Stainless Steel Bearings

Introduction

"CNZ " stainless steel bearings have many type items, including deep groove ball bearings, angular contact ball bearings, pillow block bearings, double row angular contact ball bearings, self-aligning ball bearings as well as high-temperature stainless steel bearings etc.

Common materials are 440C, 420, 304, 314 and 316L etc. Balls are not only made of stainless steel, but also ceramic materials of ZrO2, Si3N4 and SiC. Cages are made of not only stainless steel of 304, 316L, but also engineering plastic of PTFE and PEEK etc.

The stainless steel bearings can reach the precision level of P0, P6, P5, P4. "CNZ " has the ability to develop and provide various non-standard and special bearings of stainless steel.

1: StainlessBearingMaterial

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 is used.

Chemical composition of bearing materials

Materal	Symbol	Chemical Composition (Wt%)							Equivalent	Hardness (HRC)
		C	Si	Mn	P	S	Cr	Mo		
Stainless Steel	SUS440C	0.95-1.2	≤1.00	≤1.00	≤0.040	≤0.030	16.0-18.0	≤0.75	AISI 440C, X102CrMo17, X105CrMo17, 1.4 125 1.3 543	58-64
	KS440 (ACD34)	0.60-0.75	≤1.00	≤1.00	≤0.030	≤0.020	11.5-13.0	≤0.30	X65Cr13, 1.40	3758-64

2 : Tolerance, Class, Chamfer Dimension of Bearings

Tolerances of innerring (ISO)

d(mm)		△dmp				△ds		Vdp									Vdmp			
		P0		P6	P5	P4		P4	P0			P6			P5		P4				
								Diameter series	Diameter series			Diameter series			Diameter series		Diameter series				
								0,2,3	7,8,9	0	2,3	7,8,9	0	2,3	7,8,9	0,2,3	7,8,9	0,2,3	P0	P6	P5	P4
Over	Incl.	Upper	Lower	Lower	Lower	Lower	Upper	Lower	Max.			Max.			Max.		Max.		Max.	Max.	Max.	Max.
0.6	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	4	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

Remarks 1: The upper value of the bore diameter in this table is not applicable when the distance from the bearing face is less than 1.2 times the chamter dimension rsmax

Remarks 2: According to the revision of ANSI/ABMA Std.20-1996, the classes ABEC1·ABEC3·ABEC5·ABEC7 are equivalent to CLASS0·CLASS6·CLASS5·CLASS4.

Tolerances of inner ring (continue)

△Bs(△Cs)(2)			VBs(VCs)				Kia				Sd		Sia		d(mm)	
Single bearing			Inner/outer ring		Inner ring											
P0		P5	P0	P6	P5	P4	P0	P6	P5	P4	P5	P4	P5	P4		
P6		P4														
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	15	15	5	2.5	10	6	4	2.5	7	3	7	3	2.5	10
0	-120	-80	20	20	5	2.5	10	7	4	2.5	7	3	7	3	10	18
0	-120	-120	20	20	5	2.5	13	8	4		8	4	8	4	18	30
0	-120	-120	20	20	5	3	15	10	5	4	8	4	8	4	30	50

Note(1): 0.6mm is included in this classification Note(2): The inner ring width variation is the same for the outer ring of the same bearing size.CLASS5 and CLASS4 referring to outer ring only.

Tolerances of outer ring (ISO)

d(mm)		△Dmp				△Ds		VDp(2)												VDmp(2)			
		P0	P6	P5	P4	P4		P0				P6				P5		P4		P0	P6	P5	P4
								Open			Seal Shiel	Open			Seal Shiel	Open		Open					
						Diameter series		Diameter series			Diameter	series	Diameter series			Diameter series		Diameter series						
						0'2,3		7'8,9	0	2,3	2,3	7'8,9	0	2'3	2,3	7'8,9	0'2,3	7'8,9	0'2,3				
Over	Incl.	Lower	Lower	Lower	Lower	Upper	Lower	Max.				Max.				Max.		Max.		Max.	Max.	Max.	Max.
2.5(1)	6	0	-8	-7	-5	0	-4	10	8	6	10	9	7	5	9	5	4	4	3	6	5	3	2
6	18	0	-8	-7	-5	0	-4	10	8	6	10	9	7	5	9	5	4	4	3	6	5	3	2
18	30	0	-9	-8	-6	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	0	-6	14	11	8	16	11	9	7	13	7	5	6	5	8	7	4	3.5
50	80	0	-13	-11	-9	0	-7	16	13	10	20	14	11	8	16	9	7	7	5	10	8	5	3.5

Remarks 1: 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 rsmax

Remarks 2: According to the revision of ANSI/ABMA Std.20-1996, the classes ABEC1·ABEC3·ABEC5·ABEC7 are equivalent to CLASS0·CLASS6·CLASS5·CLASS4.

Tolerances of outer ring (continue)

Kea				SD		Sea		VCs(3)		d(mm)		Flanged type △Dis				d(mm)		Flanged type △Cis			
P5	P4	P5	P4	P5	P4	P5	P4	P5	P4			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	—	10	+220	-36	0	-36	0.6	2.5	0	-40	0	-40
15	8	5	3	8	4	8	5	5	2.5	10	18	+270	-43	0	-43	2.5	10	0	-120	0	-40
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

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 for the inner ring of the same as for the inner ring of the same bearing size.

Tolerances of innerring and width

Unit: μm

d(mm)		△dmp		△ds		Vdp	Vdmp	△Bs(△Cs)		VBs		Kia		Sia		Sd	
								Single bearing									
		ABEC 5P		ABEC 5P		ABEC5P	ABEC5P	AB EC 5P		ABE C5P	ABE C7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P
		ABEC 7P		ABEC 7P		ABEC7P	ABEC7P	AB EC 7P									
Over	Incl.	Upper	Lower	Upper	Lower	Max	Max.	Upper	Lower	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.
	10	0	-5	0	-5	2.5	2.5	0	-25	5	2.5	3.5	2.5	7	3	7	3
10	18	0	-5	0	-5	2.5	2.5	0	-25	5	2.5	3.5	2.5	7	3	7	3
18	30	0	-5	0	-5	2.5	2.5	0	-25	5	2.5	3.5	2.5	7	3	7	3

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

Tolerances of outer ring and width

Unit: μm

D(mm)		△Dmp			△Ds						VDp,VDmp		△Bs(△Cs)		VCs(1)		SD		Kea		Sea		Flangedtype					
					Open			Seal, Shield			ABEC 5P,7P		single bearing										△Dis		△Cis (1)		Seal (2)	
		ABEC 5P' 7P	ABEC 5P	ABEC 7P	ABEC 5P,7P	ABEC 5P	ABEC 7P	ABEC 5P' 7P	ABEC 5P	ABEC 7P	Open	seal shield	ABEC 5P, 7P		ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P, 7P		ABEC 5P, 7P		ABEC 5P	ABEC 7P
Over	Incl.	Upper	Lower	Lower	Upper	Lower	Lower	Upper	Lower	Lower	Max.	Max.	Upper	Lower	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Upper	Lower	Upper	Lower	Upper	Lower
-	18	0	-5	-5	0	-5	-5	+1	-6	-6	2.5	5	0	-25	5	2.5	8	4	5	3.5	8	5	0	-25	0	-51	7.5	5
18	30	0	-6	-5	0	-6	-5	+1	-7	-6	2.5	5	0	-25	5	2.5	8	4	6	4	8	5	0	-25	0	-51	7.5	5
30	50	0	-6	-5	0	-6	-5	+1	-7	-6	2.5	5	0	-25	5	2.5	8	4	6	4	8	5	0	-25	0	-51	7.5	5

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

Limit tolerance values of chamfer dimensions of radial bearings

Unit: μm

rsmin	d(mm)		rsmax		ramax
	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

Symbol Definition

d	: Nominal bore diameter
△dmp	: Single plane mean △ bore diameter deviation
Ads	: Deviation of a single bore diameter
Vdp	: Bore diameter variation in a single radial plane
Vamp	: Mean bore diameter variation
△Bs(△Cs)	: Deviation of the single inner and outer ring width from the normal dimension
VBs(V Cs)	: Variation of the inner and outer ring width
Kia	: Radial runout of assembled bearing inner ring
Sd	: Face runout with bore
Sia	: Assembled bearing inner ring face runout with raceway
D	: Nominal outside diameter
△Dmp	: Single plane mean outside diameter deviation
△Ds	: Deviation of a single outside diameter
V_{Dp}	: Outside diameter variation in a single radial plane
V_{Dmp}	: Mean outside diameter variation
Kea	: Radial runout of assembled bearing outer ring
S_D	: Variation of outside surface generatrix inclination with face
Sea	: Assembled bearing outer ring face runout with raceway
V_{Cs}	: Variation of outer ring width
△Dis	: Flange outside diameter deviation
△Cis	: Flange width deviation
r_{smin}	: Smallest permissible single chamfer dimension (minimum limit)
d	: Nominal bore diameter
r_{smax}	: Largest permissible single chamfer dimension (minimum limit)
r_{amax}	: Largest permissible single shaft and housing fillet radius
Note(1)	: The value of rmax in axial direction of bearing with nominal width of under 2mm is the same as
	: the one in radial direction.

3 : Fitting of Bearings

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 bearing 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 fi

1. Fitting of bearing and shaft

Condition (Steel Shaft)		Shaft Bore Diameter	Shaf ttolerance class	
			Thin type	others
Inner ring rotating load or indeterminate load direction	Light Load≤0.06Cr or Fluctuationg Load	10≤d≤18	h5	j s5
		18≤d≤30	h5	j s5
		30≤d≤50	h5	j s5
	Standard Load=0.06~0.12Cr	10≤d≤18	j s5	j5
		18≤d≤30	j s5	k5
		30≤d≤50	j s5	k5
Outer ring rotating load	Necessary for inner ring turning easily around	All bore diamet ers	g5	g6
	Unnecessary for inner ring turning easily around shaft	All bore diamet ers	h5	h6

2. Fitting of bearing and housing

Condition(ONE-PIECE HOUSING)		Axial directional movement of outer ring	Tolerace calss 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	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

4: 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.

Radial internal clearance of small and miniature bearings

Unit: μm

Clearance Symbol		C1	C2	C3	C4	C5	C6
Clearance	min	0	3	5	8	13	20
	max	5	8	10	13	20	28

Note: 1. Standard clearance is C3
2. For measuring clearance, offset by compensation factor listed below.

Unit: μm

Clearance Symbol	C1	C2	C3	C4	C5	C6
Compensation Factor	1	1	1	1	2	2

Measuring load is as follows.
Miniature bearings 2.5 N(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

Note: For measuring clearance, offset by compensation factor listed below.

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	6	6	6	6

5: 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 OFTHE 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	CNZ CODE	Manufacturer		Operating Temperature(°C)	Specific Gravity
STD. GREASE	MULTEMPSRL	SRL	KYODO YUSHI		-40~+150	0.93
	ALVANIA 2S	AV2	SHELL OIL CO.		-25~+120	0.92
HANGU GREASE	Hangu	Hangu 2	TIANJIN OIL CO.		-20~+120	0.95

LUBRICATION METHOD

There are 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)
Standard load (≤0.12Cr)

Criteria for lubricating oil selection

Operating Temperature of Bearing(°C)	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)

6: Maximum Permissible Bearing Speed

Each bearing type has its own limiting speed. The theoretical speed that bearing 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)

1. 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	0.8 5	0. 90	0.9 3	0.9 6	0. 98	1.00

2. Compensation for maximum permissible speed under combined axial and radial load

Fa/ Fr	0.2 5	0.5 0	0.7 5	1. 00	1. 25	1. 50	1. 75	2. 00
Compensation Factor	1. 00	0.9 5	0.9 3	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.

7: 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.
Full complement ball bearings are suitable for low speed and heavy radial load conditions. There is 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.

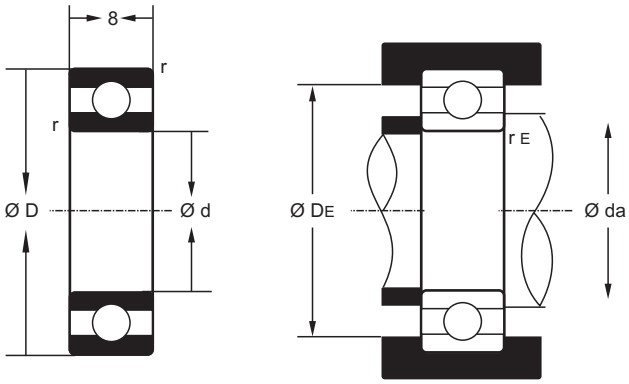
8: Problem, Cause, Remedy

	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		ng 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 corrcet lubricant quantity
		ingress of foreign matter	check and replace seals and relubricate

9: 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 po or 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 during down time	
	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
Pick-up	discolouration of raceway and rolling element surface	excessive load	check fitting correct clearance use correct lubricant quantity
		clearance too small	correct clearance
		poor lubrication	use correct lubricant quantity
	softening of surfaces	poor fitting	check fitting method
Electrical erosion	raceway eroded at regulare 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 corrent 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 during down time	
		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



Stainless deep groove ball bearing									
Bearing No.	dimension (mm)				Install dim.(mm)				weight
Z (RS)					da	da	Da	ra	(kg)
ZZ (2RS)	d	D	B	r (Min.)	Min.	Max.	Max.	Max.	
SS 684	4	9	2.5	0.1	4.8	/	8.2	0.1	0.0006
SS 694		11	4	0.15	5.2	/	9.8	0.15	0.0017
SS 604		12	4	0.2	5.6	/	10.4	0.2	0.0023
SS 624		13	5	0.2	5.6	/	11.4	0.2	0.0030
SS 634		16	5	0.3	6	/	14	0.3	0.0052
SS 685	5	11	3	0.15	6.2	/	9.8	0.15	0.0012
SS 695		13	4	0.2	6.6	/	11.4	0.2	0.0025
SS 605		14	5	0.2	6.6	/	12.4	0.2	0.0035
SS 625		16	5	0.3	7	/	14	0.3	0.0050
SS 635		19	6	0.3	7	/	17	0.3	0.0086
SS 686	6	13	3.5	0.15	7.2	/	11.8	0.15	0.0019

SS 696		15	5	0.2	7.6	/	13.4	0.2	0.0039
SS 606		17	6	0.3	8	/	15	0.3	0.0060
SS 626		19	6	0.3	8	/	17	0.3	0.0082
SS 636		22	7	0.3	8	/	20	0.3	0.0140
SS 687		14	3.5	0.15	8.2	/	12.8	0.15	0.0022
SS 697		17	5	0.3	9	/	15	0.3	0.0053
SS 607	7	19	6	0.3	9	/	17	0.3	0.0077
SS 627		22	7	0.3	9	/	20	0.3	0.0127
SS 637		26	9	0.3	9	/	24	0.3	0.0240
SS 688		16	4	0.2	9.6	/	14.4	0.2	0.0033
SS 698		19	6	0.3	10	/	17	0.3	0.0072
SS 608	8	22	7	0.3	10	/	20	0.3	0.012
SS 628		24	8	0.3	10	/	22	0.3	0.017
SS 638		28	9	0.3	10	/	26	0.3	0.028
SS 689		17	4	0.2	10.6	/	15.4	0.2	0.0035
SS 699		20	6	0.3	11	/	18	0.3	0.0085
SS 609	9	24	7	0.3	11	/	22	0.3	0.015
SS 629		26	8	0.3	11	/	24	0.3	0.020
SS 639		30	10	0.6	13	/	26	0.6	0.037
SS 6800	10	19	5	0.3	12	12	17	0.3	0.005
SS 6900		22	6	0.3	12	12.5	20	0.3	0.009
SS 6000		26	8	0.3	12	13	24	0.3	0.018
SS 6200		30	9	0.6	14	16	26	0.6	0.032

SS 6300		35	11	0.6	14	16.5	31	0.6	0.052
SS 6801	12	21	5	0.3	14	14	19	0.3	0.006
SS 6901		24	6	0.3	14	14.5	22	0.3	0.01
SS 16001		28	7	0.3	14	/	26	0.3	0.019
SS 6001		28	8	0.3	14	15.5	26	0.3	0.022
SS 6201		32	10	0.6	16	17	28	0.6	0.037
SS 6301		37	12	1	17	18	32	1	0.06
SS 6802	15	24	5	0.3	17	17	22	0.3	0.007
SS 6902		28	7	0.3	17	17	26	0.3	0.015
SS 16002		32	8	0.3	17	/	30	0.3	0.027
SS 6002		32	9	0.3	17	19	30	0.3	0.031
SS 6202		35	11	0.6	19	20.5	31	0.3	0.045
SS 6302		42	13	1	20	22.5	37	1	0.083
SS 6803	17	26	5	0.3	19	19	24	0.3	0.007
SS 6903		30	7	0.3	19	19.5	28	0.3	0.017
SS 16003		35	8	0.3	19	/	33	0.3	0.033
SS 6003		35	10	0.3	19	21.5	33	0.3	0.041
SS 6203		40	12	0.6	21	23.5	36	0.6	0.067
SS 6303		47	14	1	22	25.5	42	1	0.11
SS 6403		62	17	1.1	23.5	/	55.5	1	0.27
SS 6804	20	32	7	0.3	22	22.5	30	0.3	0.017
SS 6904		37	9	0.3	22	24	35	0.3	0.037
SS 16004		42	8	0.3	22	/	40	0.3	0.048

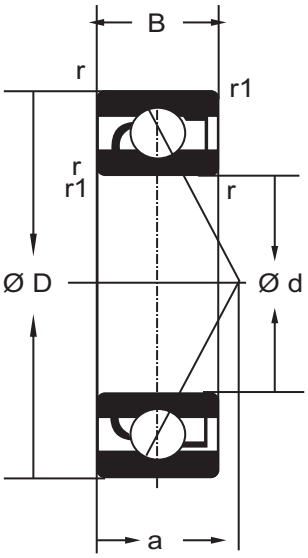
SS 6004		42	12	0.6	24	25.5	38	0.6	0.068
SS 6204		47	14	1	25	26.5	42	1	0.11
SS 6304		52	15	1.1	26.5	28	45.5	1	0.15
SS 6404		72	19	1.1	26.5	/	65.5	1	0.4
SS 6805		37	7	0.3	27	27	35	0.3	0.021
SS 6905		42	9	0.3	27	28.5	40	0.3	0.042
SS 16005		47	8	0.3	27	/	45	0.3	0.059
SS 6005	25	47	12	0.6	29	30	43	0.6	0.079
SS 6205		52	15	1	30	32	47	1	0.13
SS 6305		62	17	1.1	31.5	36	55.5	1	0.24
Ss6405		80	21	1.5	33	/	72	1.5	0.53
SS 6806		42	7	0.3	32	32	50	1	0.024
SS 6906		47	9	0.3	32	34	57	1	0.052
SS 16006		55	9	0.3	32	42.5	65.5	1	0.087
SS 6006	30	55	13	1	35	36.5	53	1	0.116
SS 6206		62	16	1	35	38.5	60	1	0.20
SS 6306		72	19	1.1	36.5	42.5	68.5	1	0.35
SS 6406		90	23	1.5	54	/	82	2	0.74
SS 6807	35	47	7	0.3	37	37	45	0.3	0.027
SS 6907		55	10	0.6	39	39	51	0.6	0.075
SS 16007		62	9	0.3	37	/	60	0.3	0.11
SS 6007		62	14	1	40	41.5	57	1	0.15
SS 6207		72	17	1.1	41.5	44.5	65.5	1	0.28

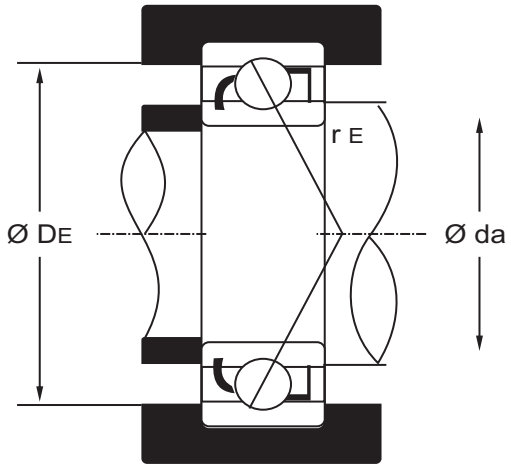
SS 6307		80	21	1.5	43	47	72	1.5	0.46
SS 6407		100	25	1.5	43	/	92	1.5	0.95
SS 6808		52	7	0.3	42	42	50	0.3	0.03
SS 6908		62	12	0.6	44	46	58	0.6	0.11
SS 16008		68	9	0.3	42	/	66	0.3	0.13
SS 6008	40	68	15	1	45	47.5	63	1	0.19
SS 6208		80	18	1.1	46.5	50.5	73.5	1	0.37
SS 6308		90	23	1.5	48	53	80	1.5	0.64
SS 6408		110	27	2	49	/	101	2	1.230
SS 6809		58	7	0.3	47	47.5	56	0.3	0.038
SS 6909		68	12	0.6	49	50	64	0.6	0.13
SS 16009		75	10	0.6	49	/	71	0.6	0.17
SS 6009	45	75	16	1	50	53.5	70	1	0.24
SS 6209		85	19	1.1	51.5	55.5	78.5	1	0.42
SS 6309		100	25	1.5	53	61.5	92	1.5	0.83
SS 6409		120	29	2	54	/	111	2	1.53
SS 6810		65	7	0.3	52	52.5	63	0.3	0.05
SS 6910		72	12	0.6	54	55	68	0.6	0.14
SS 16010		80	10	0.6	54	/	76	0.6	0.18
SS 6010	50	80	16	1	55	58.5	75	1	0.26
SS 6210		90	20	1.1	56.5	60	83.2	1	0.46
SS 6310		110	27	2	59	68	101	2	1.06
SS 6410		130	31	2.1	61	/	119	2	1.88

SS 6811	55	72	9	0.3	57	59	70	0.3	0.08
SS 6911		80	13	1	60	61.5	75	1	0.19
SS 16011		90	11	0.6	59	/	86	0.6	0.26
SS 6011		90	18	1.1	61.5	64	83.5	1	0.38
SS 6211		100	21	1.5	63	66.5	92	1.5	0.62
SS 6311		120	29	2	64	72.5	111	2	1.37
SS 6411		140	33	2.1	66	/	129	2	2.29
SS 6812	60	78	10	0.3	62	64	76	0.3	0.10
SS 6912		85	13	1	65	66	80	1	0.19
SS 16012		95	11	0.6	64	/	91	0.6	0.28
SS 6012		95	18	1.1	66.5	69	88.5	1	0.41
SS 6212		110	22	1.5	68	74.5	102	1.5	0.78
SS 6312		130	31	2.1	71	79	119	2	1.72
SS 6412		150	35	2.1	71		139	2	2.77
SS 6813	65	85	10	0.6	69	69	81	0.6	0.13
SS 6913		90	13	1	70	71.5	85	1	0.22
SS 16013		100	11	0.6	69	/	96	0.6	0.30
SS 6013		100	18	1.1	71.5	73	93.5	1	0.44
SS 6213		120	23	1.5	73	80	112	1.5	1.00
SS 6313		140	33	2.1	76	85.5	129	2	2.11
SS 6814	70	90	10	0.6	74	74.5	86	0.6	0.13
SS 6914		100	16	1	75	77.5	95	1	0.35
SS 16014		110	13	0.6	74	/	106	0.6	0.44

SS 6014		110	20	1.1	76.5	80.5	103.5	1	0.61
SS 6214		125	24	1.5	78	84	117	1.5	1.09
SS 6314		150	35	2.1	81	92	139	2	2.57
SS 6815		95	10	0.6	79	79.5	91	0.6	0.15
SS 6915		105	16	1	80	82	100	1	0.36
SS 16015	75	115	13	0.6	79	/	111	0.6	0.46
SS 6015		115	20	1.1	81.5	85.5	108.5	1	0.65
SS 6215		130	25	1.5	83	90	122	1.5	1.19
SS 6816		100	10	0.6	84	84.5	96	0.6	0.15
SS 6916		110	16	1	85	87.5	105	1	0.39
SS 16016	80	125	14	0.6	84	/	121	0.6	0.62
SS 6016		125	22	1.1	86.5	91	118.5	1	0.87
SS 6216		140	26	2	89	95.5	131	2	1.42
SS 6817		110	13	1	90	90.5	105	1	0.26
SS 6917		120	18	1.1	91.5	94.5	113.5	1	0.55
SS 16017	85	130	14	0.6	89	/	126	0.6	0.65
SS 6017		130	22	1.1	91.5	96	123.5	1	0.92
SS 6217		150	28	2	94	102	141	2	1.76
SS 6818		115	13	1	95	95.5	110	1	0.28
SS 6918		125	18	1.1	96.5	98.5	118.5	1	0.59
SS 16018	90	140	16	1	95	/	135	1	0.87
SS 6018		140	24	1.5	98	103	132	1.5	1.19
SS 6819	95	120	13	1	100	101.5	115	1	0.30

SS 6919		130	18	1.1	101.5	103.5	123.5	1	0.60
SS 16019		145	16	1	100	/	140	1	0.90
SS 6019		145	24	1.5	103	108.5	137	1.5	1.23
SS 6820	100	125	13	1	105	105.5	120	1	0.31
SS 6920		140	20	1.1	106.5	111	133.5	1	0.83
SS 16020		150	16	1	105	/	145	1	0.95
SS 6020		150	24	1.5	108	112.5	142	1.5	1.29
SS 6821	105	130	13	1	110	110.5	125	1	0.32
SS 6921		145	20	1.1	111.5	116	138.5	1	0.86
SS 6822	110	140	16	1	115	117	135	1	0.50
SS 6922		150	20	1.1	116.5	121	143.5	1	0.89
SS 6824	120	150	16	1	125	127	145	1	0.54





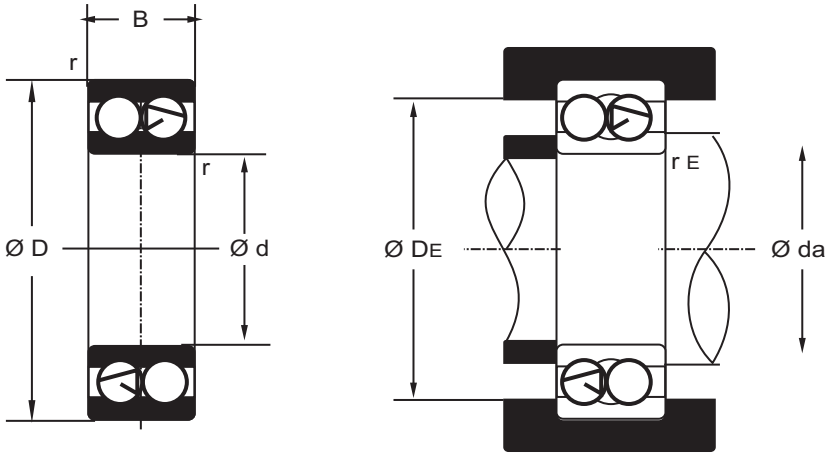
Stainless angular contact ball bearing

	dimension (mm)					InstallDim.(mm)			weight
Bearing No.	d	D	B	r	r1	da	Da	ra	(kg)
SS 7900	10	22	6	0.3	0.15	12.5	19.5	0.3	0.0091
SS 7000		26	8	0.3	0.15	12.5	23.5	0.3	0.0182
SS 7200		30	9	0.6	0.3	15	25	0.6	0.0325
SS 7300		35	11	0.6	0.3	15	30	0.6	0.052
SS 7901	12	24	6	0.3	0.15	14.5	21.5	0.3	0.0104
SS 7001		28	8	0.3	0.15	14.5	25.5	0.3	0.0221
SS 7201		32	10	0.6	0.3	17	27	0.6	0.0364

SS 7301		37	12	1	0.6	18	31	1	0.0598
SS 7902	15	28	7	0.3	0.15	17.5	25.5	0.3	0.0156
SS 7002		32	9	0.3	0.15	17.5	29.5	0.3	0.0312
SS 7202		35	11	0.6	0.3	20	30	0.3	0.0455
SS 7302		42	13	1	0.6	21	36	1	0.0832
SS 7903	17	30	7	0.3	0.15	19.5	27.5	0.3	0.0169
SS 7003		35	10	0.3	0.15	19.5	32.5	0.3	0.0416
SS 7203		40	12	0.6	0.3	22	35	0.6	0.0676
SS 7303		47	14	1	0.6	23	41	1	0.1131
SS 7904	20	37	9	0.3	0.15	22.5	34.5	0.3	0.0364
SS 7004		42	12	0.6	0.3	25	37	0.6	0.0676
SS 7204		47	14	1	0.6	26	41	1	0.1066
SS 7304		52	15	1.1	0.6	27	45	1	0.143
SS 7905	25	42	9	0.3	0.15	27.5	39.5	0.3	0.0416
SS 7005		47	12	0.6	0.3	30	42	0.6	0.0793
SS 7205		52	15	1	0.6	31	46	1	0.1287
SS 7305		62	17	1.1	0.6	32	55	1	0.234
SS 7906	30	47	9	0.3	0.15	32.5	44.5	1	0.052
SS 7006		55	13	1	0.6	36	49	1	0.1157
SS 7206		62	16	1	0.6	36	56	1	0.195
SS 7306		72	19	1.1	0.6	37	65	1	0.351
SS 7907	35	55	10	0.6	0.3	40	50	0.6	0.0754
SS 7007		62	14	1	0.6	41	56	1	0.156

SS 7207		72	17	1.1	0.6	42	65	1	0.286
SS 7307		80	21	1.5	1	44	71	1.5	0.468
SS 7908	40	62	12	0.6	0.3	45	57	0.6	0.117
SS 7008		68	15	1	0.6	46	62	1	0.195
SS 7208		80	18	1.1	0.6	47	73	1	0.364
SS 7308		90	23	1.5	1	49	81	1.5	0.637
SS 7909	45	68	12	0.6	0.3	50	63	0.6	0.1261
SS 7009		75	16	1	0.6	51	69	1	0.247
SS 7209		85	19	1.1	0.6	52	78	1	0.416
SS 7309		100	25	1.5	1	54	91	1.5	0.832
SS 7910	50	72	12	0.6	0.3	55	67	0.6	0.13
SS 7010		80	16	1	0.6	56	74	1	0.26
SS 7210		90	20	1.1	0.6	57	83	1	0.455
SS 7310		110	27	2	1	60	100	2	1.066
SS 7911	55	80	13	1	0.6	61	74	1	0.195
SS 7011		90	18	1.1	0.6	62	83	1	0.377
SS 7211		100	21	1.5	1	64	91	1.5	0.624
SS 7311		120	29	2	1	65	110	2	1.365
SS 7912	60	85	13	1	0.6	66	79	1	0.195
SS 7012		95	18	1.1	0.6	67	88	1	0.416
SS 7212		110	22	1.5	1	69	101	1.5	0.78
SS 7312		130	31	2.1	1.1	72	118	2	1.716
SS 7913	65	90	13	1	0.6	71	84	1	0.221

SS 7013		100	18	1.1	0.6	SS72	93	1	0.442
SS 7213		120	23	1.5	1	74	111	1.5	1.001
SS 7313		140	33	2.1	1.1	77	128	2	2.106
SS 7914	70	100	16	1	0.6	76	94	1	0.351
SS 7014		110	20	1.1	0.6	77	103	1	0.611
SS 7214		125	24	1.5	1	79	116	1.5	1.092
SS 7314		150	35	2.1	1.1	82	138	2	2.574
SS 7915	75	105	16	1	0.6	81	99	1	0.364
SS 7015		115	20	1.1	0.6	82	108	1	0.65
SS 7215		130	25	1.5	1	84	121	1.5	1.196
SS 7916	80	110	16	1	0.6	86	104	1	0.39
SS 7016		125	22	1.1	0.6	87	118	1	0.871
SS 7216		140	26	2	1	90	130	2	1.417
SS 7017	85	130	22	1.1	0.6	92	123	1	0.923
SS 7217		150	28	2	1	95	140	2	1.755
SS 7918	90	125	18	1.1	0.6	97	118	1	0.585
SS 7018		140	24	1.5	1	99	131	1.5	1.196
SS 7919	95	130	18	1.1	0.6	102	123	1	0.598
SS 7019		145	24	1.5	1	104	136	1.5	1.235
SS 7920	100	140	20	1.1	0.6	107	133	1	0.832
SS 7020		150	24	1.5	1	109	141	1.5	1.287
SS 7921	105	145	20	1.1	0.6	112	138	1	0.858
SS 7922	110	150	20	1.1	0.6	117	143	1	0.897

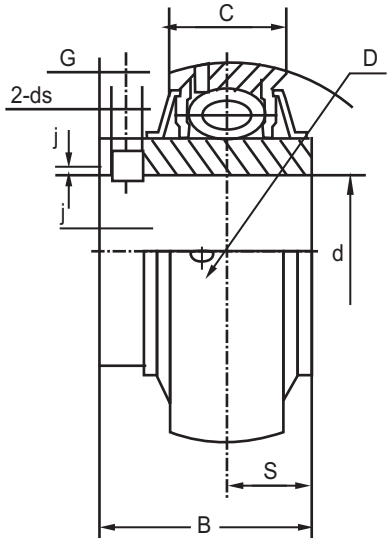


Stainless self-aligning ball bearing								
Bearing No.	Dim. (mm)				Install Dim.(mm)			Weight
	d	D	B	r	da	Da	ra	(kg)
SS 135	5	19	6	0.3	7	17	0.3	0.009
SS 126	6	19	6	0.3	8	17	0.3	0.009
SS 127	7	22	7	0.3	9	20	0.3	0.014
SS 108	8	22	7	0.3	10	20	0.3	0.014
SS 129	9	26	8	0.6	13	22	0.6	0.022
SS 1200	10	30	9	0.6	14	26	0.6	0.034
SS 2200		30	14	0.6	14	26	0.6	0.047
SS 1300		25	11	0.6	14	31	0.6	0.058

SS 2300		25	17	0.6	14	31	0.6	0.085
SS 1201	12	32	10	0.6	16	28	0.6	0.04
SS 2201		32	14	0.6	16	28	0.6	0.053
SS 1301		37	12	1	17	32	1	0.067
SS 2301		37	17	1	17	32	1	0.095
SS 1202	15	35	11	0.6	19	31	0.6	0.049
SS 2202		35	14	0.6	19	31	0.6	0.06
SS 1302		42	13	1	20	37	1	0.094
SS 2302		42	17	1	20	37	1	0.11
SS 1203	17	40	12	0.6	21	36	0.6	0.073
SS 2203		40	16	0.6	21	36	0.6	0.088
SS 1303		47	14	1	22	42	1	0.13
SS 2303		47	19	1	22	42	1	0.16
SS 1204	20	47	14	1	25	42	1	0.12
SS 2204		47	18	1	25	42	1	0.14
SS 1304		52	15	1.1	26.5	45.5	1	0.16
SS 1304		52	21	1.1	26.5	45.5	1	0.21
SS 1205	25	52	15	1	30	47	1	0.14
SS 2205		52	18	1	30	47	1	0.16
SS 1305		62	17	1.1	31.5	55.5	1	0.26
SS 2305		62	24	1.1	31.5	55.5	1	0.34
SS 1206	30	62	16	1	35	57	1	0.22
SS 2206		62	20	1	35	57	1	0.26

SS 1306		72	19	1.1	36.5	65.5	1	0.39
SS 2306		72	27	1.1	36.5	65.5	1	0.50
SS 1207	35	72	17	1.1	41.5	65.5	1	0.32
SS 2207		72	23	1.1	41.5	65.5	1	0.40
SS 1307		80	21	1.5	43	72	1.5	0.51
SS 2307		80	31	1.5	43	72	1.5	0.68
SS 1208	40	80	18	1.1	46.5	73.5	1	0.42
SS 2208		80	23	1.1	46.5	73.5	1	0.51
SS 1308		90	23	1.5	48	82	1.5	0.72
SS 2308		90	33	1.5	48	82	1.5	0.93
SS 1209	45	85	19	1.1	51.5	78.5	1	0.47
SS 2209		85	23	1.1	51.5	78.5	1	0.55
SS 1309		100	25	1.5	53	92	1.5	0.96
SS 2309		100	36	1.5	53	92	1.5	1.23
SS 1210	50	90	20	1.1	56.5	83.5	1	0.53
SS 2210		90	23	1.1	56.5	83.5	1	0.59
SS 1310		110	27	2	59	101	2	1.21
SS2310		110	40	2	59	101	2	1.64
SS 1211	55	100	21	1.5	63	92	1.5	0.71
SS 2211		100	25	1.5	63	92	1.5	0.81
SS 1311		120	29	2	64	111	2	1.58
SS 2311		120	43	2	64	111	2	2.1
SS 1212	60	110	22	1.5	68	102	1.5	0.9

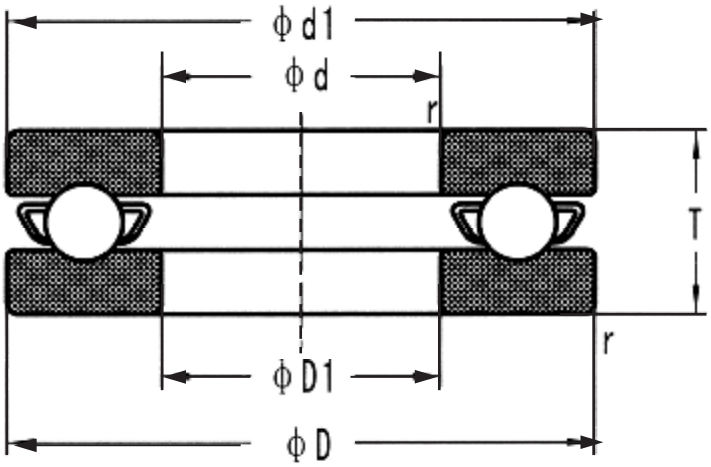
SS 2212		110	28	1.5	68	102	1.5	1.09
SS 1312		130	31	2.1	71	119	2	1.96
SS 2312		130	46	2.1	71	119	2	2.6
SS 1213	65	120	23	1.5	73	112	1.5	1.15
SS 2213		120	31	1.5	73	112	1.5	1.46
SS 1313		140	33	2.1	76	129	2	2.45
SS 2313		140	48	2.1	76	129	2	3.23
SS 1214	70	125	24	1.5	78	117	1.5	1.26
SS 2214		125	31	1.5	78	117	1.5	1.52
SS 1314		150	35	2.1	81	139	2	2.99
SS 2314		150	51	2.1	81	139	2	4.23
SS 1215	75	130	25	1.5	83	122	1.5	1.36
SS 2215		130	31	1.5	83	122	1.5	1.62
SS 1216	80	140	26	2	89	131	2	1.67
SS 2216		140	33	2	89	131	2	2.01
SS 1217	85	150	28	2	94	141	2	2.07
SS 2217		150	36	2	94	141	2	2.52



Stainless pillow block bearing

Bearing No.	Dim. (mm)							
	d	D	B	S	C	r/min	G	ds
SS 201	12	47	31	12.7	17	0.6	4.5	M6 x 1
SS 202	15	47	31	12.7	17	0.6	4.5	M6 x 1
SS 203	17	47	31	12.7	17	0.6	4.5	M6 x 1
SS 204	20	47	31	12.7	17	1	4.5	M6 x 1
SS 205	25	52	34.1	14.3	17V	1	5	M6 x 1
SS 206	30	62	38.1	15.9	19	1	5	M6 x 1
SS 207	35	72	42.9	17.5	20	1.1	6	M8 x 1
SS 208	40	80	49.2	19	21	1.1	8	M8 x 1

SS 209	45	85	49.2	19	22	1.1	8	M8 x 1
SS 210	50	90	51.6	19	24	1.1	9	M10 x 1
SS 211	55	100	55.6	22.2	25	1.5	9	M10 x 1
SS 212	60	110	65.1	25.4	27	1.5	10	M10 x 1
SS 213	65	120	65.1	25.4	27	1.5	10	M10 x 1
SS 214	70	125	74.6	30.2	29	1.5	12	M12 x 1.25
SS 215	75	130	77.8	33.3	30	1.5	12	M12 x 1.25
SS 216	80	140	82.6	33.3	33	2	14	M12 x 1.25
SS 217	85	150	85.7	34.1	36	2	14	M12 x 1.25
SS 218	90	160	96	39.7	37	2	14	M12 x 1.25
SS 220	100	180	108	42	41	2	14	M12 x 1.25

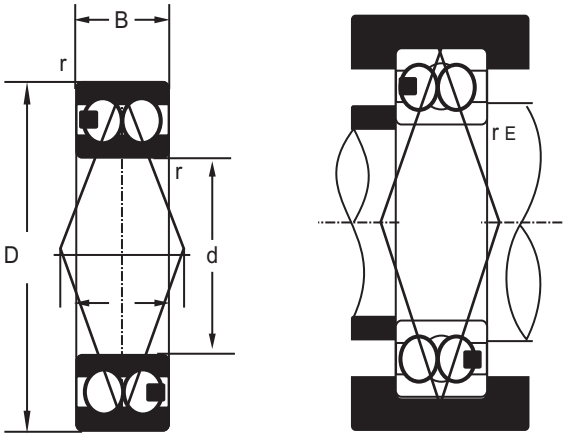


Stainless Thrust Ball Bearing

Bearing No.	d	D	T	r	d1	D1
SS 51100	10	24	9	0.3	24	11
SS 51200		26	11	0.6	26	12
SS 51101	12	26	9	0.3	26	13
SS 51201		28	11	0.6	28	14
SS 51102	15	28	9	0.3	28	16
SS 51202		32	12	0.6	32	17
SS 51103	17	30	9	0.3	30	18
SS 51203		35	12	0.6	35	19

SS 51104	20	35	10	0.3	35	21
SS 51204		40	14	0.6	40	22
SS 51105	25	42	11	0.6	42	26
SS 51205		47	15	0.6	47	27
SS 51106	30	47	11	0.6	47	32
SS 51206		52	16	0.6	52	32
SS 51107	35	52	12	0.6	52	37
SS 51207		62	18	1	62	37
SS 51108	40	60	13	0.6	60	42
SS 51208		68	19	1	68	42
SS 51109	45	65	14	0.6	65	47
SS 51209		73	20	1	73	47
SS 51110	50	70	14	0.6	70	52
SS 51210		78	22	1	78	52
SS 51111	55	78	16	0.6	78	57
SS 51211		90	25	1	90	57
SS 51112	60	85	17	1	85	62
SS 51212		95	26	1	95	62
SS 51113	65	90		1	90	67
SS 51213		100	27	1	100	67
SS 51114	70	95	18	1	95	72
SS 51214		105	27	1	105	72
SS 51115	75	100	19	1	100	77

SS 51215		110	27	1	110	77
SS 51116	80	105	19	1	105	82
SS 51216		115	28	1	115	82
SS 51117	85	110	19	1	110	87
SS 51217		125	31	1	125	88
SS 51118	90	120	22	1	120	92
SS 51218		135	35	1.1	135	93
SS 51120	100	135	25	1	135	102
SS 51220		150	38	1.1	150	103
SS 51122	110	145	25	1	145	112
SS 51124	120	155	25	1	155	122



Stainless Double-Row Angular Contacted Bearing

Bearing No.	Dim.			Weight(KG)
	d	D	B	
SS5200	10	30	14	0.051
SS5201	12	32	15.9	0.058
S5202	15	35	15.9	0.066
S5203	17	40	17.5	0.096
S5204	20	47	20.6	0.160
S5205	25	52	20.6	0.180
S5206	30	62	23.8	0.290
S5207	35	72	27	0.440
S5208	40	80	30.2	0.580
S5209	45	85	30.2	0.580
S5210	50	90	30.2	0.660
S5300	10	35	19	0.092
S5301	12	37	19	0.109
S5302	15	42	19	0.130
S5303	17	47	22.2	0.180
S5304	20	52	22.2	0.220
S5305	25	62	25.4	0.350
S5306	30	72	30.2	0.530
S5307	35	80	34.9	0.730

S5308	40	90	36.5	0.950
S5309	45	100	39.7	1.400
S5310	50	110	44.4	1.950
S3200	10	30	14	0.051
S3201	12	32	15.9	0.058
S3202	15	35	15.9	0.066
S3203	17	40	17.5	0.096
S3204	20	47	20.6	0.160
S3205	25	52	20.6	0.180
S3206	30	62	23.8	0.290
S3207	35	72	27	0.440
S3208	40	80	30.2	0.580
S3209	45	85	30.2	0.580
S3210	50	90	30.2	0.660
S3300	10	35	19	0.092
S3301	12	37	19	0.109
S3302	15	42	19	0.130
S3303	17	47	22.2	0.180
S3304	20	52	22.2	0.220
S3305	25	62	25.4	0.350
S3306	30	72	30.2	0.530
S3307	35	80	34.9	0.730
S3308	40	90	36.5	0.950
S3309	45	100	39.7	1.400
S3310	50	110	44.4	1.950
S4200	10	30	14	0.057
S4201	12	32	14	0.062
S4202	15	35	14	0.071
S4203	17	40	16	0.106
S4204	20	47	18	0.165
S4205	25	52	18	0.189
S4206	30	62	20	0.298
S4207	35	72	23	0.460
S4208	40	80	23	0.558
S4209	45	85	23	0.605
S4210	50	90	23	0.651