	0.76
–	–	TTS	3.175	0.1250	3.175	0.1250	0.914	0.0360		360	149	64	76	W	10	1.000	0.0394	0.40	0.47	0.45	0.56
–	–	TTS	3.967	0.1562	3.175	0.1250	0.914	0.0360		360	149	64	76	W	10	1.000	0.0394	0.42	0.48	0.49	0.59
–	–	TTS	3.175	0.1250	3.175	0.1250	0.787	0.0310		711	270	59	70	J	8	1.588	0.0625	0.74	0.86	0.79	0.90
–	–	TTS	3.967	0.1562	3.175	0.1250	0.787	0.0310		711	270	59	70	J	8	1.588	0.0625	0.79	0.92	0.85	0.95
–	–	–	–	–	–	–	–	–		1 300	485	51	60	J	7	2.381	0.0937	–	2.93	–	–
2RS	2RU	TTS	4.978	0.1960	4.978	0.1960	1.067	0.0420		1 300	485	51	60	J	7	2.381	0.0937	2.14	–	2.61	2.91
–	–	–	–	–	–	–	–	–		1 300	485	51	60	J	7	2.381	0.0937	–	3.21	–	–
2RS	2RU	–	5.771	0.2272	4.978	0.1960	1.067	0.0420		1 300	485	51	60	J	7	2.381	0.0937	2.27	–	2.72	3.01
–	–	–	4.978	0.1960	4.978	0.1960	–	–		1 480	617	42	50	J	8	2.381	0.0937	4.42	–	4.74	–
–	–	TTS	3.175	0.1250	3.175	0.1250	0.914	0.0360		373	172	55	65	W	11	1.000	0.0394	0.52	0.64	0.57	0.69
–	–	TTS	3.967	0.1562	3.175	0.1250	0.914	0.0360		373	172	55	65	W	11	1.000	0.0394	0.56	0.69	0.61	0.74
–	–	TTS	4.762	0.1875	4.762	0.1875	1.143	0.0450		1 080	438	48	56	J	8	2.000	0.0787	1.47	1.59	2.03	2.24
–	–	TTS	5.558	0.2188	4.762	0.1875	1.143	0.0450		1 080	438	48	56	J	8	2.000	0.0787	1.59	1.70	2.11	2.32
2RS	2RU	TTS	4.978	0.1960	4.978	0.1960	1.067	0.0420		1 480	617	42	50	J	8	2.381	0.0937	3.87	4.26	4.19	4.58
2RS	2RU	–	5.771	0.2272	4.978	0.1960	1.067	0.0420		1 480	617	42	50	J	8	2.381	0.0937	4.01	4.40	4.34	4.73
2RS	2RU	TTS	7.142	0.2812	7.142	0.2812	–	–		2 340	889	38	45	J	6	3.500	0.1378	7.43	–	8.96	–
–	–	TTS	3.967	0.1562	3.967	0.1562	0.787	0.0310		541	276	45	53	W	12	1.200	0.0472	1.41	1.56	1.50	1.65
–	–	TTS	4.762	0.1875	3.967	0.1562	0.787	0.0310		541	276	45	53	W	12	1.200	0.0472	1.49	1.64	1.58	1.72
2RS	2RU	TTS	7.142	0.2812	7.142	0.2812	1.575	0.0620		3 330	1 410	31	37	J	7	3.969	0.1563	8.74	9.85	10.7	11.8
2RS	2RU	TTS	7.938	0.3125	7.938	0.3125	1.575	0.0620		5 110	2 390	25	30	J	8	4.762	0.1875	17.2	18.7	20.5	21.8
2RS	2RU	–	8.733	0.3438	8.733	0.3438	1.745	0.0687		6 000	3 270	20	24	RJ	10	4.762	0.1875	29.8	–	35.8	38.5
–	–	–	–	–	–	–	–	–		7 920	4 450	17	21	RJ	10	5.556	0.2187	46.4	–	–	–
2RS	2RU	–	11.113	0.4375	11.113	0.4375	–	–		9 380	5 060	17	20	RJ,TW	9	6.350	0.2500	–	–	60.4	–

(1) Open type bearings have shield/seal grooves. (2) Single shield or single seal types are also available; suffix Z, RS, RU or TS.
(3) Prefix S is added for stainless material types. Load ratings of stainless material types are calculated by Cr×0.85 and Cor×0.80 of SUJ2 material types.
(4) Applicable only for open, single Z, ZZ, single RU and 2RU types in inner ring rotating conditions. Max. speeds for the contact rubber seal(s) types will be around 50-60% of above values.

Extra thin metric series: 6700, 6800, 6900 (10≦d≦30mm)



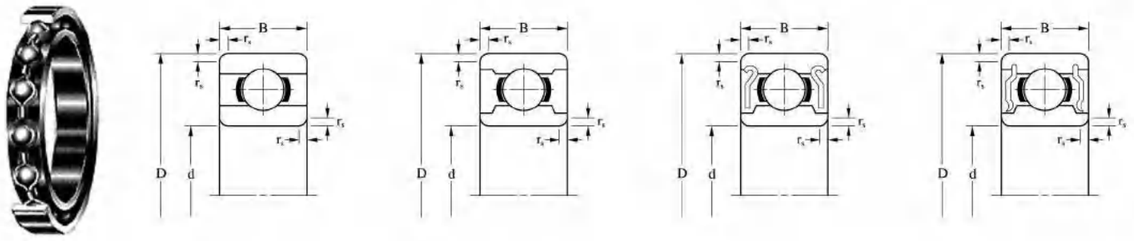


Bore Diameter: d		Outer Diameter: D		Flange Diameter: Df		Chamfer r's(min)		Width: B		Flange Width: Bf		Bearing Reference			
												Open	Flange Open	2 Shields	Flange 2 Shields
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch				
10	0.3937	15	0.5906	16.5	0.6496	0.15(4)	0.0059(4)	3	0.1181	0.8	0.0315	6700	F6700	–	–
		15	0.5906	16.5	0.6496	0.15(4)	0.0059(4)	4	0.1575	0.8	0.0315	–	–	6700ZZ	F6700ZZ
		19	0.7480	21.0	0.8268	0.30	0.0118	5	0.1969	1.0	0.0394	6800(1)	F6800(1)	6800ZZ	F6800ZZ
		19	0.7480	21.0	0.8268	0.30	0.0118	7	0.2756	1.5	0.0591	63800(1)	F63800(1)	63800ZZ	F63800ZZ
		22	0.8661	25.0	0.9843	0.30	0.0118	6	0.2362	1.5	0.0591	6900(1)	F6900(1)	6900ZZ	F6900ZZ
12	0.4724	18	0.7087	19.5	0.7677	0.20	0.0079	4	0.1575	0.8	0.0315	6701(1)	F6701(1)	6701ZZ	F6701ZZ
		21	0.8268	23.0	0.9055	0.30	0.0118	5	0.1969	1.1	0.0433	6801(1)	F6801(1)	6801ZZ	F6801ZZ
		21	0.8268	23.0	0.9055	0.30	0.0118	7	0.2756	1.5	0.0591	63801(1)	F63801(1)	63801ZZ	F63801ZZ
		24	0.9449	26.5	1.0433	0.30	0.0118	6	0.2362	1.5	0.0591	6901(1)	F6901(1)	6901ZZ	F6901ZZ
15	0.5906	21	0.8268	22.5	0.8858	0.20	0.0079	4	0.1575	0.8	0.0315	6702(1)	F6702(1)	6702ZZ	F6702ZZ
		24	0.9449	26.0	1.0236	0.30	0.0118	5	0.1969	1.1	0.0433	6802(1)	F6802(1)	6802ZZ	F6802ZZ
		24	0.9449	26.0	1.0236	0.30	0.0118	7	0.2756	1.5	0.0591	63802(1)	F63802(1)	63802ZZ	F63802ZZ
		28	1.1024	30.5	1.2008	0.30	0.0118	7	0.2756	1.5	0.0591	6902(1)	F6902(1)	6902ZZ	F6902ZZ
17	0.6693	23	0.9055	24.5	0.9646	0.20	0.0079	4	0.1575	0.8	0.0315	6703(1)	F6703(1)	6703ZZ	F6703ZZ
		26	1.0236	28.0	1.1024	0.30	0.0118	5	0.1969	1.1	0.0433	6803(1)	F6803(1)	6803ZZ	F6803ZZ
		26	1.0236	28.0	1.1024	0.30	0.0118	7	0.2756	1.5	0.0591	63803(1)	F63803(1)	63803ZZ	F63803ZZ
		30	1.1811	32.5	1.2795	0.30	0.0118	7	0.2756	1.5	0.0591	6903(1)	F6903(1)	6903ZZ	F6903ZZ
20	0.7874	27	1.0630	28.5	1.1220	0.20	0.0079	4	0.1575	0.8	0.0315	6704(1)	F6704(1)	6704ZZS	F6704ZZS
		32	1.2598	35.0	1.3780	0.30	0.0118	7	0.2756	1.5	0.0591	6804(1)	F6804(1)	6804ZZ	F6804ZZ
		32	1.2598	–	–	0.30	0.0118	10	0.3937	–	–	63804(1)	–	63804ZZ	–
		37	1.4567	40.0	1.5748	0.30	0.0118	9	0.3543	2.0	0.0787	6904(1)	F6904(1)	6904ZZ	F6904ZZ
25	0.9843	32	1.2598	34.0	1.3386	0.20	0.0079	4	0.1575	1.0	0.0394	6705(1)	F6705(1)	–	–
		37	1.4567	40.0	1.5748	0.30	0.0118	7	0.2756	1.5	0.0591	6805(1)	F6805(1)	6805ZZ	F6805ZZ
		37	1.4567	–	–	0.30	0.0118	10	0.3937	–	–	63805(1)	–	63805ZZ	–
		42	1.6535	45.0	1.7717	0.30	0.0118	9	0.3543	2.0	0.0787	6905(1)	F6905(1)	6905ZZ	F6905ZZ
30	1.1811	37	1.4567	39.0	1.5354	0.20	0.0079	4	0.1575	1.0	0.0394	6706(1)	F6706(1)	–	–
		42	1.6535	45.0	1.7717	0.30	0.0118	7	0.2756	1.5	0.0591	6806(1)	F6806(1)	6806ZZ	F6806ZZ
		47	1.8504	50.0	1.9685	0.30	0.0118	9	0.3543	2.0	0.0787	6906(1)	F6906(1)	6906ZZ	F6906ZZ

(1) Open type bearings have shield/seal grooves.
(2) Single shield or single seal types are also available; suffix Z, RS, RU or TS.
(3) Suffix H is added for stainless material types. Load ratings of stainless material types are calculated by Cr×0.85 and Cor×0.80 of SUJ2 material types.
(4) Not according to JIS B 1521.
(5) SUJ2 bearings use RJ type retainers, but stainless bearings use J type retainers.
(6) Weight of open type.
(7) Applicable only for open, single Z, ZZ, single RU and 2RU types in inner ring rotating conditions. Max. speeds for the contact rubber seal(s) types will be around 50-60% of above values.

2 Seals			Load Rating		Max. Speed		Cage Type	Ball Complement			Weight(Ref.)	
			Cr(N)	Cor(N)	Grease	Oil		Qty.:Z	Size:Dw		2 Shields	Flange 2 Shields
2RS	2RU	TTS	(N)		x1000min⁻¹			pcs.	mm	inch	g	
–	–	–	857	435	15	17	W	11	1.588	0.0625	1.3(6)	1.6(6)
2RS	–	TTS	857	435	15	17	W	11	1.588	0.0625	1.8	2.0
2RS	2RU	–	1 720	840	34	40	J,TW	10	2.381	0.0937	5.1	5.6
2RS	2RU	–	1 720	840	34	40	J,TW	10	2.381	0.0937	7.0	7.8
2RS	2RU	–	2 700	1 270	31	37	J	9	3.175	0.1250	9.4	10.6
2RS	–	TTS	928	532	13	15	W	13	1.588	0.0625	2.8	3.1
2RS	2RU	–	1 920	1 040	30	36	J,TW	12	2.381	0.0937	5.7	6.3
2RS	2RU	–	1 920	1 040	30	36	J,TW	12	2.381	0.0937	7.9	8.7
2RS	2RU	–	2 890	1 460	28	33	J	10	3.175	0.1250	10.8	11.9
2RS	–	TTS	937	581	11	13	W	14	1.588	0.0625	3.4	3.7
2RS	2RU	–	2 070	1 260	26	31	J	14	2.381	0.0937	6.7	7.4
2RS	2RU	–	2 070	1 260	26	31	J	14	2.381	0.0937	9.3	10.2
2RS	2RU	–	4 330	2 250	24	29	J	10	3.969	0.1563	16.0	17.3
2RS	–	TTS	999	657	9.5	11	W	16	1.588	0.0625	3.8	4.1
2RS	2RU	–	2 230	1 460	24	29	J,TW	16	2.381	0.0937	7.5	8.3
2RS	2RU	–	2 230	1 460	24	29	J,TW	16	2.381	0.0937	10.4	11.4
2RS	2RU	–	4 590	2 560	22	26	J	11	3.969	0.1563	16.7	18.2
2RS	–	TTS	1 010	722	8.5	10	W	18	1.588	0.0625	5.6	6.0
2RS	2RU	–	4 020	2 460	21	25	J,RJ(5)	13	3.500	0.1378	17.1	18.9
2RS	2RU	–	4 020	2 460	21	25	J,RJ(5)	13	3.500	0.1378	23.8	–
2RS	2RU	–	6 380	3 680	19	22	RJ	11	4.762	0.1875	35.1	37.9
2RS	–	–	1 100	838	7	8	W	21	1.588	0.0625	6.4(6)	7.2(6)
2RS	2RU	–	4 300	2 940	18	21	J,RJ(5)	15	3.500	0.1378	20.8	22.9
2RS	2RU	–	4 300	2 940	18	21	J,RJ(5)	15	3.500	0.1378	28.8	–
2RS	2RU	–	7 010	4 550	16	19	RJ	13	4.762	0.1875	42.0	45.1
–	2RU	–	1 140	947	5.5	7	W	24	1.588	0.0625	7.3(6)	7.7(6)
2RS	2RU	–	4 450	3 440	15	18	J,RJ(5)	17	3.500	0.1378	23.8	26.1
2RS	2RU	–	7 240	5 010	14	17	RJ	14	4.762	0.1875	47.9	51.4

Extra thin metric series: 6700, 6800, 6900 (35≦d≦95mm)

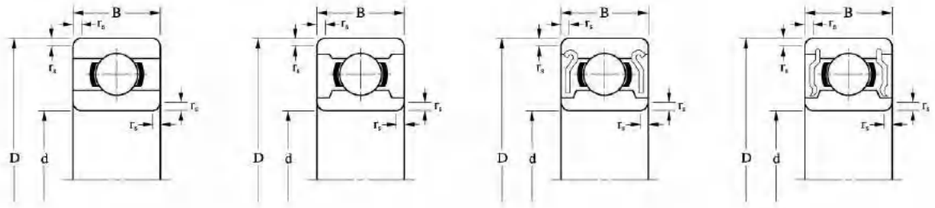


Bore Diameter: d		Outer Diameter: D		Chamfer r's(min)		Width: B Open		Bearing Reference			
								Open	2 Shields	2 Seals	
mm	inch	mm	inch	mm	inch	mm	inch			2RS	2RU
35	1.3780	44	1.7323	0.3	0.0118	5	0.1969	6707(1)	–	2RS	–
		47	1.8504	0.3	0.0118	7	0.2756	6807(1)	6807ZZ	2RS	2RU
		55	2.1654	0.6	0.0236	10	0.3937	6907(1)	6907ZZ	2RS	2RU
40	1.5748	50	1.9685	0.3	0.0118	6	0.2362	6708(1)	–	2RS	–
		52	2.0472	0.3	0.0118	7	0.2756	6808(1)	6808ZZ	2RS	2RU
		62	2.4409	0.6	0.0236	12	0.4724	6908(1)	6908ZZ	2RS	2RU
45	1.7717	55	2.1654	0.3	0.0118	6	0.2362	6709(1)	–	2RS	–
		58	2.2835	0.3	0.0118	7	0.2756	6809(1)	6809ZZ	2RS	2RU
		68	2.6772	0.6	0.0236	12	0.4724	6909(1)	6909ZZ	2RS	2RU
50	1.9685	62	2.4409	0.3	0.0118	6	0.2362	6710(1)	–	2RS	–
		65	2.5591	0.3	0.0118	7	0.2756	6810(1)	6810ZZ	2RS	2RU
		72	2.8346	0.6	0.0236	12	0.4724	6910(1)	6910ZZ	2RS	2RU
55	2.1654	72	2.8346	0.3	0.0118	9	0.3543	6811(1)	6811ZZ	2RS	2RU
		80	3.1496	1.0	0.0394	13	0.5118	6911(1)	6911ZZ	2RS	2RU
60	2.3622	78	3.0709	0.3	0.0118	10	0.3937	6812(1)	6812ZZ	2RS	2RU
		85	3.3465	1.0	0.0394	13	0.5118	6912(1)	6912ZZ	2RS	2RU
65	2.5591	85	3.3465	0.6	0.0236	10	0.3937	6813(1)	6813ZZ	2RS	–
		90	3.5433	1.0	0.0394	13	0.5118	6913(1)	6913ZZ	2RS	–
70	2.7559	90	3.5433	0.6	0.0236	10	0.3937	6814(1)	6814ZZ	2RS	2RU
		100	3.9370	1.0	0.0394	16	0.6299	6914(1)	6914ZZ	2RS	–
75	2.9528	95	3.7402	0.6	0.0236	10	0.3937	6815(1)	6815ZZ	2RS	–
		105	4.1339	1.0	0.0394	16	0.6299	6915(1)	6915ZZ	2RS	–
80	3.1496	100	3.9370	0.6	0.0236	10	0.3937	6816(1)	6816ZZ	2RS	2RU
		110	4.3307	1.0	0.0394	16	0.6299	6916(1)	6916ZZ	2RS	–
85	3.3465	110	4.3307	1.0	0.0394	13	0.5118	6817(1)	6817ZZ	2RS	–
		120	4.7244	1.1	0.0433	18	0.7087	6917(1)	6917ZZ	2RS	–
90	3.5433	115	4.5276	1.0	0.0394	13	0.5118	6818(1)	6818ZZ	2RS	–
		125	4.9213	1.1	0.0433	18	0.7087	6918(1)	–	2RS	–
95	3.7402	120	4.7244	1.0	0.0394	13	0.5118	6819(1)	–	–	2RU

Load Rating		Max. Speed		Cage Type	Ball Complement			Weight(Ref.)
Cr(N)	Cor(N)	Grease	Oil		Qty.:Z	Size:Dw		2 Shields
(N)		x1000min⁻¹			pcs.	mm	inch	g
1 860	1 630	4.9	6.0	W	26	2.000	0.0787	15.0
4 740	3 820	13	16	J,RJ(4)	19	3.500	0.1378	28.2
10 900	7 750	12	14	RJ	14	5.953	0.2344	73.3
2 510	2 230	4.3	5.0	W	25	2.381	0.0937	23.3
4 930	4 180	12	14	RJ	21	3.500	0.1378	30.3
13 700	9 920	11	13	RJ	14	6.747	0.2656	108
2 570	2 400	3.9	4.6	W	27	2.381	0.0937	25.6
6 210	5 380	11	13	RJ	21	3.969	0.1563	35.8
14 100	10 900	10	11	RJ	15	6.747	0.2656	130
2 670	2 650	3.5	4.1	W	30	2.381	0.0937	36.6
6 170	5 760	9.5	11	RJ	23	3.969	0.1563	49.5
14 500	11 700	9.0	11	RJ	16	6.747	0.2656	131
8 800	8 080	8.6	10	RJ	22	4.762	0.1875	78.3
16 600	14 100	8.1	9.6	RJ	17	7.144	0.2813	177
11 500	10 600	7.9	9.4	RJ	21	5.556	0.2187	99.4
20 200	17 300	7.5	8.9	RJ	17	7.938	0.3125	186
11 900	11 500	7.3	8.6	RJ	23	5.556	0.2187	125
17 300	16 000	7.0	8.3	RJ	19	7.144	0.2813	208
11 600	11 800	6.8	8.1	RJ	24	5.556	0.2187	134
23 700	21 100	6.4	7.6	RJ	17	8.731	0.3437	342
12 300	12 800	6.4	7.6	RJ	26	5.556	0.2187	142
24 000	22 600	6.0	7.1	RJ	18	8.731	0.3437	363
12 600	13 300	6.0	7.1	RJ	27	5.556	0.2187	150
24 800	23 900	5.7	6.7	RJ	19	8.731	0.3437	382
18 700	19 000	5.6	6.6	RJ	23	7.144	0.2813	266
31 900	29 600	5.3	6.2	RJ	17	10.319	0.4063	535
18 300	19 500	5.3	6.2	RJ	24	7.144	0.2813	279
32 400	31 600	5.0	5.9	RJ	18	10.319	0.4063	565
18 800	20 300	5.0	5.9	RJ	25	7.144	0.2813	285

(1) Open type bearings have shield/seal grooves.
(2) Single shield or single seal types are also available; suffix Z, RS or RU.
(3) Suffix H is added for stainless material types. Load ratings of stainless material types are calculated by Cr×0.85 and Cor×0.80 of SUJ2 material types.
(4) SUJ2 bearings use RJ type retainers, but stainless bearings use J type retainers.
(5) Applicable only for open, single Z, ZZ, single RU and 2RU types in inner ring rotating conditions. Max. speeds for the contact rubber seal(s) types will be around 50-60% of above values.

Large sized stainless series:6000H, 6200H, 6300H

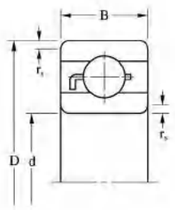


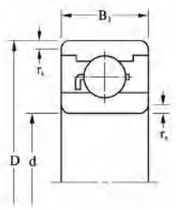
Bore Diameter: d		Outer Diameter: D		Width: B		Chamfer rs(min)		Bearing Reference				
								Open	2 Shields	2 Seals		
mm	inch	mm	inch	mm	inch	mm	inch		ZZ	2RS	2RU	TTS
10	0.3937	26	1.0236	8	0.3150	0.3	0.0118	6000H(1),(2)	ZZ	2RS	2RU	–
		30	1.1811	9	0.3543	0.6	0.0236	6200H(1),(2)	ZZ	2RS	2RU	–
		35	1.3780	11	0.4331	0.6	0.0236	6300H(1)	ZZ	2RS	2RU	–
12	0.4724	28	1.1024	8	0.3150	0.3	0.0118	6001H(1),(2)	ZZ	2RS	2RU	TTS
		32	1.2598	10	0.3937	0.6	0.0236	6201H(1)	ZZ	2RS	2RU	–
		37	1.4567	12	0.4724	1.0	0.0394	6301H(1)	ZZ	2RS	2RU	–
15	0.5906	32	1.2598	9	0.3543	0.3	0.0118	6002H(1),(2)	ZZ	2RS	2RU	–
		35	1.3780	11	0.4331	0.6	0.0236	6202H(1)	ZZ	2RS	2RU	–
		42	1.6535	13	0.5118	1.0	0.0394	6302H(1)	ZZ	2RS	2RU	–
17	0.6693	35	1.3780	10	0.3937	0.3	0.0118	6003H(1),(2)	ZZ	2RS	2RU	–
		40	1.5748	12	0.4724	0.6	0.0236	6203H(1)	ZZ	2RS	2RU	–
		47	1.8504	14	0.5512	1.0	0.0394	6303H(1)	ZZ	2RS	2RU	–
20	0.7874	42	1.6535	12	0.4724	0.6	0.0236	6004H(1)	ZZ	2RS	2RU	–
		47	1.8504	14	0.5512	1.0	0.0394	6204H(1)	ZZ	2RS	2RU	–
		52	2.0472	15	0.5906	1.1	0.0433	6304H(1)	ZZ	2RS	2RU	–
25	0.9843	47	1.8504	12	0.4724	0.6	0.0236	6005H(1)	ZZ	2RS	2RU	–
		52	2.0472	15	0.5906	1.0	0.0394	6205H(1)	ZZ	2RS	2RU	–
		62	2.4409	17	0.6693	1.1	0.0433	6305H(1)	ZZ	2RS	2RU	–
30	1.1811	55	2.1654	13	0.5118	1.0	0.0394	6006H(1)	ZZ	2RS	2RU	–
		62	2.4409	16	0.6299	1.0	0.0394	6206H(1)	ZZ	2RS	2RU	–
		72	2.8346	19	0.7480	1.1	0.0433	6306H(1)	ZZ	2RS	2RU	–
35	1.3780	62	2.4409	14	0.5512	1.0	0.0394	6007H(1)	ZZ	2RS	2RU	–
		72	2.8346	17	0.6693	1.1	0.0433	6207H(1)	ZZ	2RS	2RU	–
		80	3.1496	21	0.8268	1.5	0.0591	6307H(1)	ZZ	2RS	2RU	–
40	1.5748	68	2.6772	15	0.5906	1.0	0.0394	6008H(1)	ZZ	2RS	2RU	–
		80	3.1496	18	0.7087	1.1	0.0433	6208H(1)	ZZ	2RS	2RU	–
45	1.7717	75	2.9528	16	0.6299	1.0	0.0394	6009H(1)	ZZ	2RS	2RU	–
		85	3.3465	19	0.7480	1.1	0.0433	6209H(1)	ZZ	2RS	2RU	–
50	1.9685	80	3.1496	16	0.6299	1.0	0.0394	6010H(1)	ZZ	2RS	2RU	–
		90	3.5433	20	0.7874	1.1	0.0433	6210H(1)	ZZ	2RS	2RU	–
55	2.1654	90	3.5433	18	0.7087	1.1	0.0433	6011H(1)	ZZ	2RS	2RU	–
		100	3.9370	21	0.8268	1.5	0.0591	6211H(1)	ZZ	2RS	2RU	–
60	2.3622	95	3.7402	18	0.7087	1.1	0.0433	6012H(1)	ZZ	2RS	2RU	–
		110	4.3307	22	0.8661	1.5	0.0591	6212H(1)	ZZ	2RS	2RU	–

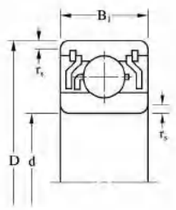
Load Rating		Max. Speed		Cage Type	Ball Complement			Weight (Ref.)
Cr(N)	Cor(N)	Grease	Oil		Qty. :Z	Size: Dw		2 Shields
(N)		x1000min⁻¹			pcs.	mm	inch	g
3 890	1 570	28	33	J	7	4.762	0.1875	18
4 350	1 910	25	30	RJ,TW	8	4.762	0.1875	30
6 880	2 750	23	27	RJ	6	7.144	0.2813	52
4 350	1 910	25	30	J,TW	8	4.762	0.1875	20
5 780	2 440	24	28	RJ,TW	7	5.953	0.2344	35
8 250	3 350	22	25	RJ	6	7.938	0.3125	58
4 750	2 270	22	26	RJ,TW	9	4.762	0.1875	28
6 490	2 980	21	25	RJ,TW	8	5.953	0.2344	44
9 720	4 350	18	21	RJ	7	7.938	0.3125	81
5 100	2 610	20	24	RJ,TW	10	4.762	0.1875	38
8 130	3 830	18	22	RJ,TW	8	6.747	0.2656	65
11 600	5 290	16	19	RJ	7	8.731	0.3437	111
7 980	4 050	17	20	RJ,TW	9	6.350	0.2500	64
10 900	5 320	16	19	RJ,TW	8	7.938	0.3125	104
13 500	6 270	15	18	RJ	7	9.525	0.3750	141
8 550	4 680	15	18	RJ,TW	10	6.350	0.2500	77
11 900	6 300	14	16	RJ,TW	9	7.938	0.3125	128
17 500	9 000	12	14	RJ	8	10.319	0.4063	232
11 200	6 620	13	15	RJ,TW	11	7.144	0.2813	111
16 500	9 070	12	14	RJ,TW	9	9.525	0.3750	193
22 700	12 000	11	12	RJ	8	11.906	0.4687	340
13 600	8 240	11	13	RJ	11	7.938	0.3125	146
21 800	12 300	10	12	RJ	9	11.112	0.4375	273
28 300	15 400	9.4	11	RJ	8	13.494	0.5313	432
14 300	9 240	10	12	RJ	12	7.938	0.3125	180
24 700	14 300	9.1	11	RJ	9	11.906	0.4687	354
17 800	12 100	9.1	11	RJ	13	8.731	0.3437	233
27 800	16 400	8.4	10	RJ	9	12.700	0.5000	386
18 500	13 300	8.4	9.9	RJ	14	8.731	0.3437	252
29 800	18 600	7.8	9.2	RJ	10	12.700	0.5000	446
24 000	17 000	7.5	8.9	RJ	13	10.319	0.4063	357
36 900	23 500	6.9	8.2	RJ	10	14.288	0.5625	571
25 000	18 500	7.0	8.3	RJ	14	10.319	0.4063	381
44 600	29 000	6.3	7.4	RJ	10	15.875	0.6250	745

(1) Open type bearings have shield/seal grooves. (2) SUJ2 material type (without suffix H) is also available. Load ratings of SUJ2 material types are calculated by Cr/0.85 and Cor/0.80 of stainless material types.
(3) Single shield or single seal types are also available; suffix Z, RS, RU or TS.
(4) Applicable only for open, single Z, ZZ, single RU and 2RU types in inner ring rotating conditions. Max. speeds for the contact rubber seal(s) types will be around 50-60% of above values.

Extra thin metric series: ET, ER



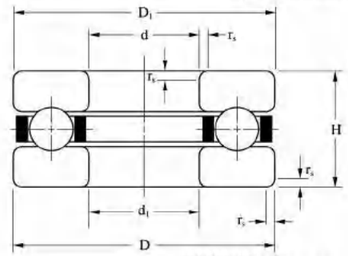




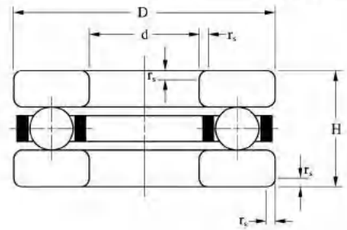
Bore Diameter: d		Outer Diameter: D		Open Type Width: B		Seal·Shield Type Width: B_1		Chamfer rs(min)		Bearing References				Load Rating		Max. Speed		Cage Type	Ball Complement			Weight(Ref.)	
										Open	2Shields	2Seals		Cr (N)	Cor (N)	Grease	Oil		Qty.: Z	Size: Dw		2Shields	Flange 2Shields
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch					(N)		X1000min⁻¹			pcs.	mm	inch	g	
ET series																							
15	0.5906	20	0.7874	3.5	0.1378	–	–	0.15	0.0059	ET2015	–	–	943	583	11	13	W	14	1.588	0.0625	2.14	–
		21	0.8268	3.5	0.1378	–	–	0.15	0.0059	ET2115	–	–	937	581	11	13	W	14	1.588	0.0625	3.04	–
16	0.6299	22	0.8661	4.0	0.1575	4.0	0.1575	0.15	0.0059	ET2216(1)	ZZS	TTS	971	620	10	12	W	15	1.588	0.0625	3.39	3.70
		23	0.9055	4.5	0.1772	4.5	0.1772	0.15	0.0059	ET2316(1)	ZZS	TTS	971	620	10	12	W	15	1.588	0.0625	4.98	5.29
20	0.7874	25	0.9843	4.0	0.1575	4.0	0.1575	0.15	0.0059	ET2520(1)	ZZS	TTS	1 010	691	8.5	10	W	17	1.588	0.0625	2.96	3.30
ER series																							
9.525	0.3750	15.875	0.6250	3.967	0.1562	3.967	0.1562	0.25	0.0098	ER1038(1)	ZZS	TTS	857	435	15	17.5	W	11	1.588	0.0625	2.40	2.60
12.700	0.5000	19.050	0.7500	3.967	0.1562	3.967	0.1562	0.25	0.0098	ER1212(1)	ZZS	TTS	919	537	12	14	W	13	1.588	0.0625	3.01	3.26
15.875	0.6250	22.225	0.8750	3.967	0.1562	3.967	0.1562	0.25	0.0098	ER1458(1)	ZZS	TTS	971	620	10	12	W	15	1.588	0.0625	3.64	3.95
19.050	0.7500	25.400	1.0000	3.967	0.1562	3.967	0.1562	0.25	0.0098	ER1634(1)	ZZS	TTS	1 010	691	8.5	10	W	17	1.588	0.0625	4.22	4.56

(1) Open type bearings have shield/seal grooves.
(2) Single shield or single seal types are also available; suffix ZS or TS.
(3) Prefix S is added for stainless material types. Load ratings of stainless material types are calculated by Cr×0.85 and Cor×0.80 of SUJ2 material types.
(4) Applicable only for open, single Z, ZZ, single RU and 2RU types in inner ring rotating conditions. Max. speeds for the contact rubber seal(s) types will be around 50-60% of above values.

Thrust series: FM, F



FM SERIES with raceway



F SERIES without raceway

FM series with raceway

Bearing Reference	Inner Ring Bore Dia. d		Outer Ring Outer Dia. D		Outer Ring Bore Dia. d_1		Inner Ring Outer Dia. D_1		Chamfer rs(min)		Hight H		Load Rating Ca(N)	Load Rating Coa(N)	Max Speed Oil	Cage Type	Ball Complement Qty.:Z	Ball Complement Size:Dw		Weight (Ref.)
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	(N)		X1000min⁻¹		pcs.	mm	inch	g
F3-8M	3	0.1181	8	0.3150	3.2	0.1260	7.8	0.3071	0.15	0.0059	3.5	0.1378	994	932	24	TP	6	1.588	0.0625	0.8
F4-9M	4	0.1575	9	0.3543	4.2	0.1654	8.8	0.3465	0.15	0.0059	4.0	0.1575	945	932	22	TP	6	1.588	0.0625	1.2
F4-10M	4	0.1575	10	0.3937	4.2	0.1654	9.8	0.3858	0.15	0.0059	4.0	0.1575	925	932	21	TP	6	1.588	0.0625	1.5
F5-12M	5	0.1969	12	0.4724	5.2	0.2047	11.8	0.4646	0.20	0.0079	4.0	0.1575	1 060	1 240	19	TP	8	1.588	0.0625	2.1
F6-12M	6	0.2362	12	0.4724	6.2	0.2441	11.8	0.4646	0.20	0.0079	4.5	0.1772	1 820	2 220	18	TP	9	2.000	0.0787	2.2
F6-14M	6	0.2362	14	0.5512	6.25	0.2461	13.8	0.5433	0.20	0.0079	5.0	0.1969	2 160	2 440	16	TP	7	2.381	0.0937	3.5
F7-13M	7	0.2756	13	0.5118	7.2	0.2835	12.8	0.5039	0.20	0.0079	4.5	0.1772	1 770	2 220	18	TP	9	2.000	0.0787	2.4
F7-17M	7	0.2756	17	0.6693	7.2	0.2835	16.8	0.6614	0.30	0.0118	6.0	0.2362	3 090	3 800	14	TP	8	2.778	0.1094	6.3
F8-16M	8	0.3150	16	0.6299	8.2	0.3228	15.8	0.6220	0.30	0.0118	5.0	0.1969	3 920	4 990	16	TP	9	3.000	0.1181	3.9
F8-19M	8	0.3150	19	0.7480	8.2	0.3228	18.8	0.7402	0.30	0.0118	7.0	0.2756	3 940	4 970	12	TP	8	3.175	0.1250	9.3
F9-20M	9	0.3543	20	0.7874	9.2	0.3622	19.8	0.7795	0.30	0.0118	7.0	0.2756	3 860	4 970	12	TP	8	3.175	0.1250	9.9
F10-18M	10	0.3937	18	0.7087	10.2	0.4016	17.8	0.7008	0.30	0.0118	5.5	0.2165	2 470	3 490	14	TP	10	2.381	0.0937	5.3

(1) Bearings in stainless steel material (suffix H) would also be available upon request. Load ratings of stainless material types are calculated by Cr×0.85 or Cor×0.80 of SUJ2 material types.

F series without raceway

Bearing Reference	Bore Dia. d		Outer Dia. D		Chamfer rs(min)		Hight H		Load Rating Ca(N)	Load Rating Coa(N)	Cage Type	Ball Complement Qty.:Z	Ball Complement Size:Dw		Weight (Ref.)
	mm	inch	mm	inch	mm	inch	mm	inch	(N)			pcs.	mm	inch	g
F2-6	2	0.0787	6	0.2362	0.10	0.0039	3.0	0.1181	143	83	TD	6	1.000	0.0394	0.5
F2X-7	2.5	0.0984	7	0.2756	0.10	0.0039	3.5	0.1378	199	120	TD	6	1.200	0.0472	0.9
F3-8	3	0.1181	8	0.3150	0.10	0.0039	3.5	0.1378	212	140	TD	7	1.200	0.0472	1.0
F4-9	4	0.1575	9	0.3543	0.15	0.0059	4.0	0.1575	220	160	TD	8	1.200	0.0472	1.4
F4-10	4	0.1575	10	0.3937	0.15	0.0059	4.5	0.1772	355	245	TD	7	1.588	0.0625	1.9
F5-11	5	0.1969	11	0.4331	0.15	0.0059	4.5	0.1772	341	245	TD	7	1.588	0.0625	2.2
F6-12	6	0.2362	12	0.4724	0.15	0.0059	4.5	0.1772	389	314	TD	9	1.588	0.0625	2.5
F7-15	7	0.2756	15	0.5906	0.20	0.0079	5.0	0.1969	793	628	TD	8	2.381	0.0937	4.2
F8-16	8	0.3150	16	0.6299	0.20	0.0079	5.0	0.1969	537	443	TD	8	2.000	0.0787	4.9
F9-17	9	0.3543	17	0.6693	0.20	0.0079	5.0	0.1969	567	499	TD	9	2.000	0.0787	5.2
F10-18	10	0.3937	18	0.7087	0.20	0.0079	5.5	0.2165	800	707	TD	9	2.381	0.0937	6.1

Interchange

〈Metric Series〉

●OPEN BEARINGS

EZO	KOYO	NMB	NSK	NTN
681	681	L-310	681	681
MR31	ML1003	L-310W51	MR31	–
691	691	R-410	691	691
MR41X	ML1204	R-412	MR41X	BC1.2-4
681X	68/1.5	L-415	681X	68/1.5
691X	69/1.5	R-515	691X	69/1.5
601X	ML1506	R-615	601X	60/1.5
672	–	–	672	672
682	682	L-520	682	682
MR52	ML2005	L-520W02	MR52	BC2-5
692	692	R-620	692	692
MR62	ML2006	R-620W02	MR62	BC2-6
MR72	ML2007	R-720Y52	MR72	BC2-7
602	602	R-720	602	602
682X	68/2.5	L-625	682X	68/2.5
692X	69/2.5	R-725	692X	69/2.5
MR82X	ML2508/1B	R-825Y52	MR82X	BC2.5-8
602X	ML2508	R-825	602X	60/2.5
MR63	ML3006	L-630	MR63	673
683	683	L-730	683	683
MR83	ML3008	R-830Y52	MR83	BC3-8
693	693	R-830	693	693
MR93	ML3009	R-930Y52	MR93	BC3-9
603	603	R-930	603	603
623	623	R-1030	623	623
633	633	–	633	633
MR74	ML4007	L-740	MR74	674
MR84	ML4008	L-840	MR84	BC4-8
684	684	L-940	684	684
MR104	ML4010	L-1040X2	MR104	BC4-10
694	694	R-1140	694	694
604	604	R-1240	604	604
624	624	R-1340	624	624
634	634	R-1640X4	634	634
MR85	ML5008	L-850	MR85	675
MR95	ML5009	L-950	MR95	BC5-9
MR105	ML5010	L-1050	MR105	BC5-10
685	685	L-1150	685	685
695	695	R-1350	695	695
605	605	R-1450	605	605
625	625	R-1650X4	625	625
635	635	R-1950	635	635
MR106	ML6010	L-1060	MR106	676
MR126	ML6012	L-1260	MR126	BC6-12
686	686	L-1360	686	686
696	696	R-1560	696	696
606	606	R-1760X2	606	606
626	626	R-1960	626	626
636	636	–	636	636
MR117	ML7011	L-1170	MR117	677
MR137	ML7013	L-1370	MR137	BC7-13
687	687	L-1470	687	687
697	697	–	697	697
607	607	R-1970	607	607
627	627	R-2270	627	627
637	637	–	637	637
MR128	ML8012	L-1280	MR128	678
MR148	ML8014	L-1480	MR148	BC8-14
688	688	L-1680	688	688
698	698	R-1980	698	698
608	608	R-2280	608	608
628	628	–	628	628
638	638	–	638	638
679	679	–	679	679
689	689	L-1790	689	689
699	699	L-2090	699	699
609	609	–	609	609
629	629	R-2690	629	629
639	639	–	639	639
6800	6800	L-1910W7	6800	6800
6900	6900	–	6900	6900
6000	6000	R-2610	6000	6000
6200	6200	–	6200	6200
6801	6801	–	6801	6801
6901	6901	–	6901	6901
6802	6802	–	6802	6802
6902	6902	–	6902	6902
6803	6803	–	6803	6803
6903	6903	–	6903	6903

●FLANGED OPEN BEARINGS

EZO	KOYO	NMB	NSK	NTN
F681	F681	LF-310	F681	FL681
F691	F691	RF-410	F691	FL691
MF41X	OBF05	RF-412	MF41X	FLBC1.2-4
F681X	F68/1.5	RF-415	F681X	FL68/1.5
F691X	F69/1.5	RF515	F691X	FL69/1.5
F601X	MLF1506	RF-615	F601X	FL60/1.5
F682	F682	LF-520	F682	FL682
MF52	MLF2005	LF-520W02	MF52	–
F692	F692	RF-620	F692	FL692
MF62	MLF2006	RF-620W52	MF62	FLBC2-6
MF72	MLF2007	RF-720Y52	MF72	–
F602	F602	RF-720	F602	FL602
F682X	F68/2.5	LF-625	F682X	FL68/2.5
F692X	F69/2.5	RF-725	F692X	FL69/.25
MF82X	MLF2508/1B	RF-825Y52	MF82X	FLBC2.5-8
F602X	MLF2508	RF-825	F602X	FL60/2.5
MF53	MLF3006	LF-630	MF63	FL673
F683	F683	LF-730	F683	FL683
MF83	MLF3008	RF-830Y52	MF83	FLBC3-8
F693	F693	RF-830	F693	FL693
MF93	MLF3009	RF-930Y52	MF93	FLBC3-9
F603	F603	RF-930	F603	FL603
F623	F623	RF-1030	F623	FL623
MF74	MLF4007	LF-740	MF74	FL674
MF84	MLF4008	LF-840	MF84	FLBC4-8
F684	F684	LF-940	F684	FL684
MF104	MLF4010	LF-1040X2	MF104	FLBC4-10
F694	F694	RF-1140	F694	FL694
F604	F604	RF-1240	F604	FL604
F624	F624	RF-1340	F624	FL624
F634	F634	RF-1640	F634	FL634
MF85	MLF5008	LF-850	MF85	FL675
MF95	MLF5009	LF-950	MF95	FLBC5-9
MF105	MLF5010	LF-1050	MF105	FLBC5-10
F685	F685	LF-1150	F685	FL685
F695	F695	RF-1350	F695	FL695
F605	F605	RF-1450	F605	FL605
F625	F625	RF-1650X4	F625	FL625
F635	F635	RF-1950	F635	FL635
MF106	MLF6010	LF-1060	MF106	FL676
MF126	MLF6012	LF-1260	MF126	FLBC6-12
F686	F686	LF-1360	F686	FL686
F696	F696	RF-1560X2	F696	FL696
F606	F606	RF-1760X2	F606	FL606
F626	F626	RF-1960	F626	FL626
MF117	MLF7011	LF-1170	MF117	FL677
MF137	MLF7013	LF-1370	MF137	FLBC3-17
F687	F687	LF-1470	F687	FL687
F697	F697	–	F697	FL697
F607	F607	RF-1970	F607	FL607
F627	F627	RF-2270	F627	FL627
MF128	MLF8012	LF-1280	MF128	FL678
MF148	MLF8014	LF-1480	MF148	FLBC8-14
F688	F688	LF-1680	F688	FL688
F698	F698	RF-1980	F698	FL698
F608	F608	RF-2280	F608	FL608
F679	–	–	F679	FL679
F689	F689	LF-1790	F689	FL689
F699	F699	LF-2090	F699	FL699
F609	F609	–	F609	FL609
F6800	F6800	LF-1910	F6800	FL6800
F63800	F63800	LF-1910W7	F63800	FL63800
F6900	F6900	–	F6900	FL6900

●SHIELDED BEARINGS

EZO	KOYO	NMB	NSK	NTN
681XZZ	W68/1.5ZZ	L-415ZZ	681XZZ	W68/1.5ZZA
691XZZ	W69/1.5ZZ	R-515ZZ	691XZZ	W69/1.5ZZA
601XZZ	WML1506ZZ	R-615ZZ	601XZZ	W60/1.5ZZA
682ZZ	W682ZZ	L-520ZZ	682ZZ	W682ZZA
MR52ZZ	WML2005ZZ	L-520ZZW52	MR52ZZ	WBC2-5ZZA
692ZZ	W692ZZ	R-620ZZ	692ZZ	W692ZZA
MR62ZZ	WML2006ZZ	R-620ZZY52	MR62ZZ	WBC2-6ZZA
MR72ZZS	WML2007ZZ	R-720ZZY03	MR72ZZS	WBC2-7ZZA
602ZZS	W602ZZX	R-720ZZ	602ZZS	W602ZZA
682XZZ	W68/2.5ZZ	L-625ZZ	682XZZ	W68/2.5ZZA
692XZZS	W69/2.5ZZ	R-725ZZ	692XZZ	W69/2.5ZZA
602XZZ	WOB17ZZ	R-825ZZ	602XZZ	W60/2.5ZZA
MR63ZZ	WML3006ZZX	L-630ZZ	MR63ZZS	WA673ZZA
683ZZ	W683ZZ	L-730ZZ	683ZZ	WA683ZZA
MR83ZZ	WML3008ZZ	L-830ZZ	MR83ZZ	WBC3-8ZZA
693ZZ	W693ZZ	R-830ZZ	693ZZ	WA693ZZA
MR93ZZ	603/2BZZ	R-930ZZY04	MR93ZZ	WBC3-9ZZA
603ZZ	W603ZZ	R-930ZZ	603ZZ	W603ZZA
623ZZ	623ZZ	R-1030ZZ	623ZZ	623ZZA
633ZZ	633ZZ	R-1330ZZ	633ZZ	633ZZ
MR74ZZ	WML4007ZZX	L-740ZZ	MR74ZZS	WA674ZZA
MR84ZZ	WML4008ZZX	L-840ZZ	MR84ZZ	WBC4-8ZZA
684ZZ	W684ZZ	L-940ZZ	684ZZ	W684ZZA
MR104ZZ	WML4010ZZ	L-1040ZZ	MR104ZZ	WBC4-10ZZA
694ZZ	694ZZ	R-1140ZZ	694ZZ	694ZZA
604ZZ	604ZZ	R-1240ZZ	604ZZ	604ZZ
624ZZ	624ZZ	R-1340ZZ	624ZZ	624ZZ
634ZZ	634ZZ	R-1640ZZ	634ZZ	634ZZ
MR85ZZ	WML5008ZZX	L-850ZZ	MR85ZZS	WA675ZZA
MR95ZZ	WML5009ZZX	L-950ZZ	MR95ZZS	WBC5-9ZZA
MR105ZZ	WML5010ZZ	L-1050ZZ	MR105ZZ	WBC5-10ZZA
685ZZ	W685ZZ	L-1150ZZ	685ZZ	W685ZZA
695ZZ	695ZZ	R-1350ZZ	695ZZ	695ZZA
605ZZ	605ZZ	R-1450ZZ	605ZZ	605ZZ
625ZZ	625ZZ	R-1650ZZ	625ZZ	625ZZ
MR106ZZ	WML610ZZX	L-1060ZZ	MR106ZZS	WA676ZZA
MR126ZZ	WML6012ZZ	L-1260ZZ	MR126ZZ	WBC6-12ZZA
686ZZ	W686ZZ	L-1360ZZ	686ZZ	W686ZZA
696ZZ	696ZZ	R-1560ZZ	696ZZ	696ZZ
606ZZ	606ZZ	R-1760ZZ	606ZZ	606ZZ
626ZZ	626ZZ	R-1960ZZ	626ZZ	626ZZ
MR117ZZS	WML7011ZZX	L-1170ZZ	MR117ZZS	WA677ZZA
MR137ZZ	WML7013ZZ	L-1370ZZ	MR137ZZ	WBC7-13ZZA
687ZZ	W687ZZ	L-1470ZZ	687ZZ	W687ZZA
607ZZ	607ZZ	R-1970ZZ	607ZZ	607ZZ
627ZZ	627ZZ	R-2270ZZ	627ZZ	627ZZ
MR128ZZ	WML8012ZZX	L-1280ZZ	MR128ZZS	W678ZZA
MR148ZZ	WML8014ZZ	L-1480ZZ	MR148ZZ	WBC8-14ZZA
688ZZ	W688ZZ	L-1680ZZ	688ZZ	W688ZZ
608ZZ	608ZZ	R-2280ZZ	608ZZ	608ZZ
689ZZ	W689ZZ	L-1790ZZ	689ZZ	W689ZZ
699ZZ	699ZZ	L-2090ZZ	699ZZ	699ZZ
629ZZ	629ZZ	R-2690ZZ	629ZZ	629ZZ
6800ZZ	6800ZZ	L-1910ZZW5	6800ZZ	6800ZZ
63800ZZ	63800ZZ	L-1910ZZ	63800ZZ	63800ZZ
6900ZZ	6900ZZ	L-2210ZZ	6900ZZ	6900ZZ
6000ZZ	6000ZZ	R-2610ZZ	6000ZZ	6000ZZ
6200ZZ	6200ZZ	–	6200ZZ	6200ZZ
6801ZZ	6801ZZ	–	6801ZZ	6801ZZ
6901ZZ	6901ZZ	–	6901ZZ	6901ZZ
6802ZZ	6802ZZ	–	6802ZZ	6802ZZ
6902ZZ	6902ZZ	–	6902ZZ	6902ZZ
6803ZZ	6803ZZ	–	6803ZZ	6803ZZ
6903ZZ	6903ZZ	–	6903ZZ	6903ZZ

●FLANGED SHIELDED BEARINGS

EZO	KOYO	NMB	NSK	NTN
F681XZZ	WF68/1.5ZZ	LF-415ZZ	F681XZZ	FLW68/1.5ZZA
F691XZZ	WF69/1.5ZZ	RF-515ZZ	F691XZZ	FLW69/1.5ZZA
F601XZZ	WMLF1506ZZ	RF-615ZZ	F601XZZ	FLW60/1.5ZZA
F682ZZ	WF682ZZ	LF-520ZZ	F682ZZ	FLW682ZZA
MF52ZZ	WMLF2005ZZ	LF-520ZZW52	MF52ZZ	FLWBC2-5ZZA
F692ZZ	WF692ZZ	RF-620ZZ	F692ZZ	FLW692ZZA
MF62ZZ	WMLF2006ZZ	RF-620ZZY52	MF62ZZ	FLWBC2-6ZZA
MF72ZZS	WMLF2007ZZ	RF-720ZZY03	MF72ZZS	FLWBC2-7ZZA
F602ZZS	WF602ZZX	RF-720ZZ	F602ZZS	FLW602ZZA
F682XZZ	WF68/2.5ZZ	LF-625ZZ	F682XZZ	FLW68/2.5ZZA
F692XZZS	WF69/2.5ZZ	RF-725ZZ	F692XZZ	FLW69/2.5ZZA
F602XZZ	WMLF2508ZZ	RF-825ZZ	F602XZZ	FLW60/2.5ZZA
MF63ZZ	WMLF3006ZZX	LF-630ZZ	MF63ZZS	FLWA673ZZA
F683ZZ	WF683ZZ	LF-730ZZ	F683ZZ	FLW683ZZA
MF83ZZ	WMLF3008ZZ	LF-830ZZ	MF83ZZ	FLWBC3-8ZZA
F693ZZ	WF693ZZ	RF-830ZZ	F693ZZ	FLW693ZZA
MF93ZZ	F603/2BZZ	RF-930ZZY04	MF93ZZ	FLAWBC3-9ZZA
F603ZZ	WF603ZZ	RF-930ZZ	F603ZZ	FLW603ZZA
F623ZZ	F623ZZ	RF-1030ZZ	F623ZZ	FL623ZZA
F633ZZ	F633ZZ	RF-1330ZZ	F633ZZ	FL633ZZ
MF74ZZ	WMLF4007ZZX	LF-740ZZ	MF74ZZS	FLWA674ZZA
MF84ZZ	WMLF4008ZZX	LF-840ZZ	MF84ZZ	FLWBC4-8ZZA
F684ZZ	WF684ZZ	LF-940ZZ	F684ZZ	FLW684ZZA
MF104ZZ	WMLF4010ZZ	LF-1040ZZ	MF104ZZ	FLAWBC4-10ZZA
F694ZZ	F694ZZ	RF-1140ZZ	F694ZZ	FL694ZZA
F604ZZ	F604ZZ	RF-1240ZZ	F604ZZ	FL604ZZ
F624ZZ	F624ZZ	RF-1340ZZ	F624ZZ	FL624ZZ
F634ZZ	F634ZZ	RF-1640ZZ	F634ZZ	FL634ZZ
MF85ZZ	WMLF5008ZZX	LF-850ZZ	MF85ZZS	FLWA675ZZA
MF95ZZ	WMLF5009ZZX	LF-950ZZ	MF95ZZS	FLWBC5-9ZZA
MF105ZZ	WMLF5010ZZ	LF-1050ZZ	MF105ZZ	FLAWBC5-10ZZA
F685ZZ	WF685ZZ	LF-1150ZZ	F685ZZ	FLW685ZZA
F695ZZ	F695ZZ	RF-1350ZZ	F695ZZ	FL695ZZA
F605ZZ	F605ZZ	RF-1450ZZ	F605ZZ	FL605ZZ
F625ZZ	F625ZZ	RF-1650ZZ	F625ZZ	FL625ZZ
MF106ZZ	WMLF610ZZX	LF-1060ZZ	MF106ZZS	FLWA676ZZA
MF126ZZ	WMLF6012ZZ	LF-1260ZZ	MF126ZZ	FLAWBC6-12ZZA
F686ZZ	WF686ZZ	LF-1360ZZ	F686ZZ	FLW686ZZA
F696ZZ	F696ZZ	RF-1560ZZ	F696ZZ	FL696ZZ
F606ZZ	F606ZZ	RF-1760ZZ	F606ZZ	FL606ZZ
F626ZZ	F626ZZ	RF-1960ZZ	F626ZZ	FL626ZZ
MF117ZZS	WMLF7011ZZX	LF-1170ZZ	MF117ZZS	FLWA677ZZA
MF137ZZ	WMLF7013ZZ	LF-1370ZZ	MF137ZZ	FLAWBC7-13ZZA
F687ZZ	WF687ZZ	LF-1470ZZ	F687ZZ	FLW687ZZA
F607ZZ	F607ZZ	RF-1970ZZ	F607ZZ	FL607ZZ
F627ZZ	F627ZZ	RF-2270ZZ	F627ZZ	FL627ZZ
MF128ZZ	WMLF8012ZZX	LF-1280ZZ	MF128ZZS	FLAW678ZZA
MF148ZZ	WMLF8014ZZ	LF-1480ZZ	MF148ZZ	FLWBC8-14ZZA
F688ZZ	WF688ZZ	LF-1680ZZ	F688ZZ	FLW688ZZ
F608ZZ	F608ZZ	RF-2280ZZ	F608ZZ	FL608ZZ
F689ZZ	WF689ZZ	LF-1790ZZ	F689ZZ	FLW689ZZ
F699ZZ	F699ZZ	LF-2090ZZ	F699ZZ	FL699ZZ
F629ZZ	F629ZZ	RF-2690ZZ	F629ZZ	FL629ZZ
F6800ZZ	F6800ZZ	LF-1910ZZW5	F6800ZZ	FL6800ZZ
F63800ZZ	F63800ZZ	LF-1910ZZ	F63800ZZ	FL63800ZZ
F6900ZZ	F6900ZZ	LF-2210ZZ	F6900ZZ	FL6900ZZ

Interchange

〈Inch Series〉

●OPEN BEARINGS

EZO	JTEKT	NMB	NSK	NTN
R09	OB63	RI-2	R09	R01
R0	OB65	RI-2 1/2	R0	R0
R1	OB67	RI-3	R1	R1
R1-4	OB69	RI-4	R1-4	R1-4
R133	OB71	RI3332	R133	R133
R1-5	OB72	RI-5	R1-5	R1-5
R144	OB74	RI-418	R144	R144
R2-5	OB75	RI-518	R2-5	R2-5
R2-6	OB76	RI-618	R2-6	R2-6
R2	EE0	R-2	R2	R2
R2A	EE1/2	–	R2A	RA2
R155	OB79	RI-5532	R155	R155
R156	OB81	RI-5632	R156	R156
R166	OB82	RI-6632	R166	R166
R3	EE1	R-3	R3	R3
R168	OB87	RI-614	R168	R168
R188	OB88	RI-814	R188	R188
R4	EE11/2	R-4	R4	R4
R4A	EE2	RI-1214	R4A	RA4
R1810	OB92-1	RI-8516	R1810	R1810
R6	EE3	RI-1438	R6	R6
R8	–	RI-1812	R8	R8
R10	–	–	R10	R10
R12	–	–	R12	R12

●SHIELDED BEARINGS

EZO	JTEKT	NMB	NSK	NTN
R0ZZ	WOB65ZZ	RI-2 1/2ZZ	R0ZZ	RA0ZZA
R1ZZ	WOB67ZZ	RI-3ZZ	R1ZZ	RA1ZZA
R1-4ZZ	WOB69ZZX	RI-4ZZ	R1-4ZZS	RA1-4ZZA
R133ZZS	WOB71ZZX	RI-3332ZZ	R133ZZS	RA133ZZA
R1-5ZZ	WOB72ZZX	RI-5ZZ	R1-5ZZS	RA1-5ZZA
R144ZZS	WOB74ZZX	RI-418ZZ	R144ZZS	RA144ZZA
R2-5ZZ	WOB75ZZ	RI-518ZZ	R2-5ZZ	RA2-5ZZA
R2-6ZZ	WOB76ZZ	RI-618ZZ	R2-6ZZ	RA2-6ZZA
R2ZZ	EE0ZZ	R-2ZZ	R2ZZ	R2ZZA
R2AZZ	EE1/2ZZ	–	R2AZZ	RA2ZZ
R155ZZS	WOB79ZZX	RI-5532ZZ	R155ZZS	RA155ZZA
R156ZZS	WOB81ZZ	RI-5632ZZ	R156ZZS	RA156ZZA
R166ZZ	WOB82ZZ	RI-6632ZZ	R166ZZ	R166ZZA
R3ZZ	EE1SZZ	R-3ZZ	R3ZZ	RA3ZZ
R168ZZS	OB87ZZX	RI-614ZZ	R168ZZS	R168ZZA
R188ZZ	WOB88ZZ	RI-814ZZ	R188ZZ	RA188ZZA
R4ZZ	EE11/2ZZ	R-4ZZ	R4ZZ	R4ZZ
R4AZZ	EE2ZZ	RI-1214ZZ	R4AZZ	RA4ZZ
R1810ZZS	OBF92ZZX	RI-8516ZZ	R1810ZZS	RA1810ZZA
R6ZZ	EE3SZZ	RI-1438ZZ	R6ZZ	R6ZZ
R8ZZ	–	RI-1812ZZ	R8ZZ	R8ZZ
R10ZZ	–	–	R10ZZ	R10ZZ
R12ZZ	–	–	R12ZZ	R12ZZ

●FLANGED OPEN BEARINGS

EZO	JTEKT	NMB	NSK	NTN
FR0	OBF65	RIF-2 1/2	FR0	FLR0
FR1	OBF67	RIF-3	FR1	FLR1
FR1-4	OBF69	RIF-4	FR1-4	FLR1-4
FR133	OBF71	RIF-3332	FR133	FLR133
FR1-5	OBF72	RIF-5	FR1-5	FLR1-5
FR144	OBF74	RIF-418	FR144	FLR144
FR2-5	OBF75	RIF-518	FR2-5	FLR2-5
FR2-6	OBF76	RIF-618	FR2-6	FLR2-6
FR2	OBF77	RF-2	FR2	FLR2
FR155	OBF79	RIF-5532	FR155	FLR155
FR156	OBF81	RIF-5632	FR156	FLR156
FR166	OBF82	RIF-6632	FR166	FLR166
FR3	OBF84	RF-3	FR3	FLRA3
FR168	OBF87	RIF-614	FR168	FLR168
FR188	OBF88	RIF-814	FR188	FLR188
FR4	OBF89	RF-4	FR4	FLR4
FR1810	OBF92-1	RIF-8516	FR1810	FLR1810
FR6	OBF93	RIF-1438	FR6	FLR6
FR8	–	RIF-1812	FR8	FLR8
FR10	–	–	FR10	FLR10
FR12	–	–	FR12	FLR12

●FLANGED SHIELDED BEARINGS

EZO	JTEKT	NMB	NSK	NTN
FR0ZZ	WOBF65ZZ	RIF-2 1/2ZZ	FR0ZZ	FLRA0ZZA
FR1ZZ	WOBF67ZZ	RIF-3ZZ	FR1ZZ	FLRA1ZZA
FR1-4ZZ	WOBF69ZZX	RIF-4ZZ	FR1-4ZZS	FLRA1-4ZZA
FR133ZZS	WOBF71ZZX	RIF-3332ZZ	FR133ZZS	FLRA133ZZA
FR1-5ZZ	WOBF72ZZX	RIF-5ZZ	FR1-5ZZS	FLRA1-5ZZA
FR144ZZS	WOBF74ZZX	RIF-418ZZ	FR144ZZS	FLRA144ZZA
FR2-5ZZ	WOBF75ZZ	RIF-518ZZ	FR2-5ZZ	FLRA2-5ZZA
FR2-6ZZ	WOBF76ZZ	RIF-618ZZ	FR2-6ZZ	FLRA2-6ZZA
FR2ZZ	OBF77ZZ	RF-2ZZ	FR2ZZ	FLR2ZZA
FR155ZZS	WOBF79ZZX	RIF-5532ZZ	FR155ZZS	FLRA155ZZA
FR156ZZS	WOBF81ZZ	RIF-5632ZZ	FR156ZZS	FLRA156ZZA
FR166ZZ	WOBF82ZZ	RIF-6632ZZ	FR166ZZ	FLAR166ZZA
FR3ZZ	OBF84ZZ	RF-3ZZ	FR3ZZ	FLRA3ZZ
FR168ZZS	OBF87ZZX	RIF-614ZZ	FR168ZZS	FLAR168ZZA
FR188ZZ	WOBF88ZZ	RIF-814ZZ	FR188ZZ	FLRA188ZZA
FR4ZZ	OBF89ZZ	RF-4ZZ	FR4ZZ	FLR4ZZ
FR1810ZZS	OBF92ZZX	RIF-8516ZZ	FR1810ZZS	FLRA1810ZZA
FR6ZZ	WOBF93ZZ	RIF-1438ZZ	FR6ZZ	FLR6ZZ
FR8ZZ	–	RIF-1812ZZ	FR8ZZ	FLR8ZZ
FR10ZZ	–	–	FR10ZZ	FLR10ZZ
FR12ZZ	–	–	FR12ZZ	FLR12ZZ

SAPPORO PRECISION GROUP'S EFFORTS TOWARD ISO

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ISO14001 : JQA-EM0554

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