Ball and Roller Bearings

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Introduction

- Business publication Ball and Roller Bearings ZVL - ZKL offers a survey of the basic types and sizes of bearings being produced and delivered under trade mark ZKL and ZVL.

- Rolling Bearings included in this publication can be supplied (besides basic and currently modified types) also in further modifications, e.g. higher tolerance class, internal clearance other than normal, different material of the cage etc.

- Boundary dimensions and design of ZVL - ZKL bearings correspond to the international standards ISO.

- For individual bearing types there are given only boundary dimensions, basic load ratings, limiting speeds and weights in this publication.

- Detailed technical information on the selection and application of ZVL - ZKL bearings can be found in the specialized publications.

- Technical advice as well as proposals for application of ZVL - ZKL bearings are available in our Purchasing and Technical Department.

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Contents

Basic Designation

The designation of ZVL - ZKL bearings consists of numerical and alphabetical symbols indicating the bearing type, size and design, as shown in the schematic.
Rolling bearings of the basic design are designated by the basic designation which consists of the bearing type and size designation.
The type designation is usually formed by a symbol indicating the bearing design (see position 3 in the schematic) and by a symbol for the dimension series or the diameter series (positions 4 and 5 in the schematic); e.g., types 222, 302, NU22, 511, 60, 12, etc.
The bearing size designation is formed by symbols indicating the nominal bore diameter d (see position 6 in the schematic).

Bearings with the bore diameter d < 10 mm:

The digit separated by a slash or the last digit directly indicates the bore diameter in mm; e.g., 619/2, 624.

Bearings with the bore diameter d = 10 up to 17 mm:

The two digit number 00 indicates the bore	d = 10 mm;	e.g., 6200
The two digit number 01 indicates the bore	d = 12 mm;	e.g., 6001
The two digit number 02 indicates the bore	d = 15 mm;	e.g., 3202
The two digit number 03 indicates the bore	d = 17 mm;	e.g., 6303

An exception to the designation are separable single row ball bearings of the type E and BO, where the two digit number directly indicates the bore diameter in mm; e.g., E20, BO17.

Bearings with the bore diameter d = 20 up to 480 mm:

The bore diameter is a five times the last two-digit number; e.g., the bearing 1220 has the bore diameter d = 20 x 5 = 100 mm.
An exception is made for bearings with the bore d = 22, 28 and 32 mm.
The two-digit number separated by a slash directly indicates the bore diameter in mm; e.g., 320/32AX.

Bearings with the bore diameter d ≥ 500 mm:

The last three or four digit number separated by a slash directly indicates the bore diameter in mm; e.g., 230/530M, NU29/1180.

Complete Designation

Bearings manufactured in a different design than standard are designated by so called „complete designation“, see the schematic. This consists of the basic designation and symbols that indicate a difference from the basic design. The symbols indicating a variation are added to the basic designation as prefixes or suffixes and may also be formed by several letters or figures. The most frequently used symbols indicating bearing variations from the basic design are shown in the schematic. The number in parentheses for individual groups corresponds to the position number in the schematic.

Bearing Nomenclature

Prefixes

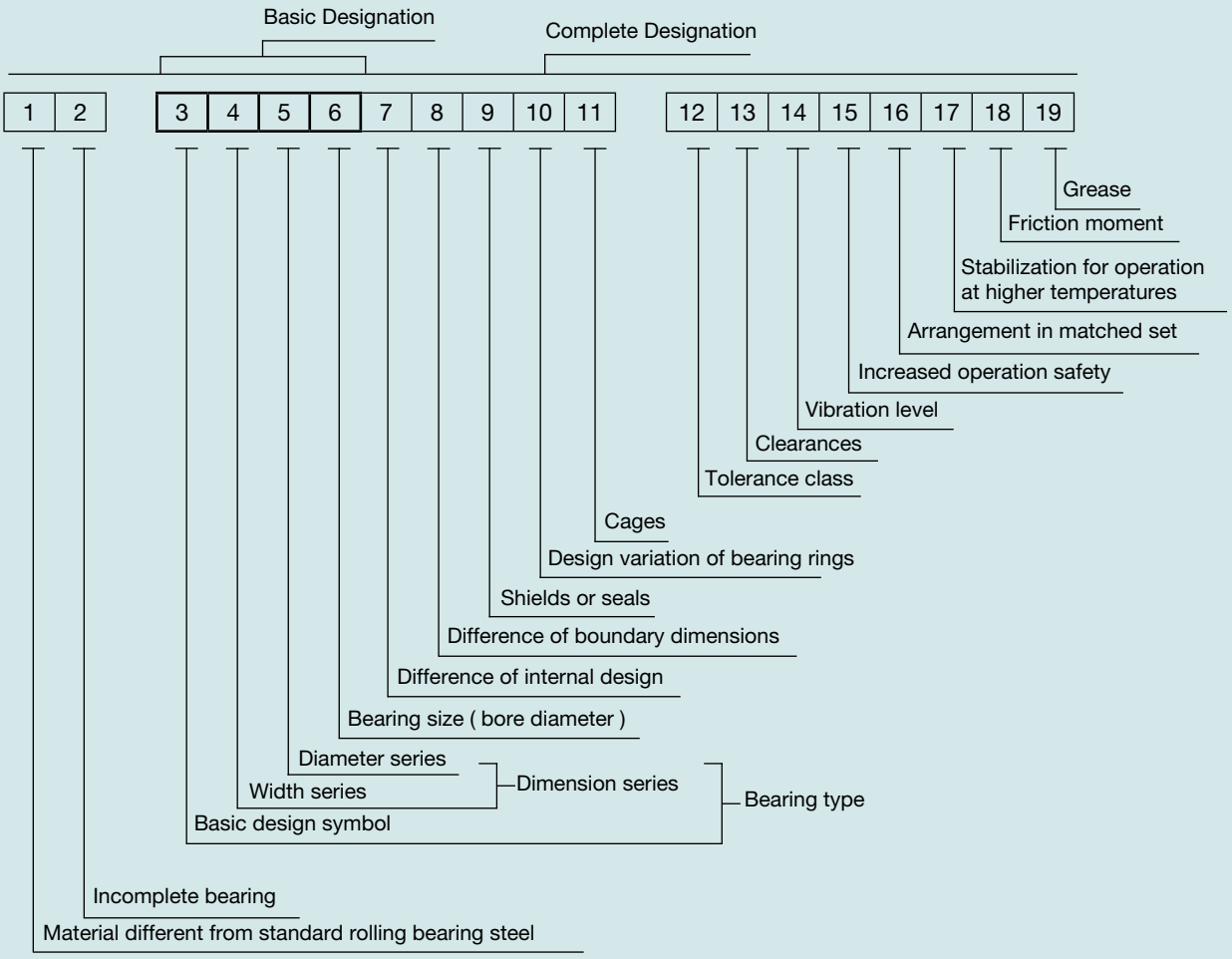
Material Different from Standard Steel (1)

X	corrosion resisting steel;	e.g., X 623
T	case hardened steel;	e.g., T 32240

Incomplete Bearing (2)

R	separable bearing without removable ring;	e.g., R N305
L	removable ring of separable bearing;	e.g., L NU206,
	for thrust ball bearings without shaft washer;	e.g., L 51215
E	single shaft washer of thrust roller bearing;	e.g., E 51314
W	single housing washer of thrust ball bearing;	e.g., W 51411
K	cage with rolling elements;	e.g., K NU320

Designation



Suffixes

Difference of Internal Design (7)

A	single row angular contact ball bearing, contact angle α = 25°;	e.g., B7205ATB P5
	single row tapered roller bearing with higher load rating and higher limiting speed;	e.g., 30206A
	thrust ball bearing with higher limiting speed;	e.g., 51105A
AA	single row angular contact ball bearing with contact angle α = 26°;	e.g., B7210AATB P4
B	single row angular contact ball bearing with contact angle α = 40°;	e.g., 7304B
	single row tapered roller bearing with contact angle α = 17°;	e.g., 32315B
BE	single row angular contact ball bearing with contact angle α = 40°; enhanced load carrying capacity;	e.g., 7302BETNG
C	single row angular contact ball bearings with contact angle α = 15°;	e.g., A7005CTA P4
	double row spherical roller bearing with C internal design construction;	e.g., 23048CM
CA	single row angular contact ball bearing with contact angle α = 12°;	e.g., B7210CATB P5
CB	single row angular contact ball bearing with contact angle α = 10°;	e.g., B7205CBTB P4
CC	double row spherical roller bearing in new design;	e.g., 23996CCM
D	single row ball bearing, type 160 with higher load rating;	e.g., 16004D
E	single row cylindrical roller bearing with higher load rating;	e.g., NU209E
	double row spherical roller bearing with higher load rating;	e.g., 24144EM
	spherical roller thrust bearing with higher load rating;	e.g., 29416EJ

Difference of Boundary Dimensions (8)

X	change of boundary dimensions, introduced by new international standards;	e.g., 32028AX

Shields or Seals (9)

RS	seal on one side;	e.g., 6203RS
-2RS	seals on both sides;	e.g., 6305-2RS
RSN	seal on one side and snap ring groove in outer ring opposite to seal side;	e.g., 6306RSN
RSNB	seal on one side and snap ring groove in outer ring on the same side as seal;	e.g., 6210RSNB
-2RSN	seals on both sides and snap ring groove in outer ring;	e.g., 6310-2RSN
RSR	seal on one side adhering to flat surface of inner ring;	e.g., 625RSR
-2RSR	seals on both sides adhering to flat surface of inner ring;	e.g., 608-2RSR
Z	metal shield on one side;	e.g., 6206Z
-2Z	metal shields on both sides;	e.g., 6206-2Z
ZN	metal shield on one side and snap ring groove in outer ring opposite to metal shield;	e.g., 6208ZN
ZNB	metal shield on one side and snap ring groove in outer ring on the same side as shield;	e.g., 6306ZNB
-2ZN	metal shields on both sides and snap ring groove in outer ring;	e.g., 6208-2ZN
ZR	metal shield on one side adhering to flat surface of inner ring;	e.g., 608ZR
-2ZR	metal shields on both sides adhering to flat surface of inner ring;	e.g., 608-2ZR
TRL	triple lip seal	e.g., UC 205TRL

Design Variation of Bearing Ring (10)

K	tapered bore, taper 1:12;	e.g., 1207K
K30	tapered bore, taper 1:30;	e.g., 24030K30M
N	snap ring groove in outer ring;	e.g., 6308N
NC	snap ring groove in the outer ring, same side as the filling slot;	e.g., 3210NC
NS	snap ring groove in the center of the outer ring;	e.g., 3203NS
NR	snap ring groove in outer ring and inserted ring;	e.g., 6308NR
NX	snap ring groove in outer ring whose boundary dimensions do not correspond to STN 02 4605;	e.g., 6210NX
D	split inner ring;	e.g., 3309D
W33	groove and lubrication holes in bearing outer ring surface;	e.g., 22220W33J
O	lubrication grooves in bearing outer ring;	e.g., NU 1014O

Cages (11)

Cage material for bearings in basic design is not usually indicated.

J	pressed steel cage, rolling element centred; (J - not indicated)	e.g., 6034J
J2	pressed steel cage, rolling element centred, new design for single row tapered roller bearings;	e.g., 30206AJ2
Y	pressed brass cage, rolling elements centred;	e.g., 6001Y
F	machined steel cage, rolling elements centred;	e.g., 6418F
L	machined light metal cage, rolling elements centred;	e.g., NG180L C3S0
M	machined brass or bronze cage, rolling elements centred;	e.g., NU330M
MB	machined brass cage guided on the inner ring;	e.g., B7215AAMB P5
MATP1	double row spherical roller bearing designed for special vibratory equipments with one-piece brass cage	e.g., 22308W33MAC4TP1
T	machined cage made of textite, rolling elements centred;	e.g., 6005T P5
TA	textite (fabric-reinforced phenolic resin) cage guided on the outer ring;	e.g., B7017AATA P5

TB	textite (fabric-reinforced phenolic resin) cage guided on the inner ring;	e.g., B7200CBTB P4T
TN	machined cage made of polyamide or similar plastic, rolling elements centred;	e.g., 6207TN
TNG	machined cage made of polyamide or similar plastic with glass fibres, rolling elements centred; (Suffix will be TNGN for ball thrust and double row self-aligning bearings)	e.g., 2305TNG

Cage design (these symbols are always used in connection with cage material symbols).

A	cage centred on outer ring;	e.g., NU 226MA
B	cage centred on inner ring;	e.g., B7204CATB P5
P	machined window type cage;	e.g., NU 1060MAP
H	one-piece open-type cage;	e.g., 629TNH
S	cage with lubrication grooves;	e.g., NJ 418MAS
V	bearing without cage, full rolling element number;	e.g., NU 209V

Tolerance Class (12)

P0	standard tolerance class (not indicated);	e.g., 6203
P6	higher tolerance class than standard;	e.g., 6205 P6
P5	higher tolerance class than P6;	e.g., 6201 P5
P5A	in some parameters higher tolerance class than P5;	e.g., 6006TB P5A
P4	higher tolerance class than P5;	e.g., B7206CATB P4
P4A	in some parameters higher tolerance class than P4;	e.g., B7205CATB P4A
P2	higher tolerance class than P4;	e.g., B7205CATB P2
P6E	higher tolerance class for rotating electric machines;	e.g., 6204 P6E
P6X	higher tolerance class for single row tapered roller bearings;	e.g., 30210A P6X
SP	higher tolerance class for cylindrical roller bearings with tapered bore;	e.g., NN3022K SPC2NA
UP	higher tolerance class than SP for cylindrical roller bearings with tapered bore;	e.g., N1016 UPC1NA

Clearances (13)

C2	clearance less than normal;	e.g., 608 C2
C0	normal clearance (not indicated);	e.g., 6203
C3	clearance greater than normal;	e.g., 6310 C3
C4	clearance greater than C3;	e.g., NU 320M C4
C5	clearance greater than C4;	e.g., 22330W33M C5
NA	radial clearance for bearings with non-interchangable rings (always after radial clearance symbol);	e.g., NU 215 P63NA

Vibration Level (14)

	normal vibration level of rolling bearings (not indicated);	e.g., 6203
C6	reduced vibration level lower than normal;	e.g., 6304 C6
C06	reduced vibration level lower than C6;	e.g., 6205 C06
C66	reduced vibration level lower than C06;	e.g., 6205 C66

Concrete C06 and C66 values are determined after negotiation between customer and supplier

Note: Bearings in tolerance class P5 and higher have vibration level C6.

Increased Operation Safety (15)

C7, C8, C9 – bearings with increased safety determined primarily for aircraft industry; e.g., 16008 C8

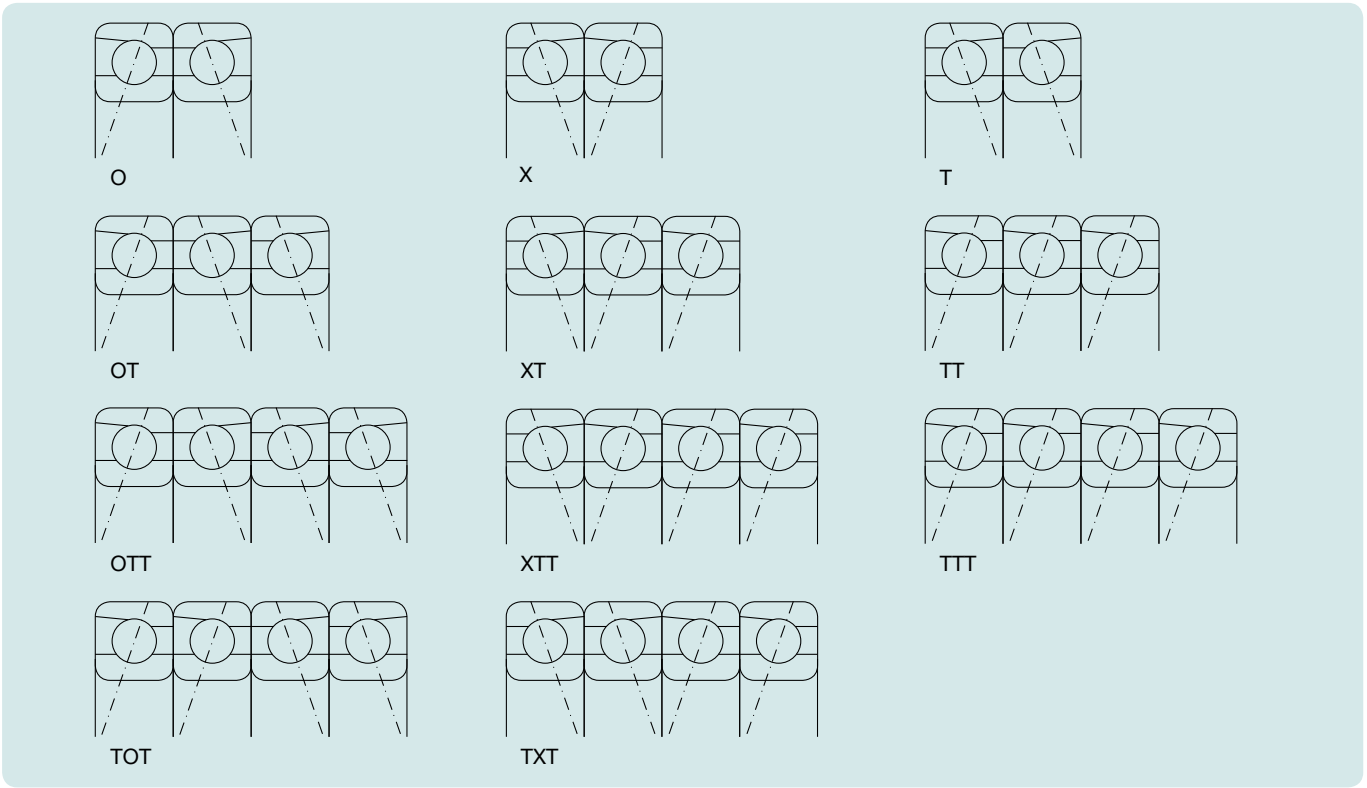
Designation

Symbol Combination (12-15)
Symbols for tolerance class, bearing internal clearance, vibration levels and increased operation safety are combined when symbol C is omitted from the second and following special bearing characteristics; e.g.:

P6 + C3 = P63	e.g., 6211 P63
P6 + C8 = P68	e.g., 16002 P68
C3 + C6 = C36	e.g., 6303-2RS C36
P5 + C3 + C9 = P539	e.g., 6205MA P539
P6 + C2NA + C6 = P626NA	e.g., NU1038 P626NA

Bearing Arrangement in Matched Set (16)
Designation of the arrangement in matched sets of two, three or four bearings consists of symbols indicating the bearing arrangement and symbols determining internal clearance, or preload of matched bearings.

U	universal bearing matching;	e.g., B7003CTA P4UL
O	bearing pairs in Back-to-Back arrangement „O“;	e.g., B7213CATB P5OM
X	bearing pairs in Face-to-Face arrangement „X“;	e.g., B7016AATB P4XL
T	bearing pairs in Tandem arrangement „T“;	e.g., B7207CATB P5T
OT	bearings matched in sets of three bearings, arrangement „OT“;	e.g., B7212CATB P5OT
TTT	bearings matched in sets of four bearings, arrangement „TTT“;	e.g., B7206CATB P4TTT



Internal Clearance or Preload
Introduced symbols are always used in combination with matching symbols.

A	bearing matching with clearance;	e.g., 7305OA
O	bearing matching without clearance;	e.g., 7305 P6XO
L	bearing matching with light preload;	e.g., B7216AATB P5OL
M	bearing matching with medium preload;	e.g., B7204CBTB P4XM
S	bearing matching with great preload;	e.g., B7018CATB P5OS

Stabilization for Operation at Higher Temperature (17)

Both rings have stabilized dimensions for operation at higher temperature:

S0	for operating temperature	up to 150°C
S1	for operating temperature	up to 200°C
S2	for operating temperature	up to 250°C
S3	for operating temperature	up to 300°C
S4	for operating temperature	up to 350°C
S5	for operating temperature	up to 400°C

Designation example – 6204 S0, 6303-2Z C5S2

Friction Moment (18)

JU	reduced friction moment;	e.g., 619/2 JU
JUA	bearings with determined friction moment for starting up;	e.g., 623 JUA
JUB	bearings with determined friction moment for running out;	e.g., 624 JUB

Grease (19)

For designation of bearings with shields or seals on both sides, filled with grease, symbol combinations are used.The first two symbols determine the operating temperature range. The third symbol (a letter) represents the name or type of lubricant, according to producer, or another symbol (a number) determines the grease volume.

TL	grease for low operating temperatures from	-60°C to +100°C;	e.g., 6302-2RS TL
TM	grease for medium operating temperatures from	-35°C to +140°C;	e.g., 6204-2Z TM
TH	grease for high operating temperatures from	-30°C to +200°C;	e.g., 6202-2Z TH
TW	grease for both low and high operating temperatures from	-40°C to +150°C;	e.g., 6310-2Z C4TW

Rolling Bearings
Dimension Tables

Single Row Deep Groove Ball Bearings

Single row deep groove ball bearings are the most common type of bearing. ZVL-ZKL offers deep groove ball bearings that are non-separable and without filling slots. Relatively high load ratings are achieved by utilizing optimum size and number of balls for each bearing. These bearings will handle both radial and axial loads in both directions and are suitable for high rotational speeds.

ZVL-ZKL also offers a separable outer ring ball bearing, which is noted by the prefix „E“ or „BO“. These bearings are produced with a bore up to 20 mm and are suitable for smaller loads and high rotational speeds.

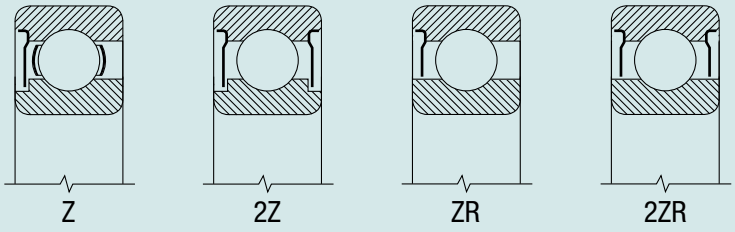
Shielded or Sealed Bearings

Single row deep groove ball bearings can be produced with seals or shields. The shields (noted by a suffix of Z, 2Z, ZR, 2ZR) are produced from metal and create a non-contact sealing surface. The seals (noted by a suffix of RS, 2RS, RSR, 2RSR) are produced by covering a vulcanised metal ring with a rubber material. The bearings are produced with contact seals.

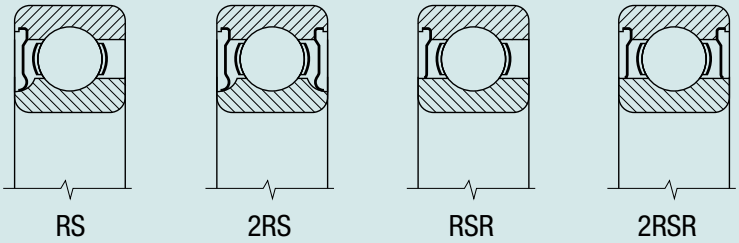
Bearings with double seals or shields are filled with grease and are lubricated for the life of the bearing. These bearings are suitable for a temperature range of -30°C to +110°C.

Single Row Deep Groove Ball Bearings

Standard Shield Designs



Standard Seal Designs



Cage

ZVL-ZKL single row deep groove ball bearings are produced with a pressed steel cage as standard production. Other styles of cages may be produced upon request, including but not limited to pressed brass, machined brass, polyamide (THN or TNB) and textite (TB) cages as well.

Boundary Dimensions

All boundary dimensions except for separable single row ball bearings (prefix „E“ and „BO“) comply with the standard ISO 15.

Tolerance

All single row deep groove ball bearings are produced in accordance to P0 (ABEC 1) tolerance class. Standard ISO 199 and ISO 492 specify these tolerances. Exceptions are only separable single row ball bearings (prefix „E“ and „BO“). For these bearings the outer diameter has a limiting deviation of D+0.01/0.00 mm.

Radial Clearance

All ball bearings are offered in a range of radial clearances. The two standard radial clearances are C0 and C3. Other clearances may be produced upon request. All radial clearance values comply with standard ISO 5753 and are listed in the chart below.

Bore Diameter		Radial Clearance of Single Row Ball Bearings										Single Row Separable Ball Bearings Type E and BO	Radial Clearance	
d		C2		normal		C3		C4		C5				
over	to	min	max	min	max	min	max	min	max	min	max		min	max
mm		µm											µm	
2,5	10	0	7	2	13	8	23	14	29	20	37	E10, E12	15	30
10	18	0	9	3	18	11	25	18	33	25	45	E15	15	30
18	24	0	10	5	20	13	28	20	36	28	48	BO17, E17	25	45
24	30	1	11	5	20	13	28	23	41	30	53	E20	20	40
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			

Single Row Deep Groove Ball Bearings

Bore Diameter		Radial Clearance of Single Row Ball Bearings										Single Row Separable Ball Bearings Type E and BO	Radial Clearance	
d		C2		normal		C3		C4		C5				
over	to	min	max	min	max	min	max	min	max	min	max		min	max
mm		µm											µm	
100	120	2	20	15	41	36	66	61	97	90	140			
120	140	2	23	18	48	41	81	71	114	105	160			
140	160	2	23	18	53	46	91	81	130	120	180			
160	180	2	25	20	61	53	102	91	147	135	200			
180	200	2	30	25	71	63	117	107	163	150	215			

Vibration Level

All single row deep groove ball bearings are 100% checked for noise and vibration at the manufacturing facility. When special vibration levels are required, bearings with tolerance class P5 and special internal design changes can be produced. These bearings are noted by the designation C6, C06 or C66.

Tapered Bore

Single row deep groove ball bearings with tapered bores may be produced upon request. The standard taper is 1:12; the bearings can be mounted on adapter sleeves or directly on a tapered shaft.

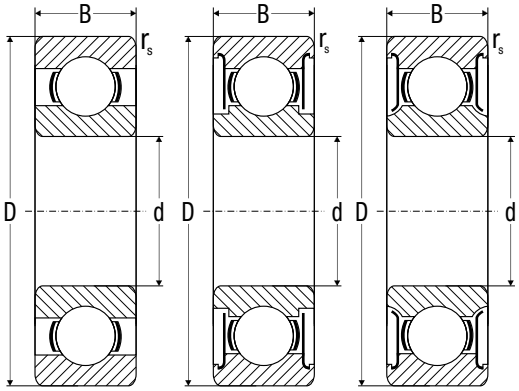
Designation

Listed below are some common designations for ZVL-ZKL deep groove ball bearings.

Single Row Deep Groove Ball Bearings		
Suffix	Description	Example of Designation
RS	Seal on one side	6304RS
RSR	Seal on one side adjacent to the smooth rib of the inner ring	6006RSR
2RS	Seals on both sides	6205-2RS
2RSR	Seals on both sides adjacent to the smooth rib of the inner ring	6001-2RSR
Z	Shield on one side	6210Z
ZR	Shield on one side adjacent to the smooth rib of the inner ring	6305ZR
2Z	Shields on both sides	6008-2Z
2ZR	Shields on both sides adjacent to the smooth rib of the inner ring	608-2ZR
K	Tapered bearing bore at a 1:12 ratio	6208K-2RS
N	Snap ring groove on the outer ring	6207N
F	Machined steel cage guided on the rolling elements	6418F
M	Machined brass cage guided on the rolling elements	6310M
MA	Machined brass cage guided on the outer ring	6209MA
TB	Solid cage made of textite, guided on inner ring	6308TB
Y	Pressed brass cage, rolling elements centred	623Y
P6	Higher tolerance class than normal	6203 P6
P6E	Higher tolerance class for rotating electrical machines	6206 P6E
P5	Higher tolerance class than P6	6005 P5
P4	Higher tolerance class than P5	6007 P4
C2	Radial clearance less than normal	6003 C2
C3	Radial clearance greater than normal	6212 C3
C4	Radial clearance greater than C3	6313 C4
C5	Radial clearance grater than C4	6304-2Z C5
C6	Reduced vibration level	6206 C6
S0	Heat stabilized for an operating temperature up to 150°C	6204 S0
S1	Heat stabilized for an operating temperature up to 200°C	6307M C4S1
S2	Heat stabilized for an operating temperature up to 250°C	6303-2Z C5S2
S3	Heat stabilized for an operating temperature up to 300°C	6308M C4S3

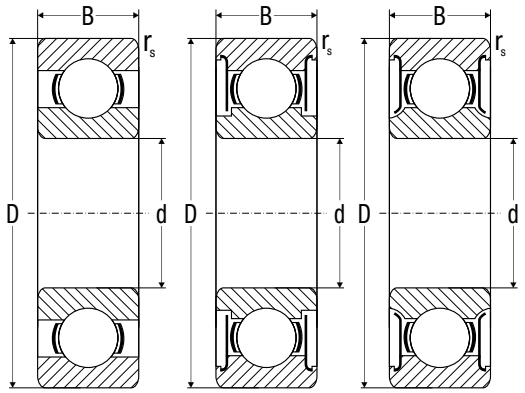
Notes

Single Row Deep Groove Ball Bearings



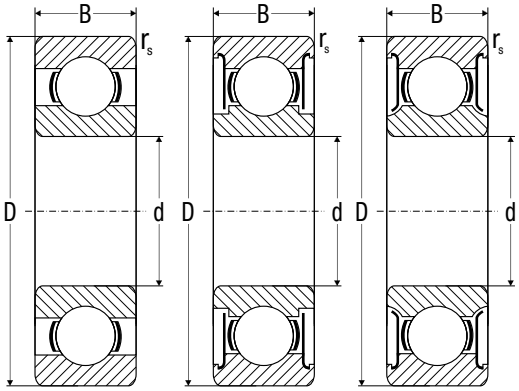
Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation				Weight
				Dynamic	Static							
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Open	2Z	2RS	N	
mm				kN		rpm						kg
3	10	4	0,15	0,65	0,23	40 000	50 000	**623**	**2Z**			0,002
4	13	5	0,2	1,17	0,41	38 000	45 000	**624**	**2Z**			0,004
	16	5	0,3	1,88	0,68	35 000	42 000	**634**	**2Z**			0,005
5	16	5	0,3	1,88	0,68	35 000	42 000	**625**	**2Z**	**2RS**		0,006
	19	6	0,3	2,84	1,08	35 000	42 000	**635**	**2Z**			0,009
6	19	6	0,3	2,84	1,08	35 000	42 000	**626**	**2Z**	**2RS**		0,010
7	19	6	0,3	2,84	1,08	35 000	42 000	**607**	**2Z**	**2RS**		0,010
	22	7	0,3	3,28	1,36	35 000	42 000	**627**	**2Z**	**2RS**		0,012
8	22	7	0,3	3,28	1,36	35 000	42 000	**608**	**2Z**	**2RS**		0,015
	24	8	0,3	3,67	1,64	35 000	42 000	**628**	**2Z**	**2RS**		0,017
9	24	7	0,3	3,67	1,64	35 000	42 000	**609**	**2Z**	**2RS**		0,018
	26	8	0,3	4,56	1,96	35 000	42 000	**629**	**2Z**	**2RS**		0,020
10	26	8	0,3	4,56	1,96	28 000	33 000	**6000**	**2Z**	**2RS**		0,019
	30	9	0,6	6,05	2,51	25 000	30 000	**6200**	**2Z**	**2RS**		0,031
	30	14	0,6	6,05	2,51	25 000	30 000	**62200**		**2RS**		0,040
	35	11	0,6	8,07	3,43	22 000	27 000	**6300**	**2Z**	**2RS**		0,054
12	28	8	0,3	5,09	2,36	25 000	30 000	**6001**	**2Z**	**2RS**		0,022
	32	10	0,6	6,91	3,10	22 000	27 000	**6201**	**2Z**	**2RS**		0,037
	32	14	0,6	6,91	3,10	22 000	27 000	**62201**		**2RS**		0,045
	37	12	1	9,76	4,23	20 000	24 000	**6301**	**2Z**	**2RS**		0,061
15	32	8	0,3	5,59	2,86	21 000	25 000	**16002**				0,027
	32	9	0,3	5,59	2,86	21 000	25 000	**6002**	**2Z**	**2RS**		0,030
	35	11	0,6	7,72	3,75	20 000	24 000	**6202**	**2Z**	**2RS**	**N**	0,046
	35	14	0,6	7,72	3,75	20 000	24 000	**62202**		**2RS**		0,054
	42	13	1	11,30	5,34	18 000	21 000	**6302**	**2Z**	**2RS**	**N**	0,085
17	35	8	0,3	6,00	3,27	20 000	24 000	**16003**				0,032
	35	10	0,3	6,00	3,27	20 000	24 000	**6003**	**2Z**	**2RS**		0,040
	40	12	0,6	9,53	4,73	18 000	21 000	**6203**	**2Z**	**2RS**	**N**	0,073
	40	16	0,6	9,53	4,73	18 000	21 000	**62203**		**2RS**		0,083
	47	19	1	13,40	6,55	16 000	19 000	**62303**		**2RS**		0,145
	47	14	1	13,55	6,56	16 000	19 000	**6303**	**2Z**	**2RS**	**N**	0,115
	62	17	1,1	22,68	10,89	12 600	15 000	**6403**	**2Z**			0,271
20	42	8	0,3	9,37	4,97	17 000	20 000	**16004**				0,050
	42	12	0,6	9,37	4,97	17 000	20 000	**6004**	**2Z**	**2RS**	**N**	0,070
	47	14	1	12,80	6,55	15 000	18 000	**6204**	**2Z**	**2RS**	**N**	0,108
	47	18	1	12,80	6,55	15 000	18 000	**62204**		**2RS**		0,130
	52	15	1,1	15,85	7,81	14 000	17 000	**6304**	**2Z**	**2RS**	**N**	0,145
	72	19	1,1	31,00	15,20	10 000	13 000	**6404**	**2Z**			0,420

Single Row Deep Groove Ball Bearings



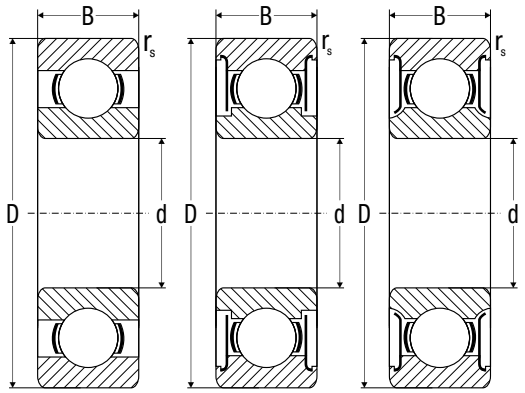
Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation				Weight
				Dynamic	Static							
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Open	2Z	2RS	N	
mm				kN		rpm						kg
25	47	8	0,3	10,05	5,81	14 000	17 000	**16005**				0,053
	47	12	0,6	10,05	5,81	14 000	17 000	**6005**	**2Z**	**2RS**	**N**	0,082
	52	15	1	14,05	7,94	12 600	15 000	**6205**	**2Z**	**2RS**	**N**	0,129
	52	18	1	14,05	7,94	12 600	15 000	**62205**		**2RS**		0,150
	62	17	1,1	21,10	10,80	11 000	13 000	**6305**	**2Z**	**2RS**	**N**	0,230
	80	21	1,5	36,00	19,20	9 400	11 000	**6405**	**2Z**		**N**	0,530
30	55	9	0,3	11,20	7,36	12 000	14 000	**16006**				0,087
	55	13	1	13,25	8,25	12 000	14 000	**6006**	**2Z**	**2RS**	**N**	0,119
	62	16	1	19,45	11,20	11 000	13 000	**6206**	**2Z**	**2RS**	**N**	0,200
	62	20	1	19,45	11,20	11 000	13 000	**62206**		**2RS**		0,240
	72	19	1,1	29,70	15,70	10 000	12 000	**6306**	**2Z**	**2RS**	**N**	0,331
	90	23	1,5	43,00	23,70	8 400	10 000	**6406**	**2Z**		**N**	0,725
35	62	9	0,3	12,30	8,74	10 600	12 600	**16007**				0,111
	62	14	1	15,95	10,35	10 600	12 600	**6007**	**2Z**	**2RS**	**N**	0,154
	72	17	1,1	25,65	15,25	9 400	11 000	**6207**	**2Z**	**2RS**	**N**	0,284
	80	21	1,5	33,35	19,25	8 400	10 000	**6307**	**2Z**	**2RS**	**N**	0,447
	100	25	1,5	55,20	31,00	7 500	8 900	**6407**	**2Z**		**N**	0,954
40	68	9	0,3	13,20	10,20	9 400	11 000	**16008**				0,125
	68	15	1	16,80	11,50	9 400	11 000	**6008**	**2Z**	**2RS**	**N**	0,191
	80	18	1,1	32,65	19,90	8 400	10 000	**6208**	**2Z**	**2RS**	**N**	0,349
	90	23	1,5	40,75	24,15	7 900	9 400	**6308**	**2Z**	**2RS**	**N**	0,625
	110	27	2	63,10	36,20	6 700	7 900	**6408**	**2Z**		**N**	1,230
45	75	10	0,6	15,65	12,15	8 400	10 000	**16009**				0,170
	75	16	1	21,10	15,30	8 400	10 000	**6009**	**2Z**	**2RS**	**N**	0,241
	85	19	1,1	32,70	20,35	7 900	9 400	**6209**	**2Z**	**2RS**	**N**	0,404
	100	25	1,5	52,80	31,70	7 100	8 400	**6309**	**2Z**	**2RS**	**N**	0,828
	120	29	2	76,50	44,70	6 000	7 100	**6409**	**2Z**		**N**	1,540
50	80	10	0,6	16,10	13,15	7 900	9 400	**16010**				0,188
	80	16	1	21,70	16,65	7 900	9 400	**6010**	**2Z**	**2RS**	**N**	0,260
	90	20	1,1	35,05	23,25	7 100	8 400	**6210**	**2Z**	**2RS**	**N**	0,460
	110	27	2	61,75	37,75	6 300	7 500	**6310**	**2Z**	**2RS**	**N**	1,060
	130	31	2,1	87,40	52,10	7 100	6 700	**6410**	**2Z**		**N**	1,890
55	90	11	0,6	19,30	16,20	7 100	8 400	**16011**				0,260
	90	18	1,1	28,20	21,30	7 100	8 400	**6011**	**2Z**	**2RS**	**N**	0,383
	100	21	1,5	43,35	29,40	6 700	7 900	**6211**	**2Z**	**2RS**	**N**	0,597
	120	29	2	71,00	44,70	5 600	6 700	**6311**	**2Z**	**2RS**	**N**	1,380
	140	33	2,1	100,00	61,90	5 300	6 300	**6411**	**2Z**		**N**	2,290

Single Row Deep Groove Ball Bearings



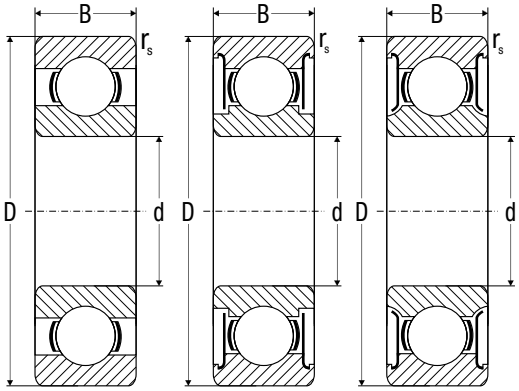
Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation				Weight
				Dynamic	Static							
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Open	2Z	2RS	N	
mm				kN		rpm						kg
60	95	11	0,6	20,00	17,60	7 000	8 500	**16012**				0,280
	95	18	1,1	29,35	23,25	6 700	7 900	**6012**	**2Z**	**2RS**	**N**	0,411
	110	22	1,5	52,85	35,80	6 000	7 100	**6212**	**2Z**	**2RS**	**N**	0,771
	130	31	2,1	81,50	52,10	5 300	6 300	**6312**	**2Z**	**2RS**	**N**	1,720
	150	35	2,1	110,00	69,40	4 700	5 600	**6412**	**2Z**		**N**	2,760
65	100	11	0,6	21,20	19,60	6 300	7 500	**16013**				0,300
	100	18	1,1	30,50	25,10	6 300	7 500	**6013**	**2Z**	**2RS**	**N**	0,437
	120	23	1,5	57,20	40,00	5 300	6 300	**6213**	**2Z**	**2RS**	**N**	0,997
	140	33	2,1	92,60	59,60	5 000	6 000	**6313**	**2Z**	**2RS**	**N**	2,100
	160	37	2,1	118,00	78,35	4 500	5 300	**6413**	**2Z**		**N**	3,280
70	110	13	0,6	27,60	25,10	5 600	6 700	**16014**				0,433
	110	20	1,1	37,95	31,00	5 600	6 700	**6014**	**2Z**	**2RS**	**N**	0,604
	125	24	1,5	62,00	43,80	5 300	6 300	**6214**	**2Z**	**2RS**	**N**	1,070
	150	35	2,1	104,00	63,10	4 700	5 600	**6314**	**2Z**	**2RS**	**N**	2,540
	180	42	3	144,00	104,00	4 000	4 700	**6414**	**2Z**		**N**	4,850
75	115	13	0,6	28,70	26,60	5 300	6 300	**16015**				0,457
	115	20	1,1	39,75	33,15	5 300	6 300	**6015**	**2Z**	**2RS**	**N**	0,638
	130	25	1,5	66,20	49,30	5 000	6 000	**6215**	**2Z**	**2RS**	**N**	1,180
	160	37	2,1	114,00	76,40	4 200	5 000	**6315**	**2Z**	**2RS**	**N**	3,060
	190	45	3	153,00	113,00	3 800	4 500	**6415**	**2Z**		**N**	5,740
80	125	14	0,6	32,90	31,60	5 000	6 000	**16016**				0,597
	125	22	1,1	47,50	39,80	5 000	6 000	**6016**	**2Z**	**2RS**	**N**	0,845
	140	26	2	72,20	53,10	4 700	5 600	**6216**	**2Z**	**2RS**	**N**	1,400
	170	39	2,1	123,00	86,20	3 800	4 500	**6316**	**2Z**	**2RS**	**N**	3,630
	200	48	3	164,00	125,00	3 400	4 000	**6416**	**2Z**		**N**	7,500
85	130	14	0,6	34,10	32,90	4 700	5 600	**16017**				0,626
	130	22	1,1	49,80	42,60	4 700	5 600	**6017**	**2Z**	**2RS**	**N**	0,892
	150	28	2	83,30	63,70	4 200	5 000	**6217**	**2Z**	**2RS**	**N**	1,800
	180	41	3	133,00	96,50	3 600	4 300	**6317**	**2Z**	**2RS**	**N**	4,230
	210	52	4	173,00	136,00	3 200	3 800	**6417**	**2Z**		**N**	9,000
90	140	16	1	41,50	39,10	4 500	5 300	**16018**				0,848
	140	24	1,5	58,20	49,60	4 500	5 300	**6018**	**2Z**	**2RS**	**N**	1,170
	160	30	2	96,20	70,80	4 000	4 700	**6218**	**2Z**	**2RS**	**N**	2,160
	190	43	3	144,00	108,00	3 500	4 200	**6318**	**2Z**	**2RS**	**N**	4,950
	225	54	4	190,00	160,00	3 000	3 600	**6418**	**2Z**		**N**	11,500
95	145	16	1	42,30	41,50	4 200	5 000	**16019**				0,890
	145	24	1,5	60,70	54,10	4 200	5 000	**6019**	**2Z**	**2RS**	**N**	1,220
	170	32	2,1	108,00	81,00	3 800	4 500	**6219**	**2Z**	**2RS**	**N**	2,600
	200	45	3	153,00	118,00	3 200	3 800	**6319**	**2Z**	**2RS**	**N**	5,690

Single Row Deep Groove Ball Bearings



Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation				Weight
				Dynamic	Static							
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Open	2Z	2RS	N	
mm				kN		rpm						kg
100	150	16	1	44,00	43,80	4 200	5 000	**16020**				0,910
	150	24	1,5	60,10	54,20	4 200	5 000	**6020**	**2Z**	**2RS**	**N**	1,270
	180	34	2,1	123,00	92,60	3 500	4 200	**6220**	**2Z**	**2RS**	**N**	3,130
	215	47	3	174,00	141,00	3 200	3 800	**6320**	**2Z**	**2RS**	**N**	7,070
105	160	18	1	52,00	51,00	4 000	4 800	**16021**				1,200
	160	26	2	72,20	65,60	4 000	4 700	**6021**	**2Z**	**2RS**		1,590
	190	36	2,1	133,00	105,00	3 300	4 000	**6221**	**2Z**	**2RS**		3,700
	225	49	3	184,00	153,00	2 900	3 500	**6321**	**2Z**	**2RS**		8,000
110	170	19	1	57,60	56,20	3 800	4 500	**16022**				1,460
	170	28	2	81,90	72,80	3 800	4 500	**6022**	**2Z**	**2RS**		1,950
	200	38	2,1	144,00	117,00	3 200	3 800	**6222**	**2Z**	**2RS**		4,370
	240	50	3	204,00	178,00	2 800	3 300	**6322**	**2Z**	**2RS**		9,590
120	180	19	1	63,20	63,30	3 400	4 000	**16024**				1,800
	180	28	2	85,00	79,40	3 400	4 000	**6024**	**2Z**	**2RS**		2,100
	215	40	2,1	155,00	131,00	3 000	3 500	**6224**	**2Z**	**2RS**		5,150
	260	55	3	207,00	185,00	2 500	3 000	**6324**	**2Z**	**2RS**		12,500
130	200	22	1,1	79,00	81,00	3 200	3 800	**16026**				2,500
	200	33	2	106,00	101,00	3 000	3 600	**6026**	**2Z**	**2RS**		3,250
	230	40	3	167,00	146,00	2 600	3 200	**6226**	**2Z**	**2RS**		6,000
	280	58	4	229,00	214,00	2 200	2 800	**6326**	**2Z**	**2RS**		15,300
140	210	22	1,1	80,50	86,00	2 800	3 400	**16028**				2,700
	210	33	2	110,00	109,00	2 800	3 400	**6028**	**2Z**	**2RS**		7,500
	250	42	3	176,00	164,00	2 400	3 000	**6228**	**2Z**	**2RS**		7,500
	300	62	4	253,00	246,00	2 000	2 600	**6328M**				21,300
150	225	24	1,1	92,30	98,00	2 600	3 200	**16030**				3,400
	225	35	2,1	125,00	126,00	2 600	3 200	**6030**	**2Z**	**2RS**		4,750
	270	45	3	176,00	170,00	2 000	2 600	**6230**	**2Z**	**2RS**		9,600
	320	65	4	275,00	284,00	1 900	2 300	**6330M**				26,000
160	240	25	1,5	99,40	107,00	2 400	3 000	**16032**				3,600
	240	38	2,1	140,00	143,00	2 400	3 000	**6032**	**2Z**	**2RS**		5,850
	290	48	3	185,00	186,00	1 900	2 400	**6232**	**2Z**	**2RS**		14,300
	340	68	4	278,00	286,00	1 800	2 200	**6332M**				31,300
170	260	28	1,5	118,00	127,00	2 200	2 800	**16034M**				5,700
	260	42	2,1	168,00	172,00	2 200	2 800	**6034**	**2Z**	**2RS**		7,800
	310	52	4	212,00	224,00	1 900	2 400	**6234**	**2Z**	**2RS**		17,500
	360	72	4	326,00	355,00	1 700	2 000	**6334M**				34,900
180	280	31	2	140,00	146,00	2 000	2 600	**16036M**				7,200
	280	46	2,1	186,00	194,00	2 000	2 600	**6036**	**2Z**	**2RS**		10,500
	320	52	4	227,00	242,00	1 800	2 200	**6236**	**2Z**	**2RS**		18,300

Single Row Deep Groove Ball Bearings



Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation				Weight
				Dynamic	Static							
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Open	2Z	2RS	N	
mm				kN		rpm						kg
190	290	31	2	139,00	158,00	2 000	2 600	**16038M**				8,110
	290	46	2,1	194,00	210,00	2 000	2 600	**6038**	**2Z**	**2RS**		11,000
	340	55	4	255,00	278,00	1 700	2 000	**6238M**				23,000
200	310	34	2	161,00	180,00	1 900	2 400	**16040M**				10,300
	310	51	2,1	208,00	226,00	1 900	2 400	**6040**				13,500
	360	58	4	269,00	311,00	1 700	2 000	**6240M**				28,000
	420	80	5	411,00	506,00	1 700	2 000	**6340M**				59,200
220	340	56	3	245,00	293,00	1 800	2 200	**6044M**				18,800
	400	65	4	310,00	375,00	1 500	1 800	**6244M**				37,000
240	360	56	3	255,00	315,00	1 700	2 000	**6048M**				19,500
	440	72	4	360,00	470,00	1 300	1 600	**6248M**				51,000
260	400	65	4	294,00	373,00	1 500	1 800	**6052M**				28,800
280	420	65	4	325,00	422,00	1 400	1 700	**6056M**				31,000
300	460	74	4	358,00	500,00	1 200	1 500	**6060M**				43,500

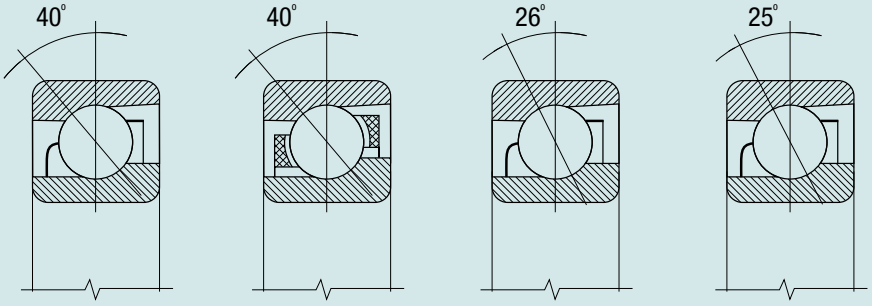
Notes

Single Row Angular Contact Ball Bearings

Single row angular contact ball bearings are designed so that the connecting line of the raceway-to ball contact points are positioned at an acute angle to the perpendicular line of the bearings axis or contact angle. Since this allows them to stand up to radial loads acting simultaneously with high axial forces in one direction, they are usually arranged back-to-back in pairs to accommodate axial loading in both directions. Optimum ball size and conformity give these bearings high load ratings. Although they have only a single rib on the bearing rings, single row angular contact bearings are non-separable.

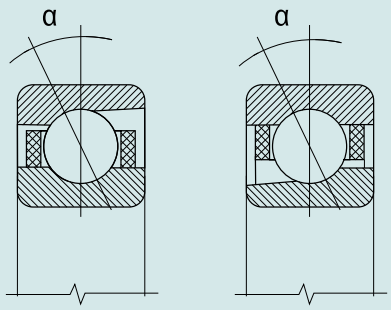
Single Row Angular Contact Ball Bearings

Bearings with the designation B and BE have a contact angle of α = 40°. Other designations such as AA with a contact angle of α = 26° and A with a contact angle of α = 25°are also produced.



72B 73B | 72BETNG 73BETNG | 72AA 73AA | 72A 73A

Single row angular contact bearings, type A70 and A72 or B70 and B72, are designed for high rotational speeds.They are different in internal design from the standard angular contact bearings.
These bearings have designations CB (contact angle α = 10°). Often these bearings are produced with a higher tolerance classes P4 or P4A.
Bearings with the C designation have a design with a contact angle of α = 15° and are often produced in a tolerance class P5 or P5A and P4 or P4A.
These bearings are predominately used in machine tool spindles and similar applications.



B70 B72 | A70 A72

Cage

ZVL-ZKL bearing types 72 and 73 in B, A and AA design have a pressed steel cage or a polyamide cage that is strengthened by glass fibers (TNG). Bearing types A70 and A72 which are designed for high rotational speeds use a textite cage that is guided on the outer ring (TA). Bearing types B70 and B72 use a textite cage that is guided on the inner ring (TB). Other cage designs, such as brass, may be produced upon request.

Boundary Dimensions

Boundary dimensions comply with the standard ISO 15.

Tolerance

These bearings are produced within ABEC 1 or P0 tolerance class. More demanding tolerance classes may be produced upon request. The basic bearing dimensions comply with standards ISO 199 and ISO 492.

Bearing Arrangement in Pairs
Bearing types A70, A72, B70 and B72 are designed for high rotational speeds and are delivered in pairs.

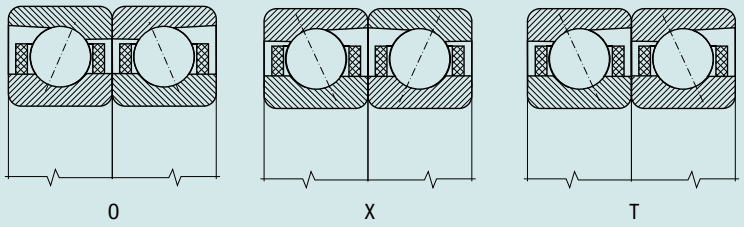
Pair in „O“ Arrangement (back to back)
This pairing is significant for its high rigidity and it withstands axial loads in both directions. It is used mostly to accommodate tilting moments. See picture below for arrangement drawing.

Pair in „X“ Arrangement (face to face)
This pairing carries axial loads much like the „O“ arrangement. The difference is that the rigidity for tilting moments is smaller.

Pair in „T“ Arrangement (tandem)
This pair is significant by its rigidity against tilting, but it is capable of carrying the axial load in one direction only.

Universal Bearing Matching (U)
Single row angular contact ball bearings B70..CTA in universal design (U) are determined for matching in pairs, in „X“, „O“ or „T“ arrangements, or for matching in sets of three or four bearings. They are manufactured with a light preload (UL) by „X“ and „O“ matching.

Bearing Matching in Sets of Three and Four Bearings
For special arrangements where high accuracy, high rigidity, high load ratings and high rotational speeds are required, matched sets of three and four bearings can be used.



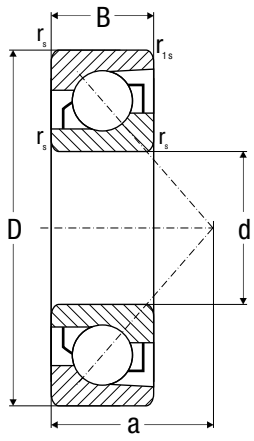
Single Row Angular Contact Ball Bearings

Designation

Listed below are some common designations for single row angular contact bearings.

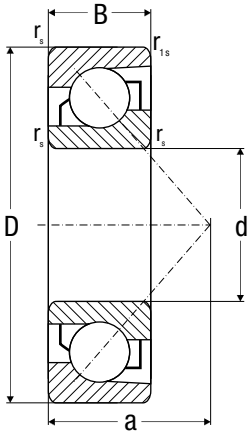
Single Row Angular Contact Ball Bearings		
Prefix	Description	Example of Designation
A	Internal construction with two ribs on the outer ring	A7201AATA P5
B	Internal construction with two ribs on the inner ring	B7018CATB P4
Suffix	Description	Example of Designation
A	Contact angle α = 25°	7203A
AA	Contact angle α = 26°	7212AA
B	Contact angle α = 40°	7214B
C	Contact angle α = 15°	B7007CTA P5
CA	Contact angle α = 12°	B7210CATB P5
CB	Contact angle α = 10°	B7200CBTB P4
MB	Machined brass cage guided on the inner ring	B7017AAMB
TA	Textite(fabric-reinforced phenolic resin) cage guided on the outer ring	A7201AATA P5
TB	Textite(fabric-reinforced phenolic resin) cage guided on the inner ring	B7203CBTB P4
TNG	Polyamide cage reinforced with glass fiber, guided on the rolling elements	7304BTNG
P6	Higher tolerance class than normal	7204B P6
P5	Higher tolerance class than P6	B7014AATB P5
P4	Higher tolerance class than P5	B7206CBTB P4
O	Duplex mounting of bearings in back-to-back arrangement	B7024CATB P5OL
X	Duplex mounting of bearings in a face-to-face arrangement	B7210CBTB P4XM
T	Duplex mounting of bearings in a tandem arrangement	B7215CATB P5T
U	Universal bearing matching	B7003CTA P4UL
OT	Triplex mounting of bearings O+T	B7018CATB P5OTL
XT	Triplex mounting of bearings X+T	B7211CATB P4XTM
TT	Triplex mounting of bearings T+T	B7205AATB P4TT
L	Light preload	B7016AATB P5OL
M	Medium preload	B7206CBTB P4XM
S	Heavy preload	B7209CATB P4OS

Single Row Angular Contact Ball Bearings



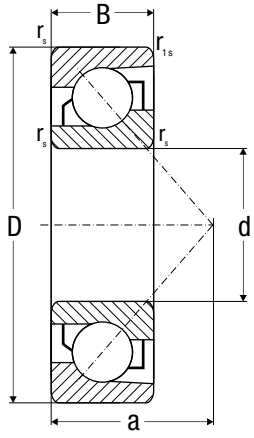
Dimensions						Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
						Dynamic	Static				
d	D	B	r_s	r_{1s}	a	C_r	C_{or}	Grease	Oil		
mm						kN		rpm			kg
12	32	10	0,6	0,3	14	6,90	3,20	19 000	26 000	**7201B**	0,036
15	35	11	0,6	0,3	16	7,90	4,20	16 000	22 000	**7202B**	0,045
	42	13	1	0,6	18	12,40	6,50	14 000	19 000	**7302BTNG**	0,080
17	40	12	0,6	0,3	18	9,90	5,50	14 000	19 000	**7203B**	0,065
	47	14	1	0,6	20	14,10	8,10	13 000	17 000	**7303B**	0,110
20	47	14	1	0,6	21	13,40	7,60	12 000	16 000	**7204B**	0,110
	52	15	1,1	0,6	23	17,30	9,60	11 000	15 000	**7304B**	0,140
25	52	15	1	0,6	24	14,80	9,30	10 000	14 000	**7205B**	0,130
	62	17	1,1	0,6	27	24,30	14,10	9 000	13 000	**7305B**	0,230
30	62	16	1	0,6	27	20,50	13,50	8 500	12 000	**7206B**	0,200
	72	19	1,1	0,6	31	29,30	18,10	8 000	11 000	**7306B**	0,340
35	72	17	1,1	0,6	31	28,30	18,50	8 000	11 000	**7207B**	0,280
	80	21	1,5	1	35	38,30	24,40	7 000	9 500	**7307B**	0,450
40	80	18	1,1	0,6	34	37,60	26,60	7 100	9 000	**7208AA**	0,370
	80	18	1,1	0,6	34	34,50	23,80	7 100	9 000	**7208B**	0,370
	90	23	1,5	1	27,2	48,20	33,60	6 300	8 500	**7308AA**	0,630
	90	23	1,5	1	39	46,50	29,50	6 300	8 500	**7308B**	0,630
45	85	19	1,1	0,6	25,5	39,80	29,30	6 300	8 500	**7209AA**	0,420
	85	19	1,1	0,6	37	36,10	26,20	6 300	8 500	**7209B**	0,420
	100	25	1,5	1	43	59,60	39,60	5 600	7 500	**7309B**	0,850
50	90	20	1,1	0,6	27	42,40	32,40	6 000	7 100	**7210AA**	0,470
	90	20	1,1	0,6	39	37,40	28,60	6 000	7 100	**7210B**	0,470
	110	27	2	1	47	68,20	47,90	5 000	6 700	**7310B**	1,100
55	100	21	1,5	1	29,5	52,60	40,50	5 300	7 000	**7211AA**	0,620
	100	21	1,5	1	43	46,20	36,20	5 300	7 000	**7211B**	0,620
	120	29	2	1	52	82,20	56,20	4 500	6 300	**7311B**	1,400
60	110	22	1,5	1	32	63,40	50,60	5 000	6 300	**7212AA**	0,800
	110	22	1,5	1	47	56,10	44,30	5 000	6 300	**7212B**	0,800
	130	31	2,1	1,1	56	91,50	65,40	4 300	5 600	**7312B**	1,750
65	120	23	1,5	1	34	70,80	59,60	4 500	6 000	**7213AA**	1,000
	120	23	1,5	1	50	65,70	50,20	4 500	6 000	**7213B**	1,000
	140	33	2,1	1,1	41	110,00	84,10	4 000	5 300	**7313AA**	2,150
	140	33	2,1	1,1	60	102,30	75,30	4 000	5 300	**7313B**	2,150
70	125	24	1,5	1	53	70,40	56,30	4 200	5 600	**7214B**	1,100
	150	35	2,1	1,1	44,5	123,00	96,20	3 800	5 000	**7314AA**	2,650
	150	35	2,1	1,1	64	114,00	86,00	3 800	5 000	**7314B**	2,650
75	130	25	1,5	1	56	68,60	58,20	4 000	5 300	**7215B**	1,200
	160	37	2,1	1,1	68	127,70	95,40	3 400	4 800	**7315B**	3,200
80	140	26	2	1	59	78,70	65,70	4 000	5 300	**7216B**	1,500
	170	39	2,1	1,1	72	141,40	107,90	3 200	4 600	**7316B**	3,800

Single Row Angular Contact Ball Bearings



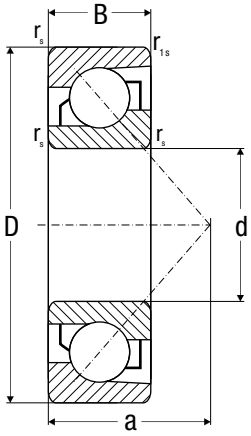
Dimensions						Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
						Dynamic	Static				
d	D	B	r_s	r_{1s}	a	C_r	C_{or}	Grease	Oil		
mm						kN		rpm			kg
85	150	28	2	1	64	93,10	81,10	3 600	5 000	**7217B**	1,840
	180	41	3	1,1	76	155,80	120,90	3 100	4 200	**7317B**	4,500
90	160	30	2	1	67	107,60	92,40	3 200	4 300	**7218B**	2,300
	190	43	3	1,1	80	157,90	136,90	3 100	4 200	**7318B**	5,300
95	170	32	2,1	1,1	71	121,40	106,70	3 000	4 000	**7219B**	2,700
	200	45	3	1,1	84	172,00	154,10	3 000	4 000	**7319BTNG**	6,100
	200	45	3	1,1	84	172,00	154,10	3 000	4 000	**7319BM**	6,100
100	180	34	2,1	1,1	76	140,70	102,50	2 800	3 800	**7220BTNG**	3,300
	180	34	2,1	1,1	76	140,70	102,50	2 800	3 800	**7220BM**	3,300
	215	47	3	1,1	90	190,00	177,30	2 600	3 800	**7320BM**	7,290
110	200	38	2,1	1,1	84	153,80	144,30	2 400	3 400	**7222BM**	4,650
	240	50	3	1,1	98	225,80	225,30	2 200	3 400	**7322BM**	10,100
120	215	40	2,1	1,1	90	165,40	161,40	2 200	3 200	**7224BM**	5,200
	260	55	3	1,1	107	250,40	262,00	1 900	2 800	**7324BM**	12,500
130	280	58	4	1,5	115	275,80	301,50	1 800	2 600	**7326BM**	15,400
140	300	62	4	1,5	123	301,80	343,80	1 700	2 400	**7328BM**	20,500

Single Row Angular Contact Ball Bearings
for High Rotational Speed



Dimensions						Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
						Dynamic	Static				
d	D	B	r_s	r_{1s}	a	C_r	C_{or}	Grease	Oil		
		mm				kN		rpm			kg
7	22	7	0,3	0,15	5	2,22	0,90	94 000	140 000	**A727CBTA**	0,013
9	26	8	0,6	0,3	5,5	3,65	1,64	71 000	106 000	**A729CBTA**	0,020
10	30	9	0,6	0,3	7	4,53	3,28	45 000	65 000	**B7200CTA**	0,028
	30	9	0,6	0,3	6	5,00	2,29	60 000	89 000	**B7200CBTB**	0,027
	30	9	0,6	0,3	6,5	6,67	2,90	42 000	63 000	**B7200CATB**	0,028
12	32	10	0,6	0,3	7	5,48	2,66	56 000	84 000	**B7201CBTB**	0,035
	32	10	0,6	0,3	7,5	7,43	3,47	38 000	56 000	**B7201CATB**	0,036
	32	10	0,6	0,3	10,5	7,05	3,21	33 000	50 000	**AC7201ATA**	0,036
15	35	11	0,6	0,3	7,5	6,48	3,45	50 000	75 000	**B7202CBTB**	0,042
	35	11	0,6	0,3	8	8,27	4,18	33 000	50 000	**B7202CATB**	0,043
17	35	10	0,3	0,15	9	6,24	3,47	30 000	45 000	**A7003CTA**	0,039
	35	10	0,3	0,15	8	4,55	4,25	44 000	67 500	**B7003CTA**	0,039
	40	12	0,6	0,3	8,5	7,83	4,25	45 000	67 000	**B7203CBTB**	0,060
	40	12	0,6	0,3	9	10,21	5,29	28 000	42 000	**B7203CATB**	0,061
20	42	12	0,6	0,3	10	9,83	5,45	28 000	42 000	**A7004CTA**	0,068
	42	12	0,6	0,3	10	7,22	6,90	39 000	57 000	**B7004CTA**	0,066
	47	14	1	0,6	10	9,60	5,54	40 000	60 000	**B7204CBTB**	0,098
	47	14	1	0,6	10,5	13,67	7,32	25 000	38 000	**B7204CATB**	0,100
	47	14	1	0,6	15	13,00	6,99	22 000	33 000	**B7204AATB**	0,102
25	47	12	0,6	0,3	11	11,08	6,87	25 000	38 000	**A7005CTA**	0,080
	47	12	0,6	0,3	11	7,94	7,85	33 000	47 000	**B7005CTA**	0,080
	52	15	1	0,6	11	13,13	7,96	33 000	50 000	**B7205CBTB**	0,119
	52	15	1	0,6	11,5	14,82	8,63	22 000	33 000	**B7205CATB**	0,122
	52	15	1	0,6	17	13,96	8,16	20 000	30 000	**B7205AATB**	0,124
30	55	13	1	0,6	12	14,40	9,55	22 000	30 000	**A7006CTA**	0,116
	55	13	1	0,6	12,2	10,22	11,09	26 000	40 000	**B7006CTA**	0,115
	62	16	1	0,6	12	16,81	10,72	28 000	42 000	**B7206CBTB**	0,184
	62	16	1	0,6	13	20,57	12,42	20 000	30 000	**B7206CATB**	0,189
	62	16	1	0,6	19	19,42	11,58	17 000	25 000	**B7206AATB**	0,192
35	62	14	1	0,6	14	18,29	12,70	17 000	25 000	**A7007CTA**	0,155
	62	14	1	0,6	13	12,80	14,73	22 000	36 000	**B7007CTA**	0,155
	62	14	1	0,6	18,5	17,30	12,05	9400	11000	**B7007AATB**	0,148
	72	17	1,1	0,6	13	21,02	14,35	25 000	38 000	**B7207CBTB**	0,268
	72	17	1,1	0,6	14	28,94	18,60	16 000	24 000	**B7207CATB**	0,275
	72	17	1,1	0,6	15	30,66	20,30	16 000	24 000	**B7207CAMB**	0,323
40	68	15	1	0,6	20,5	18,56	14,14	8 400	10 000	**B7008AATB**	0,185
	80	18	1,1	0,6	14	24,50	17,30	22 000	33 000	**B7208CBTB**	0,337
	80	18	1,1	0,6	15,5	36,73	23,78	13 000	20 000	**B7208CATB**	0,347

Single Row Angular Contact Ball Bearings
for High Rotational Speed



Dimensions						Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
						Dynamic	Static				
d	D	B	r_s	r_{1s}	a	C_r	C_{or}	Grease	Oil		
mm						kN		rpm			kg
45	68	12	0,6	0,3	13,6	9,06	10,90	19 000	32 000	**B71909CTA**	0,129
	75	16	1	0,6	16	23,41	18,14	13 000	20 000	**A7009CTA**	0,242
	75	16	1	0,6	16	15,50	19,38	18 000	30 000	**B7009CTA**	0,245
	85	19	1,1	0,6	15	28,30	20,31	20 000	30 000	**B7209CBTB**	0,381
	85	19	1,1	0,6	16,5	36,86	24,62	12 600	19 000	**B7209CATB**	0,381
	100	25	1,5	1	28	60,33	38,78	5 600	6 700	**B7309CATB**	0,771
50	80	16	1	0,6	15,8	22,66	18,52	9 500	11 000	**B7010AATB**	0,253
	90	20	1,1	0,6	16	32,33	23,56	18 000	27 000	**B7210CBTB**	0,432
	90	20	1,1	0,6	17,5	38,99	27,26	12 000	18 000	**B7210CATB**	0,443
	90	20	1,1	0,6	26	36,56	25,92	10 600	16 000	**B7210AATB**	0,447
55	90	18	1,1	0,6	26,5	30,99	25,38	6 300	7 500	**B7011AATB**	0,395
	100	21	1,5	1	17	38,46	29,12	17 000	25 000	**B7211CBTB**	0,567
	100	21	1,5	1	18,5	48,20	34,50	11 000	17 000	**B7211CATB**	0,582
60	110	22	1,5	1	18	42,98	33,80	15 000	22 000	**B7212CBTB**	0,735
	110	22	1,5	1	20	58,26	42,60	10 000	15 000	**B7212CATB**	0,754
	110	22	1,5	1	32	54,82	39,96	8 900	13 000	**B7212AATB**	0,759
65	120	23	1,5	1	21,5	70,50	54,78	8 900	13 000	**B7213CATB**	0,994
70	110	20	1,1	0,6	32	41,15	36,46	7 900	12 000	**B7014AATB**	0,597
	125	24	1,5	1	20,5	58,56	47,66	12 600	19 000	**B7214CBTB**	1,040
	125	24	1,5	1	22,5	76,65	60,14	7 900	12 000	**B7214CATB**	1,070
75	130	25	1,5	1	23,5	76,53	61,39	7 500	11 000	**B7215CATB**	1,160
	130	25	1,5	1	37,5	71,53	58,33	6 700	10 000	**B7215AATB**	1,260
	130	25	1,5	1	37,5	74,90	62,49	4 200	5 000	**B7215AAMB**	1,390
80	125	22	1,1	0,6	22	55,36	50,01	7 500	11 000	**B7016CATB**	0,841
	125	22	1,1	0,6	36	53,44	49,44	6 700	10 000	**B7016AATB**	0,848
	140	26	2	1	24,5	89,50	73,05	6 700	10 000	**B7216CATB**	1,410
	140	26	2	1	40	84,07	68,04	6 300	9 400	**B7216AATB**	1,420
85	130	22	1,1	0,6	37	54,44	52,69	4 200	5 000	**B7017AATA**	0,912
	130	28	1,1	0,6	37	56,24	55,33	6 300	9 400	**B7017AAMB**	1,060
	150	28	2	1	26,5	100,52	86,08	6 300	9 400	**B7217CATB**	1,800
	150	28	2	1	42,5	94,26	80,67	6 000	8 900	**B7217AATB**	1,820
90	140	24	1,5	1	24	67,63	62,47	6 300	9 400	**B7018CATB**	1,150
	140	24	1,5	1	26,8	65,22	62,60	4 000	4 800	**B7018ATA**	0,597
	140	24	1,5	1	40	65,29	61,76	4 000	4 700	**B7018AATB**	1,160
100	180	34	2,1	1,1	51	141,10	120,96	5 300	7 900	**B7220AATB**	3,320
120	180	28	2	1	30	101,10	103,66	5 000	7 500	**B7024CATB**	2,100
	180	28	2	1	35	97,46	102,12	3 000	3 600	**B7024ATA**	0,155
	180	28	2	1	50,5	96,10	101,28	3 000	3 500	**B7024AATB**	2,090
130	165	11	1	0,5	41,5	13,48	19,10	3 200	3 800	**B70826AAMB**	0,635

Double Row Angular Contact Ball Bearings

ZVL-ZKL double row angular contact ball bearings correspond, in principle, to two single row angular contact ball bearings in the back-to-back arrangement; however, there is a narrower profile for the same bearing size. The connecting line of the raceway-to-ball contact points intersects the bearing axis outside the bearing at a contact angle of $\alpha = 32°$. These bearings are produced with a filling slot on one side to achieve maximum load ratings. If axial forces act predominately in one direction, the bearing must be mounted so that these forces do not push against its filling slot.

Double Row Angular Contact Ball Bearings

Cage
Double row angular contact ball bearings are produced with pressed steel cage.

Boundary Dimensions
Boundary dimensions comply with the standard ISO 15.

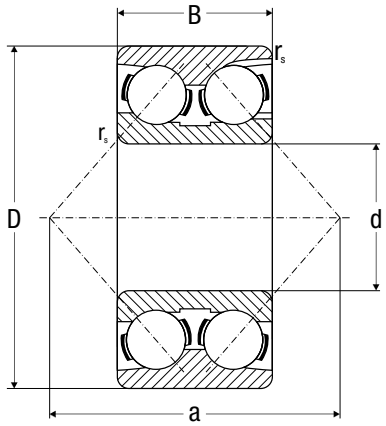
Tolerance
These bearings are produced within ABEC 1 or P0 tolerance class. More demanding tolerance classes may be produced upon request. The basic bearing dimensions comply with standards ISO 199 and ISO 492.

Radial/Axial Clearance
Double row angular contact bearings are commonly produced with C0 or C3 fits. These clearance values are listed in the chart below.

Bore Diameter		Axial Clearance of Double Row Angular Contact Ball Bearings							
d		C2		normal		C3		C4	
over	to	min	max	min	max	min	max	min	max
mm		µm							
6	10	1	11	5	21	12	28	25	45
10	18	1	12	6	23	13	31	27	47
18	24	2	14	7	25	16	34	28	48
24	30	2	15	8	27	18	37	30	50
30	40	2	16	9	29	21	40	33	54
40	50	2	19	11	33	23	44	36	58
50	65	3	22	13	36	26	48	40	63
65	80	3	24	15	40	30	54	46	71

Designation
Bearing designation in standard design is a part of data in the dimension tables.

Double Row Angular Contact Ball Bearings



Dimensions					Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
					Dynamic	Static				
d	D	B	r_s	a	C_r	C_{or}	Grease	Oil		
		mm			kN		rpm			kg
10	30	14,3	0,6	20	9,25	5,84	16 000	19 000	**3200**	0,05
12	32	15,9	0,6	22	11,05	7,08	14 000	17 000	**3201**	0,06
15	35	15,9	0,6	23	10,38	7,50	13 000	16 000	**3202**	0,07
	42	19	1	27	17,37	11,90	10 600	12 600	**3302**	0,13
17	40	17,5	0,6	27	14,42	10,60	11 000	13 000	**3203**	0,10
	47	22,2	1	31	23,65	16,20	9 400	11 000	**3303**	0,19
20	47	20,6	1	31	19,91	15,00	9 400	11 000	**3204**	0,17
	52	22,2	1,1	34	23,66	18,50	8 400	10 000	**3304**	0,23
25	52	20,6	1	35	21,54	18,10	8 400	10 000	**3205**	0,19
	62	25,4	1,1	40	32,88	26,60	7 100	8 400	**3305**	0,37
30	62	23,8	1	41	31,00	27,10	7 100	8 400	**3206**	0,31
	72	30,2	1,1	47	43,69	36,20	6 000	7 100	**3306**	0,58
35	72	27	1,1	47	42,13	37,60	6 000	7 100	**3207**	0,48
	80	34,9	1,5	54	56,22	47,30	5 300	6 300	**3307**	0,78
40	80	30,2	1,1	52	48,19	43,80	5 300	6 300	**3208**	0,65
	90	36,5	1,5	58	59,60	59,60	4 700	5 600	**3308**	1,05
45	85	30,2	1,1	56	51,99	51,10	5 000	6 000	**3209**	0,70
	100	39,7	1,5	64	82,48	73,60	4 200	5 000	**3309**	1,41
50	90	30,2	1,1	59	59,55	58,40	4 500	5 300	**3210**	0,74
	110	44,4	2	73	99,90	96,20	3 800	4 500	**3310**	1,90
55	100	33,3	1,5	64	74,48	66,80	4 200	5 000	**3211**	1,05
	120	49,2	2	80	110,38	108,00	3 300	4 000	**3311**	2,48
60	110	36,5	1,5	71	82,49	85,80	3 800	4 500	**3212**	1,36
	130	54	2,1	86	128,71	128,00	3 200	3 800	**3312**	3,17
65	120	38,1	1,5	76	90,75	94,40	3 500	4 200	**3213**	1,76
	140	58,7	2,1	94	146,33	147,00	3 000	3 500	**3313**	4,01
70	125	39,7	1,5	81	87,35	98,10	3 200	3 800	**3214**	1,93
75	130	41,3	1,5	84	96,15	110,00	3 200	3 800	**3215**	2,08

Notes

Double Row Self-Aligning Ball Bearings

Double row self-aligning ball bearings are designed with two rows of balls and a spherical outer ring raceway. This design allows the inner ring to have a certain amount of misalignment with respect to the outer ring and will have no adverse effect on the bearing. These bearings are produced with cylindrical and tapered bores and are non-separable. These bearings are recommended for applications with small axial loads.

Double Row Self-Aligning Ball Bearings

Cage
Double row self-aligning ball bearings can be produced with several types of cages. ZVL-ZKL produces a pressed steel, pressed brass, machined brass and polyamide cage (TNGN) for these bearings.

Boundary Dimensions
Boundary dimensions comply with the standard ISO 15.

Tolerance
All double row self-aligning ball bearings are produced within ABEC 1 or P0 tolerance class. Standard ISO 199 and ISO 492 specify these tolerances.

Radial Clearance
Double row self-aligning ball bearings are commonly produced with C0 or C3 fits. All radial clearance values comply with standard ISO 5753 and are listed in the chart below.

Radial Clearance of Double Row Self-Aligning Ball Bearings

Bore Diameter		Cylindrical Bore Radial Clearance										Tapered Bore Radial Clearance									
d		C2		normal		C3		C4		C5		C2		normal		C3		C4		C5	
over	to	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max
mm		µm										µm									
2,5	6	1	8	5	15	10	20	15	25	21	33										
6	10	2	9	6	17	12	25	19	33	27	42										
10	14	2	10	6	19	13	26	21	35	30	48										
14	18	3	12	8	21	15	28	23	37	32	50										
18	24	4	14	10	23	18	30	25	39	34	52	7	17	13	26	20	33	28	42	37	55
24	30	5	16	11	24	19	35	29	46	40	58	9	20	15	28	23	39	33	50	44	62
30	40	6	18	13	29	23	40	34	53	46	66	12	24	19	35	29	46	40	59	52	72
40	50	6	19	14	31	25	44	37	57	50	71	14	27	22	39	33	52	45	65	58	79
50	65	7	21	16	36	30	50	45	69	62	88	18	32	27	47	41	61	56	80	73	99
65	80	8	24	18	40	35	60	54	83	76	108	23	39	35	57	50	75	69	98	91	123
80	100	9	27	22	48	42	70	64	96	89	124	29	47	42	68	62	90	84	116	109	144
100	120	10	31	25	56	50	83	75	114	105	145	35	56	50	81	75	108	100	139	130	170
120	140	10	38	30	68	60	100	90	135	125	175										
140	160	15	44	35	80	70	120	110	161	150	210										

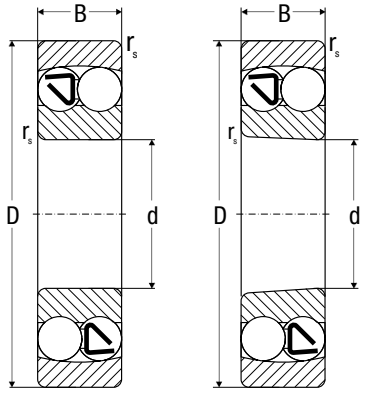
Tapered Bore
Bearings with a tapered bore have a taper of 1:12. These bearings are mounted onto shafts by use of adapter sleeves. Corresponding adapter sleeves are noted with each part number.

Designation
Listed below are some common designations for our double row self-aligning ball bearings.

Double Row Self-Aligning Ball Bearings

Suffix	Description	Example of Designation
K	Tapered bearing bore at 1:12 ratio	1211K
F	Machined steel cage guided on the rolling elements	1230F
TNGN	Polyamide cage reinforced with glass fiber, guided on the rolling elements	2305TNGN
P6	Higher tolerance class than normal	2206 P6
C2	Radial clearance less than normal	1201 C2
C3	Radial clearance greater than normal	1209 C3
C4	Radial clearance greater than C3	2322 C4

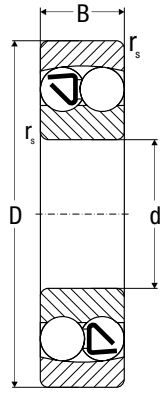
Double Row Self-Aligning Ball Bearings



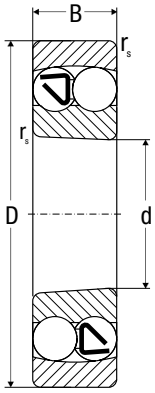
Cylindrical Bore Tapered Bore

Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation		Weight	Used Adapter Sleeve
				Dynamic	Static						
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore		
mm				kN		rpm				kg	
10	30	9	0,6	5,50	1,25	24 000	30 000	**1200**		0,034	
	30	14	0,6	7,20	1,60	25 000	30 000	**2200**		0,047	
	35	11	0,6	7,20	1,60	20 000	26 000	**1300**		0,620	
12	32	10	0,6	5,60	1,25	22 000	28 000	**1201**		0,040	
	32	14	0,6	7,60	1,75	20 000	26 000	**2201**		0,053	
	37	12	1	9,40	2,15	18 000	22 000	**1301**		0,067	
	37	17	1	9,50	2,30	17 000	20 000	**2301**		0,095	
15	35	11	0,6	7,50	1,75	19 000	24 000	**1202**		0,049	
	35	14	0,6	7,70	1,85	18 000	22 000	**2202**		0,060	
	42	13	1	9,55	2,30	17 000	20 000	**1302**		0,094	
	42	17	1	12,10	2,90	15 000	18 000	**2302**		0,110	
17	40	12	0,6	8,14	2,03	18 000	22 000	**1203**		0,073	
	40	16	0,6	9,80	2,40	17 000	20 000	**2203**		0,088	
	47	14	1	12,50	3,15	14 000	17 000	**1303**		0,130	
	47	19	1	14,50	3,60	13 000	16 000	**2303**		0,160	
20	47	14	1	10,24	2,66	14 000	17 000	**1204**	**1204K**	0,120	H204
	47	18	1	12,60	3,30	14 000	17 000	**2204**		0,140	
	52	15	1,1	12,40	3,35	12 000	15 000	**1304**		0,160	
	52	21	1,1	18,20	4,70	11 000	14 000	**2304**		0,210	
25	52	15	1	12,46	3,35	12 600	15 000	**1205**	**1205K**	0,141	H205
	52	18	1	12,88	3,48	12 600	15 000	**2205**	**2205K**	0,163	H305
	62	17	1,1	18,49	5,01	11 000	13 000	**1305**	**1305K**	0,260	H305
	62	24	1,1	24,20	6,56	10 000	12 000	**2305**	**2305K**	0,335	H2305
30	62	16	1	15,60	4,73	11 000	13 000	**1206**	**1206K**	0,220	H206
	62	20	1	15,76	4,55	11 000	13 000	**2206**	**2206K**	0,260	H306
	72	19	1,1	22,04	6,31	9 400	11 000	**1306**	**1306K**	0,387	H306
	72	27	1,1	32,34	8,74	8 400	10 000	**2306**	**2306K**	0,500	H2306
35	72	17	1,1	16,27	5,11	9 400	11 000	**1207**	**1207K**	0,323	H207
	72	23	1,1	22,35	6,68	9 400	11 000	**2207**	**2207K**	0,403	H307
	80	21	1,5	25,10	7,95	7 500	9 000	**1307**	**1307K**	0,501	H307
	80	31	1,5	39,70	12,90	7 000	8 500	**2307**	**2307K**	0,670	H2307
40	80	18	1,1	19,88	6,56	7 900	9 400	**1208**	**1208K**	0,417	H208
	80	23	1,1	22,50	7,40	7 900	9 400	**2208**	**2208K**	0,500	H308
	90	23	1,5	29,87	9,81	7 100	8 400	**1308**	**1308K**	0,715	H308
	90	33	1,5	46,14	13,30	6 700	7 900	**2308**	**2308K**	0,925	H2308
45	85	19	1,1	22,56	7,36	7 500	8 900	**1209**	**1209K**	0,465	H209
	85	23	1,1	24,00	8,10	7 500	8 900	**2209**	**2209K**	0,545	H309
	100	25	1,5	39,14	12,80	6 300	7 500	**1309**	**1309K**	0,957	H309
	100	36	1,5	55,41	16,50	6 000	7 100	**2309**	**2309K**	1,230	H2309

Double Row Self-Aligning Ball Bearings



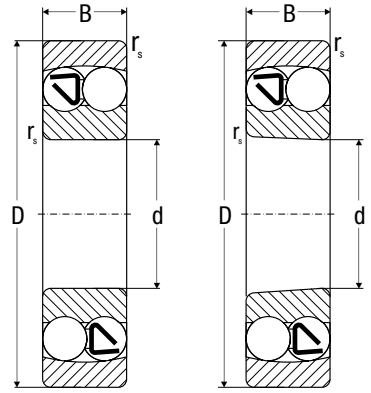
Cylindrical Bore



Tapered Bore

Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation		Weight	Used Adapter Sleeve
				Dynamic	Static						
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore		
mm				kN		rpm				kg	
50	90	20	1,1	23,38	8,10	7 100	8 400	**1210**	**1210K**	0,525	H210
	90	23	1,1	24,00	8,41	7 100	8 400	**2210**	**2210K**	0,590	H310
	100	27	2	44,60	14,10	5 600	6 700	**1310**	**1310K**	1,210	H310
	110	40	2	64,40	23,60	5 300	6 300	**2310**	**2310K**	1,780	H2310
55	100	21	1,5	27,60	10,00	6 300	7 500	**1211**	**1211K**	0,705	H211
	100	25	1,5	27,30	10,00	6 300	7 500	**2211**	**2211K**	0,810	H311
	120	29	2	51,30	18,10	5 000	6 000	**1311**	**1311K**	1,580	H311
	120	43	2	75,30	23,80	4 800	5 600	**2311**	**2311K**	2,100	H2311
60	110	22	1,5	31,00	11,70	5 600	6 700	**1212**	**1212K**	0,900	H212
	110	28	1,5	35,23	12,60	5 600	6 700	**2212**	**2212K**	1,090	H312
	130	31	2	58,81	20,70	4 700	5 600	**1312**	**1312K**	1,960	H312
	130	46	2,1	87,10	28,00	4 300	5 000	**2312**	**2312K**	2,600	H2312
65	120	23	1,5	31,93	12,30	5 300	6 300	**1213**	**1213K**	1,150	H213
	120	31	1,5	44,91	16,50	5 300	6 300	**2213**	**2213K**	1,460	H313
	140	33	2,1	62,00	22,90	4 300	5 000	**1313**	**1313K**	2,450	H313
	140	48	2,1	98,88	32,40	4 000	4 800	**2313**	**2313K**	3,250	H2313
70	125	24	1,5	34,60	13,80	5 000	6 000	**1214**	**1214K**	1,250	H214
	125	31	1,5	45,22	17,10	5 000	6 000	**2214**	**2214K**	1,520	H314
	150	35	2,1	74,10	27,70	4 000	4 800	**1314**	**1314K**	3,000	H314
	150	51	2,1	112,27	37,60	3 800	4 500	**2314**	**2314K**	3,900	H2314
75	130	25	1,5	40,07	15,50	4 700	5 600	**1215**	**1215K**	1,360	H215
	130	31	1,5	45,53	17,80	4 700	5 600	**2215**	**2215K**	1,620	H315
	160	37	2,1	81,68	29,90	3 800	4 500	**1315**	**1315K**	3,560	H315
	160	55	2,1	126,69	43,00	3 500	4 200	**2315**	**2315K**	4,720	H2315
80	140	26	2	40,99	16,80	4 500	5 300	**1216**	**1216K**	1,670	H216
	140	33	2	50,47	20,00	4 500	5 300	**2216**	**2216K**	2,010	H316
	170	39	2,1	88,40	33,00	3 400	4 000	**1316**	**1316K**	4,200	H316
	170	58	2,1	136,00	48,50	3 200	3 800	**2316**	**2316K**	6,100	H2316
85	150	28	2	50,27	20,30	4 000	4 700	**1217**	**1217K**	2,070	H217
	150	36	2	58,50	23,80	4 000	4 700	**2217**	**2217K**	2,500	H317
	180	41	3	100,63	37,60	3 300	4 000	**1317**	**1317K**	4,980	H317
	180	60	3	144,20	51,10	3 200	3 800	**2317**	**2317K**	6,710	H2317
90	160	30	2	58,61	23,30	3 800	4 500	**1218**	**1218K**	2,520	H218
	160	40	2	72,41	28,70	3 800	4 500	**2218**	**2218K**	3,200	H318
	190	43	3	117,00	44,50	3 000	3 600	**1318**	**1318K**	5,800	H318
	190	64	3	157,59	57,30	3 000	3 500	**2318**	**2318K**	7,960	H2318
95	170	32	2,1	65,61	27,10	3 500	4 200	**1219**	**1219K**	3,100	H219
	170	43	2,1	85,70	34,10	3 500	4 200	**2219**	**2219K**	3,950	H319
	200	45	3	135,96	51,10	3 000	3 500	**1319**	**1319K**	6,690	H319
	200	67	3	169,95	64,30	2 800	3 300	**2319**	**2319K**	9,210	H2319

Double Row Self-Aligning Ball Bearings



Cylindrical Bore Tapered Bore

Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation		Weight	Used Adapter Sleeve
				Dynamic	Static						
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore		
mm				kN		rpm				kg	
100	180	34	2,1	71,07	29,30	3 300	4 000	**1220**	**1220K**	3,700	H220
	180	46	2,1	97,50	40,60	3 300	4 000	**2220**	**2220K**	4,720	H320
	215	47	3	147,29	58,40	2 800	3 300	**1320**	**1320K**	8,300	H320
	215	73	3	197,76	77,90	2 700	3 200	**2320**	**2320K**	11,700	H2320
110	200	38	2,1	90,54	38,30	3 000	3 500	**1222**	**1222K**	5,150	H222
	200	53	2,1	124,00	52,10	3 000	3 500	**2222**	**2222K**	6,840	H322
	240	50	3	167,89	70,80	2 700	3 200	**1322**	**1322K**	11,800	H322
	240	80	3	223,51	94,40	2 500	3 000	**2322**	**2322K**	17,300	H2322
120	215	42	2,1	119,00	52,10	2 800	3 300	**1224**	**1224K**	6,750	
130	230	46	3	129,78	59,60	2 700	3 200	**1226**		8,300	

Notes

Single Row Cylindrical Roller Bearings

Single row cylindrical roller bearings are manufactured in several basic separable designs, with different guide flange locations to achieve a variety of capabilities. With higher basic load ratings in comparison to single row ball bearings of the same size, cylindrical roller bearings are especially suitable for use in application with heavy radial loads, high speeds and where interference fits are required on both bearing rings.

Selected sizes of ZVL-ZKL single row cylindrical roller bearings are available in the „E“ design. The E design has an increased load carrying capacity.

Cage
Single row cylindrical roller bearings are produced with steel, brass (M) or polyamide (TNG) cages.

Boundary Dimensions
Boundary dimensions comply with the standard ISO 15.

Tolerance
All single row cylindrical roller bearings are produced with ABEC 1 or P0 tolerance class.
Standard ISO 199 and ISO 492 specify these tolerances.

Radial Clearance

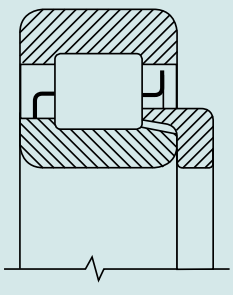
Single row cylindrical roller bearings are commonly produced with C0 or C3 radial clearance. All radial clearance values comply with standard ISO 5753 and are listed in the chart below.

Bore Diameter		Radial Clearance of Single Row Cylindrical Roller Bearings									
d		C2		normal		C3		C4		C5	
over	to	min	max	min	max	min	max	min	max	min	max
mm		μm									
10	24	0	25	20	45	35	60	50	75	65	90
24	30	0	25	20	45	35	60	50	75	70	95
30	40	5	30	25	50	45	70	60	85	80	105
40	50	5	35	30	60	50	80	70	100	95	125
50	65	10	40	40	70	60	90	80	110	110	140
65	80	10	45	40	75	65	100	90	125	130	165
80	100	15	50	50	85	75	110	105	140	155	190
100	120	15	55	50	90	85	125	125	165	180	220
120	140	15	60	60	105	100	145	145	190	200	245
140	160	20	70	70	120	115	165	165	215	225	275
160	180	25	75	75	125	120	170	170	220	250	300
180	200	35	90	90	145	140	195	195	250	275	330
200	225	45	105	105	165	160	220	220	280	305	365
225	250	45	110	110	175	170	235	235	300	330	395
250	280	55	125	125	195	190	260	260	330	370	440
280	315	55	130	130	205	200	275	275	350	410	485
315	355	65	145	145	225	225	305	305	385	455	535
355	400	100	190	190	280	280	370	370	460	510	600
400	450	110	210	210	310	310	410	410	510	565	665
450	500	110	220	220	330	330	440	440	550	625	735
500	560	120	240	240	360	360	480	480	600	695	815
560	630	140	260	260	380	380	500	500	620	780	900
630	710	145	285	285	425	425	565	565	705	870	1010
710	800	150	310	310	470	470	630	630	790	980	1140
800	900	180	350	350	520	520	690	690	860	1100	1270
900	1000	200	390	390	580	580	770	770	960	1220	1410
1000	1120	220	430	430	640	640	850	850	1060	1360	1570
1120	1250	230	470	470	710	710	950	950	1190	1520	1760

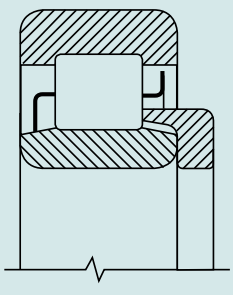
Bearings with Angle Rings

Angle rings, type HJ10, HJ2, HJ2E, HJ3, HJ3E and HJ4 can be used with bearings NJ and NU.

Example of bearing designation:	
NJ10 + HJ10 = NH10	NU10 + HJ10 = NUJ10
NJ2 + HJ2 = NH2	NU2 + HJ2 = NUJ2
NJ3 + HJ3 = NH3	NU3 + HJ3 = NUJ3
NJ4 + HJ4 = NH4	NU4 + HJ4 = NUJ4



NH

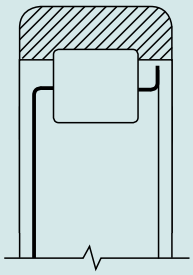


NUJ

Single Row Cylindrical Roller Bearings

Bearings without Inner Ring

In application where space for bearing mounting is limited, single row cylindrical roller bearings without inner rings, designated R NU, can be used. The bearing´s outer ring and rollers are mounted directly to the shaft which now becomes the inner ring and raceway.



R NU

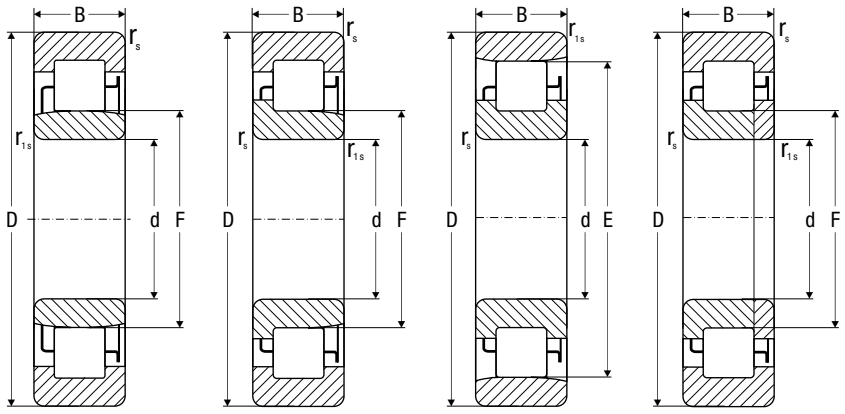
Designation

Listed below are some common designations for single row cylindrical roller bearings.

Single Row Cylindrical Roller Bearings		
Suffix	Description	Example of Designation
E	Internal design change for enhanced load carrying capacity	NU 2216EM
N	Snap ring groove on the outer ring	NU 314N
M	Machined brass cage guided on the rolling elements	NJ 312EM
MA	Machined brass cage guided on the outer ring	NU 226MA
MAS	Machined brass cage guided on the outer ring with lubrication holes	NJ 2308EMAS
MB	Machined brass cage guided on the inner ring	N 313MB
TNG	Polyamide cage reinforced with glass fiber, guided on the rolling elements	NUP 310E TNG
P6	Higher tolerance class than normal	N 212 P6
P5	Higher tolerance class than P6	N 320 P5
P4	Higher tolerance class than P5	NUP 2324 P4
C1	Radial clearance less than C2	NJ 204 C1
C2	Radial clearance less than normal	NU 213 C2
C3	Radial clearance greater than normal	NJ 315 C3
C4	Radial clearance greater than C3	NU 220 C4
C5	Radial clearance grater than C4	NU 234E C5
NA	Radial clearance for bearings with non-interchangeable rings	NU 224NA
S0	Heat stabilized for an operating temperature up to 150°C	NU 220 CS0
S1	Heat stabilized for an operating temperature up to 200°C	NJ 318 S1
S2	Heat stabilized for an operating temperature up to 250°C	N 412 S2
S3	Heat stabilized for an operating temperature up to 300°C	NJ 2215E S3
S4	Heat stabilized for an operating temperature up to 350°C	NUP 228 S4
S5	Heat stabilized for an operating temperature up to 400°C	NU 5234M C3S5

Notes

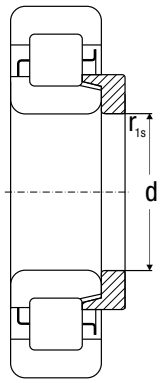
Single Row Cylindrical Roller Bearings



NU NJ N NUP

Dimensions							Bearing Designation			
d	D	B	r_s	r_{1s}	F	E	NU	NJ	NUP	N
			mm							
17	40	12	0,6	0,3	22,9	33,9	**NU 203**	**NJ 203**		**N 203**
	40	12	0,6	0,3	22,1	35,1	**NU 203EM**	**NJ 203EM**	**NUP 203EM**	**N 203EM**
20	47	14	1	0,6	27	40	**NU 204**	**NJ 204**		
	47	14	1	0,6	26,5	41,5	**NU 204EM**	**NJ 204EM**	**NUP 204EM**	**N 204EM**
	47	18	1,1	1,1	27		**NU 2204**	**NJ 2204**		
	47	18	1,1	1,1	27		**NU 2204EM**	**NJ 2204EM**	**NUP 2204EM**	
	52	15	1,1	0,6	28,5		**NU 304**	**NJ 304**		
	52	15	1,1	0,6	27,5	45,5	**NU 304EM**	**NJ 304EM**	**NUP 304EM**	**N 304EM**
25	52	15	1	0,6	32	45	**NU 205**	**NJ 205**	**NUP 205**	**N 205**
	52	15	1	0,6	31,5	46,5	**NU 205EM**	**NJ 205EM**	**NUP 205EM**	**N 205EM**
	52	18	1	0,6	32		**NU 2205**	**NJ 2205**		
	52	18	1	0,6	31,5		**NU 2205EM**	**NJ 2205EM**	**NUP 2205EM**	
	62	17	1,1	1,1	35	53	**NU 305**	**NJ 305**	**NUP 305**	**N 305**
	62	17	1,1	1,1	34	54	**NU 305EM**	**NJ 305EM**	**NUP 305EM**	**N 305EM**
	62	24	1,1	1,1	35		**NU 2305**	**NJ 2305**		
	62	24	1,1	1,1	34		**NU 2305EM**	**NJ 2305EM**		
	80	21	1,5	1,5	38,8		**NU 405**	**NJ 405**		
	80	21	1,5	1,5	38,8	62,8	**NU 405M**	**NJ 405M**	**NUP 405M**	**N 405M**
30	62	16	1	0,6	38,5	53,5	**NU 206**	**NJ 206**	**NUP 206**	**N 206**
	62	16	1,1	0,6	37,5	55,5	**NU 206EM**	**NJ 206EM**	**NUP 206EM**	**N 206EM**
	62	20	1	0,6	38,5		**NU 2206**	**NJ 2206**	**NUP 2206**	
	62	20	1	0,6	37,5		**NU 2206EM**	**NJ 2206EM**	**NUP 2206EM**	
	72	19	1,1	1,1	42	62	**NU 306**	**NJ 306**	**NUP 306**	**N 306**
	72	19	1,1	1,1	40,5	62,5	**NU 306EM**	**NJ 306EM**	**NUP 306EM**	**N 306EM**
	72	27	1,1	1,1	42			**NJ 2306**		
	72	27	1,1	1,1	40,5		**NU 2306EM**	**NJ 2306EM**	**NUP 2306EM**	
	90	23	1,5	1,5	45		**NU 406**	**NJ 406**	**NUP 406**	
	90	23	1,5	1,5	45	73	**NU 406M**	**NJ 406M**	**NUP 406M**	**N 406M**
35	72	17	1,1	0,6	43,8	61,8	**NU 207**	**NJ 207**	**NUP 207**	**N 207**
	72	17	1,1	0,6	44	64	**NU 207EM**	**NJ 207EM**	**NUP 207EM**	**N 207EM**
	72	23	1,1	0,6	43,8		**NU 2207**	**NJ 2207**	**NUP 2207**	
	72	23	1,1	0,6	44		**NU 2207EM**	**NJ 2207EM**	**NUP 2207EM**	
	80	21	1,5	1,1	46,2	68,2	**NU 307**	**NJ 307**	**NUP 307**	**N 307**
	80	21	1,5	1,1	46,2	70,2	**NU 307EM**	**NJ 307EM**	**NUP 307EM**	**N 307EM**
	80	31	1,7	1,1	46,2		**NU 2307**	**NJ 2307**		
	80	31	1,7	1,1	46,2		**NU 2307EM**	**NJ 2307EM**		
	100	25	1,5	1,5	53	83	**NU 407**	**NJ 407**	**NUP 407**	**N 407**
	100	25	1,5	1,5	53	83	**NU 407M**	**NJ 407M**	**NUP 407M**	**N 407M**

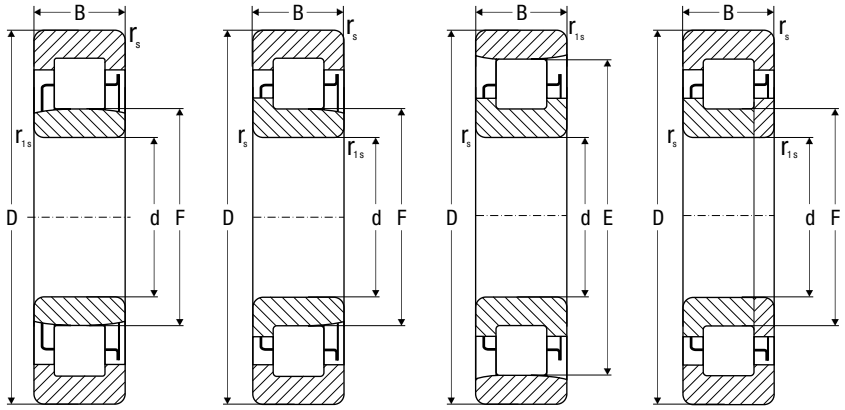
Single Row Cylindrical Roller Bearings



HJ

Weight	Basic Load Rating Dynamic C_r	Basic Load Rating Static C_{or}	Limiting Speed for Lubrication with Grease	Limiting Speed for Lubrication with Oil	Angle Ring
kg	kN		rpm		
0,080	12,6	8,0	16 000	19 000	
0,082	17,6	14,6	15 000	18 000	
0,110	15,4	12,7	14 000	17 000	**HJ 204**
0,110	25,7	22,6	14 000	17 000	**HJ 204E**
0,150	20,7	18,4	14 000	17 000	
0,150	30,5	28,3	14 000	17 000	
0,150	21,4	17,3	13 000	16 000	**HJ 304**
0,150	31,5	26,9	13 000	16 000	**HJ 304E**
0,130	17,7	15,7	12 600	15 000	**HJ 205**
0,160	29,3	27,7	12 600	15 000	**HJ 205E**
0,164	23,7	22,8	12 600	15 000	
0,170	34,9	34,7	12 000	14 000	
0,247	29,3	25,2	10 000	12 000	**HJ 305**
0,280	41,6	37,4	10 000	12 000	**HJ 305E**
0,343	42,7	41,0	11 000	13 500	
0,400	57,0	56,0	9 000	12 000	
0,565	44,7	37,7	8 400	10 000	
0,640	44,7	37,7	8 400	10 000	
0,200	23,5	21,5	10 600	12 600	**HJ 206**
0,240	39,1	37,4	10 600	12 600	**HJ 206E**
0,260	32,8	33,1	10 600	12 600	
0,300	49,0	50,0	9 500	12 000	
0,360	38,6	35,2	8 900	10 600	**HJ 306**
0,410	50,9	47,5	8 400	10 000	**HJ 306E**
0,530	51,4	50,8	9 500	11 500	
0,600	72,5	74,9	9 500	11 500	
0,759	60,4	52,4	7 100	8 400	**HJ 406**
0,877	60,4	52,4	7 100	8 400	**HJ 406**
0,297	33,6	31,5	9 400	11 000	**HJ 207**
0,360	50,3	50,2	8 900	10 600	**HJ 207E**
0,409	49,0	51,2	9 400	11 000	
0,450	64,9	69,9	8 900	10 600	
0,473	44,3	40,4	7 900	9 400	**HJ 307**
0,540	64,2	62,3	7 500	8 900	**HJ 307E**
0,720	58,3	57,6	8 000	9 500	
0,850	91,0	97,6	7 100	8 400	
1,004	75,3	68,9	6 300	7 500	**HJ 407**
1,135	75,3	68,9	6 300	7 500	**HJ 407**

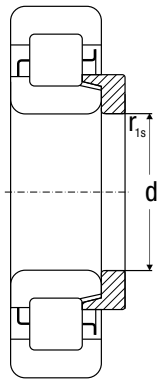
Single Row Cylindrical Roller Bearings



NU NJ N NUP

Dimensions							Bearing Designation			
d	D	B	r_s	r_{1s}	F	E	NU	NJ	NUP	N
			mm							
40	80	18	1,1	1,1	50	70	**NU 208**	**NJ 208**	**NUP 208**	**N 208**
	80	18	1,1	1,1	49,5	71,5	**NU 208EM**	**NJ 208EM**	**NUP 208EM**	**N 208EM**
	80	23	1,1	1,1	50		**NU 2208**	**NJ 2208**		
	80	23	1,1	1,1	49,5		**NU 2208EM**	**NJ 2208EM**	**NUP 2208EM**	
	90	23	1,5	1,5	53,5	77,5	**NU 308**	**NJ 308**	**NUP 308**	**N 308**
	90	23	1,5	1,5	52	80	**NU 308EM**	**NJ 308EM**	**NUP 308EM**	**N 308EM**
	90	33	1,5	1,5	52		**NU 2308EM**	**NJ 2308EM**	**NUP 2308EM**	
	110	27	2,1	2,1	58		**NU 408**	**NJ 408**		
	110	27	2,1	2,1	58	92	**NU 408M**	**NJ 408M**	**NUP 408M**	**N 408M**
45	85	19	1,1	1,1	54,5	75	**NU 209E**	**NJ 209E**	**NUP 209E**	**N 209**
	85	19	1,1	1,1	54,5	76,5	**NU 209EM**	**NJ 209EM**	**NUP 209EM**	**N 209EM**
	85	23	1,1	1,1	54,5		**NU 2209E**	**NJ 2209E**	**NUP 2209E**	
	85	23	1,1	1,1	54,5		**NU 2209EM**	**NJ 2209EM**	**NUP 2209EM**	
	100	25	1,5	1,5	58,5	86,5	**NU 309**	**NJ 309**	**NUP 309**	**N 309**
	100	25	1,5	1,5	58,5	88,5	**NU 309EM**	**NJ 309EM**	**NUP 309EM**	**N 309EM**
	100	36	1,5	1,5	58,5		**NU 2309E**	**NJ 2309E**	**NUP 2309E**	
	100	36	1,5	1,5	58,5		**NU 2309EM**	**NJ 2309EM**	**NUP 2309EM**	
	120	29	2,1	2,1	64,5	100,5	**NU 409**	**NJ 409**	**NUP 409**	**N 409**
	120	29	2,1	2,1	64,5	100,5	**NU 409M**	**NJ 409M**	**NUP 409M**	**N 409M**
50	80	16	1	0,6	57,5		**NU 1010M**			
	90	20	1,1	1,1	60,4	80,4	**NU 210**	**NJ 210**	**NUP 210**	**N 210**
	90	20	1,1	1,1	59,5	81,5	**NU 210EM**	**NJ 210EM**	**NUP 210EM**	**N 210EM**
	90	23	1,1	1,1	60,4		**NU 2210**	**NJ 2210**	**NUP 2210**	
	90	23	1,1	1,1	59,5		**NU 2210EM**	**NJ 2210EM**	**NUP 2210EM**	
	110	27	2,1	2,1	65	95	**NU 310**	**NJ 310**	**NUP 310**	**N 310**
	110	27	2,1	2,1	65	97	**NU 310EM**	**NJ 310EM**	**NUP 310EM**	**N 310EM**
	110	40	2,1	2,1	65		**NU 2310**	**NJ 2310**	**NUP 2310**	
	110	40	2,1	2,1	65		**NU 2310EM**	**NJ 2310EM**	**NUP 2310EM**	
	130	31	2,1	2,1	70,8	110,8	**NU 410**	**NJ 410**	**NUP 410**	**N 410**
	130	31	2,1	2,1	70,8	110,8	**NU 410M**	**NJ 410M**	**NUP 410M**	**N 410M**
55	90	18	1,1	1	64,5		**NU 1011M**			
	100	21	1,5	1,1	66,5	88,5	**NU 211**	**NJ 211**	**NUP 211**	**N 211**
	100	21	1,5	1,1	66	90	**NU 211EM**	**NJ 211EM**	**NUP 211EM**	**N 211EM**
	100	25	1,5	1,5	66,5		**NU 2211**	**NJ 2211**	**NUP 2211**	
	100	25	1,5	1,5	66		**NU 2211EM**	**NJ 2211EM**	**NUP 2211EM**	
	100	33,34	1,1	1,1	66,9		**NU 5211M**			
	120	29	2,1	2,1	70,5	104,5	**NU 311**	**NJ 311**	**NUP 311**	**N 311**
	120	29	2,1	2,1	70,5	106,5	**NU 311EM**	**NJ 311EM**	**NUP 311EM**	**N 311EM**
	120	43	2,1	2,1	70,5		**NU 2311EM**	**NJ 2311EM**	**NUP 2311EM**	
	140	33	2,1	2,1	77,2	117,2	**NU 411**	**NJ 411**	**NUP 411**	**N 411**
	140	33	2,1	2,1	77,2	117,2	**NU 411M**	**NJ 411M**		**N 411M**

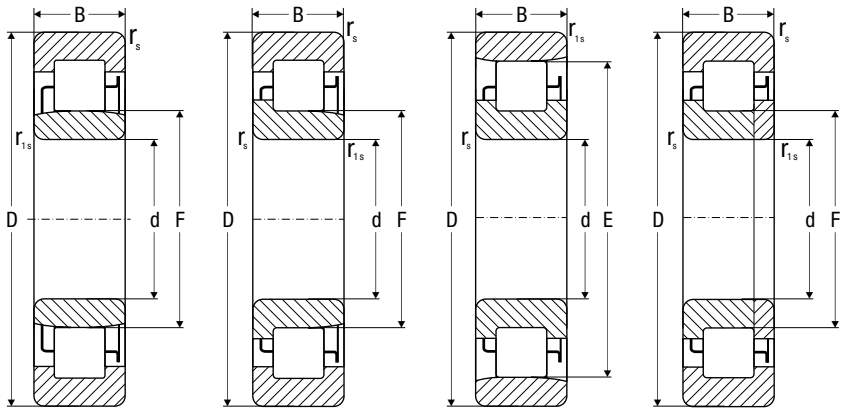
Single Row Cylindrical Roller Bearings



HJ

Weight	Basic Load Rating Dynamic C_r	Basic Load Rating Static C_{or}	Limiting Speed for Lubrication with Grease	Limiting Speed for Lubrication with Oil	Angle Ring
kg	kN		rpm		
0,370	43,7	42,9	7 900	9 400	**HJ 208**
0,440	53,1	52,1	7 900	9 400	**HJ 208E**
0,500	58,2	62,0	7 900	9 400	
0,504	69,9	74,3	7 500	8 900	
0,656	56,1	53,8	7 100	8 400	**HJ 308**
0,710	80,4	78,0	6 700	7 900	**HJ 308E**
1,100	111,4	118,8	6 300	7 500	
1,282	93,8	86,8	5 600	6 700	**HJ 408**
1,300	93,8	86,8	5 600	6 700	**HJ 408**
0,450	60,4	62,8	7 500	8 900	**HJ 209E**
0,530	60,4	62,8	7 500	8 900	**HJ 209E**
0,543	73,5	80,9	7 100	8 400	
0,560	73,5	80,9	7 100	8 400	
0,856	71,1	67,8	6 300	7 500	**HJ 309**
0,970	97,4	98,3	6 000	7 100	**HJ 309E**
1,330	137,4	153,1	5 600	6 700	
1,510	137,4	153,1	5 600	6 700	
1,618	105,2	99,1	5 300	6 300	**HJ 409**
1,860	105,2	99,1	5 300	6 300	**HJ 409**
0,310	38,0	45,0	9 000	9 400	
0,481	48,2	51,0	7 100	8 400	**HJ 210**
0,540	63,2	68,0	6 700	7 900	**HJ 210E**
0,584	64,2	73,6	7 100	8 400	
0,650	79,5	91,5	6 400	7 700	
1,130	86,9	86,2	5 600	6 700	**HJ 310**
1,310	116,4	121,8	5 300	6 300	**HJ 310E**
1,687	120,5	131,5	5 600	6 700	
1,830	162,5	186,5	5 000	6 000	
1,984	129,0	123,5	4 700	5 600	**HJ 410**
2,260	129,0	123,5	4 700	5 600	**HJ 410**
0,450	46,0	56,5	7 800	8 400	
0,647	58,0	62,5	6 300	7 500	**HJ 211**
0,690	83,1	94,2	6 300	7 500	**HJ 211E**
0,783	76,4	89,0	6 300	7 500	
0,810	98,0	116,0	5 600	6 700	
1,250	114,0	141,0	5 900	6 900	
1,445	108,5	108,5	5 300	6 300	**HJ 311**
1,520	141,0	147,6	4 700	5 600	**HJ 311E**
2,350	199,0	229,7	4 800	5 600	
2,489	139,2	138,4	4 500	5 300	**HJ 411**
2,549	139,2	138,4	4 500	5 300	**HJ 411**

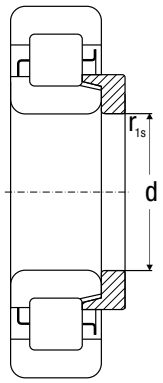
Single Row Cylindrical Roller Bearings



NU NJ N NUP

Dimensions							Bearing Designation			
d	D	B	r_s	r_{1s}	F	E	NU	NJ	NUP	N
			mm							
60	95	18	1,1	1	69,5		**NU 1012M**			
	110	22	1,5	1,5	73,5	97,5	**NU 212**	**NJ 212**	**NUP 212**	**N 212**
	110	22	1,5	1,5	72	100	**NU 212EM**	**NJ 212EM**	**NUP 212EM**	**N 212EM**
	110	28	1,5	1,5	73,5		**NU 2212**	**NJ 2212**	**NUP 2212**	
	110	28	1,5	1,5	72		**NU 2212EM**	**NJ 2212EM**	**NUP 2212EM**	
	110	36,5	1,5	1,5	74		**NU 5212M**			
	130	31	2,1	2,1	77	113	**NU 312**	**NJ 312**	**NUP 312**	**N 312**
	130	31	2,1	2,1	77	115	**NU 312EM**	**NJ 312EM**	**NUP 312EM**	**N 312EM**
	130	46	2,1	2,1	77		**NU 2312**	**NJ 2312**		
	130	46	2,1	2,1	77		**NU 2312EM**	**NJ 2312EM**	**NUP 2312EM**	
	150	35	2,1	2,1	83		**NU 412**	**NJ 412**	**NUP 412**	
	150	35	2,1	2,1	83		**NU 412M**	**NJ 412M**	**NUP 412M**	
65	100	18	1,1	1	74,5		**NU 1013M**			
	120	23	1,5	1,5	79,6	105,6	**NU 213**	**NJ 213**	**NUP 213**	**N 213**
	120	23	1,5	1,5	78,5	108,5	**NU 213EM**	**NJ 213EM**	**NUP 213EM**	**N 213EM**
	120	31	1,5	1,5	79,6		**NU 2213**	**NJ 2213**	**NUP 2213**	
	120	31	1,5	1,5	78,5		**NU 2213EM**	**NJ 2213EM**	**NUP 2213EM**	
	120	38,1	1,5	1,5	79,5		**NU 5213M**			
	140	33	2,1	2,1	83,5	121,5	**NU 313**	**NJ 313**	**NUP 313**	**N 313**
	140	33	2,1	2,1	82,5	124,5	**NU 313EM**	**NJ 313EM**	**NUP 313EM**	**N 313EM**
	140	48	2,1	2,1	83,5		**NU 2313**	**NJ 2313**		
	140	48	2,1	2,1	82,5		**NU 2313EM**	**NJ 2313EM**	**NUP 2313EM**	
	160	37	2,1	2,1	89,3			**NJ 413**		
	160	37	2,1	2,1	89,3		**NU 413M**	**NJ 413M**		
70	110	20	1,1	1	80		**NU 1014M**			
	125	24	1,5	1,5	84,5	110,5	**NU 214**	**NJ 214**		**N 214**
	125	24	1,5	1,5	83,5	113,5	**NU 214EM**	**NJ 214EM**	**NUP 214EM**	**N 214EM**
	125	31	1,5	1,5	84,5		**NU 2214**	**NJ 2214**	**NUP 2214**	
	125	31	1,5	1,5	83,5		**NU 2214EM**	**NJ 2214EM**	**NUP 2214EM**	
	125	39,69	1,5	1,5	83,5		**NU 5214M**			
	150	35	2,1	2,1	90	130	**NU 314**	**NJ 314**	**NUP 314**	**N 314**
	150	35	2,1	2,1	89	133	**NU 314EM**	**NJ 314EM**	**NUP 314EM**	**N 314EM**
	150	51	2,1	2,1	90		**NU 2314**	**NJ 2314**		
	150	51	2,1	2,1	89		**NU 2314EM**	**NJ 2314EM**	**NUP 2314EM**	
	180	42	4	4	100		**NU 414**	**NJ 414**	**NUP 414**	
	180	42	4	4	100		**NU 414M**	**NJ 414M**		

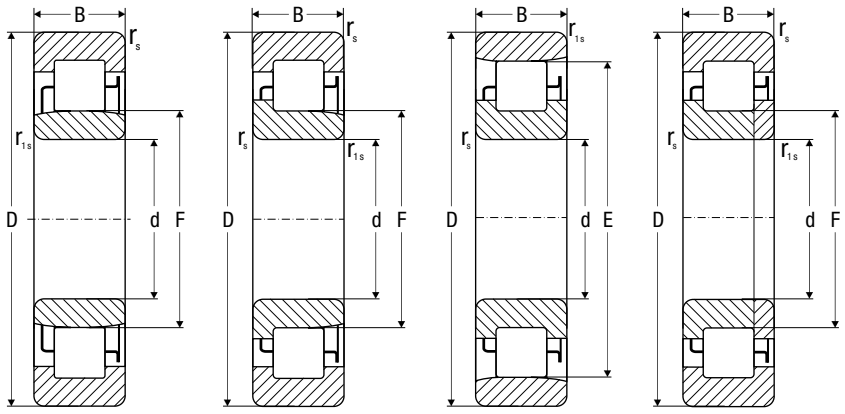
Single Row Cylindrical Roller Bearings



HJ

Weight	Basic Load Rating Dynamic C_r	Basic Load Rating Static C_{or}	Limiting Speed for Lubrication with Grease	Limiting Speed for Lubrication with Oil	Angle Ring
kg	kN		rpm		
0,480	51,0	66,0	7 700	8 300	
0,837	68,8	75,5	5 600	6 700	**HJ 212**
0,931	94,0	102,3	5 600	6 700	**HJ 212E**
1,085	98,1	119,1	5 600	6 700	
1,150	133,0	161,0	5 300	6 300	
1,600	149,7	185,8	5 500	6 500	
1,826	121,3	123,3	4 700	5 600	**HJ 312**
2,070	149,5	156,9	4 500	5 300	**HJ 312E**
2,743	166,3	184,9	4 700	5 600	
3,380	216,7	252,8	4 600	5 200	
2,990	167,2	168,3	4 200	5 000	**HJ 412**
3,370	167,2	168,3	4 200	5 000	**HJ 412**
0,510	52,0	70,0	7 500	8 000	
1,063	80,5	89,6	5 300	6 300	**HJ 213**
1,150	107,5	118,8	5 000	6 000	**HJ 213E**
1,453	116,9	144,8	5 300	6 300	
1,550	149,0	180,9	4 700	5 600	
1,890	156,3	201,5	4 900	5 900	
2,230	134,8	138,9	4 500	5 300	**HJ 313**
2,560	180,5	191,5	4 000	4 700	**HJ 313E**
3,250	187,6	212,5	4 500	5 300	
3,750	247,5	287,2	4 200	5 000	
3,700	182,3	185,9	3 800	4 500	**HJ 413**
4,030	194,6	202,7	3 800	4 500	**HJ 413**
0,710	65,5	81,7	7 200	7 700	
1,150	80,2	90,4	5 600	6 700	**HJ 214**
1,340	118,6	137,0	5 000	6 000	**HJ 214E**
1,512	116,3	145,9	5 000	6 000	
1,700	156,0	194,0	4 600	5 500	
2,200	174,1	223,5	4 700	5 700	
2,690	148,9	155,5	4 200	5 000	**HJ 314**
3,040	204,6	222,0	4 200	5 000	**HJ 314E**
3,950	210,0	241,9	4 200	5 000	
4,500	273,8	322,9	3 800	4 500	
5,260	223,2	229,7	3 300	4 000	**HJ 414**
5,840	223,2	229,7	3 300	4 000	**HJ 414**

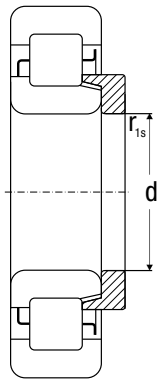
Single Row Cylindrical Roller Bearings



NU NJ N NUP

Dimensions							Bearing Designation			
d	D	B	r_s	r_{1s}	F	E	NU	NJ	NUP	N
			mm							
75	115	20	1,1	1	85		**NU 1015M**			
	130	25	1,5	1,5	88,5	116,5	**NU 215E**	**NJ 215E**	**NUP 215E**	**N 215**
	130	25	1,5	1,5	88,5	118,5	**NU 215EM**	**NJ 215EM**	**NUP 215EM**	**N 215EM**
	130	31	1,5	1,5	88,5		**NU 2215E**	**NJ 2215E**	**NUP 2215E**	
	130	31	1,5	1,5	88,5		**NU 2215EM**	**NJ 2215EM**	**NUP 2215EM**	
	130	41,28	1,5	1,5	88,5		**NU 5215M**			
	160	37	2,1	2,1	95,5	139,5	**NU 315**	**NJ 315**	**NUP 315**	**N 315**
	160	37	2,1	2,1	95	143	**NU 315EM**	**NJ 315EM**	**NUP 315EM**	**N 315EM**
	160	55	2,1	2,1	95,5		**NU 2315**	**NJ 2315**		
	160	55	2,1	2,1	95		**NU 2315EM**	**NJ 2315EM**	**NUP 2315EM**	
	190	45	4	4	104,5	160,5	**NU 415**	**NJ 415**		**N 415**
	190	45	4	4	104,5		**NU 415M**	**NJ 415M**		
80	125	22	1,1	1	91,5		**NU 1016M**			
	140	26	2,1	2,1	95,3	125,3	**NU 216**	**NJ 216**	**NUP 216**	**N 216**
	140	26	2,1	2,1	95,3	127,3	**NU 216EM**	**NJ 216EM**	**NUP 216EM**	**N 216EM**
	140	33	2,1	2,1	95,3		**NU 2216E**	**NJ 2216E**	**NUP 2216E**	
	140	33	2,1	2,1	95,3		**NU 2216EM**	**NJ 2216EM**	**NUP 2216EM**	
	140	44,45	2,1	2,1	95,3		**NU 5216M**			
	170	39	2,1	2,1	103	147	**NU 316**	**NJ 316**	**NUP 316**	**N 316**
	170	39	2,1	2,1	101	151	**NU 316EM**	**NJ 316EM**	**NUP 316EM**	**N 316EM**
	170	58	2,1	2,1	103		**NU 2316**	**NJ 2316**		
	170	58	2,1	2,1	101		**NU 2316EM**	**NJ 2316EM**	**NUP 2316EM**	
	200	48	4	4	110		**NU 416**	**NJ 416**		
	200	48	3	3	110	170	**NU 416M**	**NJ 416M**	**NUP 416M**	**N 416M**
85	130	22	1,1	1,1	96,5		**NU 1017M**			
	150	28	2,1	2,1	101,8	133,8	**NU 217**	**NJ 217**	**NUP 217**	**N 217**
	150	28	2,1	2,1	100,5	136,5	**NU 217EM**	**NJ 217EM**	**NUP 217EM**	**N 217EM**
	150	36	2,1	2,1	100,5		**NU 2217E**	**NJ 2217E**		
	150	36	2,1	2,1	100,5		**NU 2217EM**	**NJ 2217EM**	**NUP 2217EM**	
	150	49,21	2,1	2,1	101,5		**NU 5217M**			
	180	41	3	3	108	156	**NU 317**	**NJ 317**	**NUP 317**	**N 317**
	180	41	3	3	108	160	**NU 317EM**	**NJ 317EM**	**NUP 317EM**	**N 317EM**
	180	60	3	3	108		**NU 2317EM**	**NJ 2317EM**	**NUP 2317EM**	
	210	52	4	4	113	177	**NU 417M**	**NJ 417M**	**NUP 417M**	**N 417M**

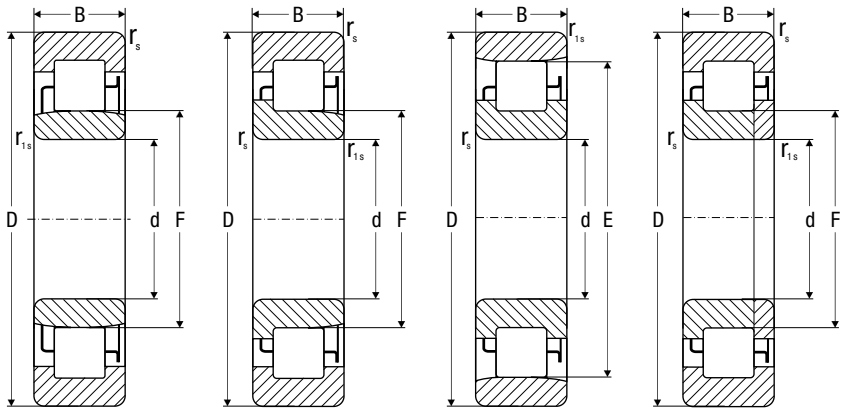
Single Row Cylindrical Roller Bearings



HJ

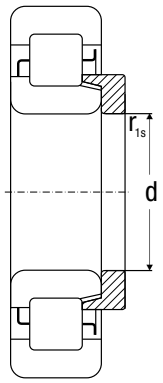
Weight	Basic Load Rating Dynamic C_r	Basic Load Rating Static C_{or}	Limiting Speed for Lubrication with Grease	Limiting Speed for Lubrication with Oil	Angle Ring
kg	kN		rpm		
0,750	67,9	86,6	7 000	7 600	
1,300	130,0	156,4	4 500	5 300	**HJ 215E**
1,460	130,0	156,4	4 500	5 300	**HJ 215E**
1,630	161,8	207,2	4 500	5 300	
1,800	161,8	207,2	4 500	5 300	
2,400	173,4	225,9	4 500	5 300	
3,250	179,0	188,8	3 800	4 500	**HJ 315**
3,880	254,0	283,0	3 500	4 200	**HJ 315E**
4,875	258,1	302,1	3 800	4 500	
5,450	330,0	395,0	3 400	4 000	
6,230	257,5	267,2	3 200	3 800	**HJ 415**
6,700	257,5	267,2	3 200	3 800	**HJ 415**
0,990	71,4	89,3	5 000	6 000	
1,523	106,2	122,3	4 500	5 300	**HJ 216**
1,700	143,4	173,6	4 200	5 000	**HJ 216E**
2,050	186,3	243,0	4 200	5 000	
2,050	186,3	243,0	4 200	5 000	
2,920	202,9	270,1	4 300	5 300	
3,920	190,0	207,4	3 500	4 200	**HJ 316**
4,330	251,1	275,1	3 300	4 000	**HJ 316E**
5,890	273,9	331,8	3 500	4 200	
6,360	359,0	424,1	3 500	4 200	
7,290	294,2	308,0	3 000	3 500	**HJ 416**
8,110	314,0	336,0	3 000	3 500	**HJ 416**
1,050	70,9	89,8	5 000	6 000	
1,900	120,4	140,2	4 200	5 000	**HJ 217**
2,100	171,3	205,5	4 000	4 700	**HJ 217E**
2,520	214,7	274,1	3 800	4 500	
2,800	214,7	274,1	3 800	4 500	
3,680	234,3	318,0	3 900	4 600	
4,530	211,7	228,1	3 300	4 000	**HJ 317**
5,250	285,9	322,7	3 200	3 800	**HJ 317E**
7,300	390,0	485,0	3 200	3 800	
9,620	355,0	381,8	3 000	3 500	**HJ 417**

Single Row Cylindrical Roller Bearings



Dimensions							Bearing Designation			
d	D	B	r_s	r_{1s}	F	E	NU	NJ	NUP	N
			mm							
90	140	24	1,5	1,1	103		**NU 1018M**			
	160	30	2,1	2,1	107	143	**NU 218**	**NJ 218**	**NUP 218**	**N 218**
	160	30	2,1	2,1	107	145	**NU 218EM**	**NJ 218EM**	**NUP 218EM**	**N 218EM**
	160	40	2,1	2,1	107		**NU 2218EM**	**NJ 2218EM**	**NUP 2218EM**	
	160	52,4	2,1	2,1	107		**NU 5218M**			
	190	43	4	4	115	165	**NU 318**	**NJ 318**		**N 318**
	190	43	4	4	113,5	169,5	**NU 318EM**	**NJ 318EM**	**NUP 318EM**	**N 318EM**
	190	64	4	4	113,5		**NU 2318EM**	**NJ 2318EM**	**NUP 2318EM**	
	225	54	4	4	123,5		**NU 418M**	**NJ 418M**		
95	145	24	1,5	1,1	108		**NU 1019M**			
	170	32	2,1	2,1	113,5	151,5	**NU 219**	**NJ 219**		**N 219**
	170	32	2,1	2,1	112,5		**NU 219EM**	**NJ 219EM**	**NUP 219EM**	
	170	43	2,1	2,1	113,5		**NU 2219**	**NJ 2219**	**NUP 2219**	
	170	43	2,1	2,1	112,5		**NU 2219EM**	**NJ 2219EM**	**NUP 2219EM**	
	170	56,6	2,1	2,1	112,5		**NU 5219M**			
	200	45	4	4	121,5	173,5	**NU 319**	**NJ 319**		**N 319**
	200	45	4	4	121,5	177,5	**NU 319EM**	**NJ 319EM**	**NUP 319EM**	**N 319EM**
	200	67	4	4	121,5		**NU 2319EM**	**NJ 2319EM**	**NUP 2319EM**	
	240	55	4	4	133,5		**NU 419M**	**NJ 419M**		
100	150	24	1,5	1,1	113		**NU 1020M**			
	180	34	2,1	2,1	120	160	**NU 220**	**NJ 220**	**NUP 220**	**N 220**
	180	34	2,1	2,1	119	163	**NU 220EM**	**NJ 220EM**	**NUP 220EM**	**N 220EM**
	180	46	2,1	2,1	120		**NU 2220**	**NJ 2220**	**NUP 2220**	
	180	46	2,1	2,1	119		**NU 2220EM**	**NJ 2220EM**	**NUP 2220EM**	
	180	60,32	2,1	2,1	119		**NU 5220M**			
	215	47	4	4	129,5	185,5	**NU 320**	**NJ 320**	**NUP 320**	**N 320**
	215	47	4	4	127,5	191,5	**NU 320EM**	**NJ 320EM**	**NUP 320EM**	**N 320EM**
	215	73	4	4	127,5		**NU 2320EM**	**NJ 2320EM**	**NUP 2320EM**	
	250	58	4	4	139		**NU 420M**	**NJ 420M**		
105	190	36	2,1	2,1	126,8	168,8	**NU 221**	**NJ 221**	**NUP 221**	**N 221**
	190	36	2,1	2,1	125	173	**NU 221EM**	**NJ 221EM**	**NUP 221EM**	**N 221EM**
	225	49	4	4	135	195	**NU 321**	**NJ 321**		**N 321**
	225	49	4	4	133	201	**NU 321EM**	**NJ 321EM**		**N 321EM**
	260	60	4	4	144,5		**NU 421M**	**NJ 421M**		

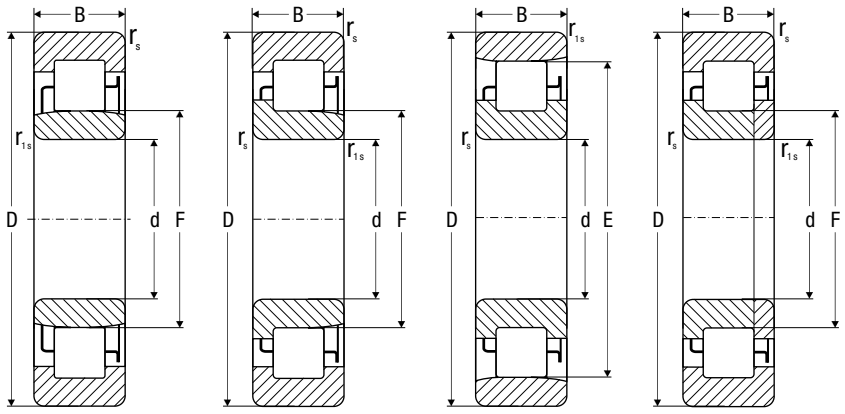
Single Row Cylindrical Roller Bearings



HJ

Weight	Basic Load Rating Dynamic C_r	Basic Load Rating Static C_{or}	Limiting Speed for Lubrication with Grease	Limiting Speed for Lubrication with Oil	Angle Ring
kg	kN		rpm		
1,360	88,1	114,4	4 800	5 600	
2,324	149,0	173,6	4 000	4 700	**HJ 218**
2,630	189,6	229,3	3 900	4 600	**HJ 218E**
3,480	242,0	313,8	3 400	4 000	
4,480	265,2	351,5	3 700	4 300	
5,520	234,0	258,0	3 200	3 800	**HJ 318**
6,229	310,8	346,9	3 000	3 500	**HJ 318E**
9,200	430,2	526,7	2 800	3 300	
11,540	389,6	422,3	2 700	3 200	**HJ 418**
1,420	99,8	135,9	4 500	5 000	
2,830	165,0	194,8	3 800	4 500	**HJ 219**
3,250	220,0	264,0	3 500	4 200	**HJ 219E**
3,850	230,0	297,0	3 800	4 500	
4,300	286,0	370,0	3 200	4 000	
5,450	290,2	401,1	3 500	4 300	
6,200	253,5	281,8	3 200	3 800	
7,110	328,9	378,5	2 800	3 300	**HJ 319E**
10,900	472,3	602,8	2 700	3 200	
13,570	415,2	465,0	2 500	3 000	
1,520	102,5	142,7	4 300	5 000	
3,390	182,8	217,2	3 500	4 200	**HJ 220**
3,780	248,0	305,0	3 200	3 800	**HJ 220E**
4,630	257,7	337,9	3 500	4 200	
5,420	333,5	444,4	3 200	3 900	
6,500	332,5	442,3	3 300	4 000	
7,660	293,0	329,2	2 800	3 300	**HJ 320**
8,690	379,1	424,3	2 700	3 200	**HJ 320E**
13,900	570,1	717,0	2 500	3 000	
16,440	478,0	543,0	2 200	2 700	**HJ 420**
4,065	200,8	241,0	3 300	4 000	**HJ 221**
4,470	261,9	311,9	3 200	4 000	**HJ 221E**
8,740	335,0	379,1	2 700	3 200	**HJ 321**
9,860	425,9	480,2	2 700	3 200	**HJ 321E**
19,000	515,1	585,1	2 200	2 700	**HJ 421**

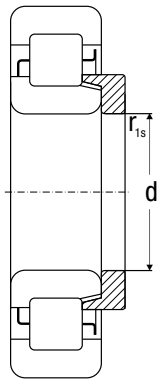
Single Row Cylindrical Roller Bearings



NU NJ N NUP

Dimensions							Bearing Designation			
d	D	B	r_s	r_{1s}	F	E	NU	NJ	NUP	N
			mm							
110	170	28	2	1,1	125		**NU 1022M**			
	200	38	2,1	2,1	132,5	178,5	**NU 222**	**NJ 222**		**N 222**
	200	38	2,1	2,1	132,5	180,5	**NU 222EM**	**NJ 222EM**	**NUP 222EM**	**N 222EM**
	200	53	2,1	2,1	132,5		**NU 2222**	**NJ 2222**		
	200	53	2,1	2,1	132,5		**NU 2222EM**	**NJ 2222EM**		
	200	69,85	2,1	2,1	132,95		**NU 5222M**			
	240	50	4	4	143	207	**NU 322**	**NJ 322**		**N 322**
	240	50	4	4	143	211	**NU 322EM**	**NJ 322EM**	**NUP 322EM**	**N 322EM**
	240	80	4	4	143		**NU 2322EM**	**NJ 2322EM**	**NUP 2322EM**	
	280	65	4	4	155		**NU 422M**	**NJ 422M**		
120	180	28	2	1,1	135		**NU 1024M**			
	215	40	2,1	2,1	143,5	191,5	**NU 224**	**NJ 224**	**NUP 224**	**N 224**
	215	40	2,1	2,1	143,5	195,5	**NU 224EM**	**NJ 224EM**	**NUP 224EM**	**N 224EM**
	215	58	2,1	2,1	143,5		**NU 2224**	**NJ 2224**		
	215	58	2,1	2,1	143,5		**NU 2224EM**	**NJ 2224EM**		
	215	76,2	2,1	2,1	145,5		**NU 5224M**			
	260	55	4	4	154	230	**NU 324EM**	**NJ 324EM**		**N 324EM**
	260	86	4	4	154		**NU 2324EM**	**NJ 2324EM**	**NUP 2324EM**	
	310	72	5	5	170		**NU 424M**	**NJ 424M**		
130	200	33	2	1,1	148		**NU 1026M**			
	230	40	4	4	156	204	**NU 226**	**NJ 226**		**N 226**
	230	40	4	4	153,5	209,5	**NU 226EM**	**NJ 226EM**	**NUP 226EM**	**N 226EM**
	230	64	3	3	153,5		**NU 2226EM**	**NJ 2226EM**		
	230	79,38	3	3	155,5		**NU 5226M**			
	280	58	4	4	167	247	**NU 326EM**	**NJ 326EM**		**N 326EM**
	280	93	4	4	167		**NU 2326EM**	**NJ 2326EM**		
140	210	33	2	1,1	158		**NU 1028M**			
	250	42	4	4	169	221	**NU 228**	**NJ 228**		**N 228**
	250	42	4	4	169	225	**NU 228EM**	**NJ 228EM**	**NUP 228EM**	**N 228EM**
	250	68	3	3	169		**NU 2228EM**	**NJ 2228EM**		
	250	82,55	3	3	169		**NU 5228M**			
	300	62	4	4	180	260	**NU 328EM**	**NJ 328EM**	**NUP 328EM**	**N 328EM**
	300	102	4	4	180		**NU 2328EM**	**NJ 2328EM**		
	360	82	5	5	196			**NJ 428M**		
150	225	35	2,1	1,7	169,5		**NU 1030M**			
	270	45	4	4	182		**NU 230**	**NJ 230**		
	270	45	4	4	182	242	**NU 230EM**	**NJ 230EM**	**NUP 230EM**	**N 230EM**
	270	73	3	3	182		**NU 2230EM**	**NJ 2230EM**		
	320	65	4	4	193	283	**NU 330EM**	**NJ 330EM**		**N 330EM**
	320	108	4	4	193		**NU 2330EM**	**NJ 2330EM**		

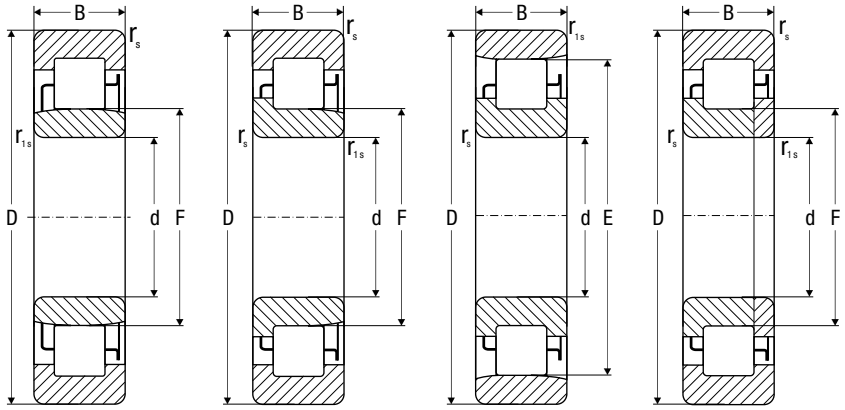
Single Row Cylindrical Roller Bearings



HJ

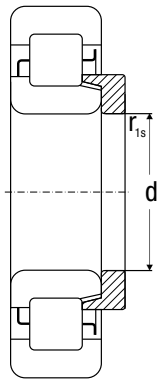
Weight	Basic Load Rating Dynamic C_r	Basic Load Rating Static C_{or}	Limiting Speed for Lubrication with Grease	Limiting Speed for Lubrication with Oil	Angle Ring
kg	kN		rpm		
2,340	150,5	207,5	3 900	4 500	
4,770	240,1	289,7	3 200	3 800	**HJ 222**
5,360	292,5	364,8	3 000	3 600	**HJ 222E**
6,720	333,2	441,5	3 200	3 800	
7,320	383,0	516,0	3 000	3 600	
9,900	426,6	590,4	3 000	3 600	
10,440	379,6	433,8	2 500	3 000	**HJ 322**
11,806	439,6	507,6	2 400	2 800	**HJ 322E**
17,500	670,0	880,0	2 400	2 800	
21,880	569,5	654,7	2 100	2 500	**HJ 422**
2,450	154,1	218,6	3 700	4 300	
5,710	259,9	318,5	3 000	3 500	**HJ 224**
6,480	339,2	428,1	2 800	3 400	**HJ 224E**
8,290	364,7	492,2	3 000	3 500	
9,550	446,4	609,2	2 600	3 100	
11,790	484,2	710,5	2 750	3 300	
14,700	516,2	592,8	2 200	2 700	**HJ 324E**
24,300	782,1	1 011,2	2 100	2 500	
29,960	714,4	834,5	1 900	2 200	**HJ 424**
3,710	162,8	221,4	3 200	3 800	
6,510	270,3	342,3	2 700	3 200	**HJ 226**
7,315	351,1	433,5	2 500	3 000	**HJ 226E**
11,900	490,8	666,8	2 500	3 000	
14,100	561,6	832,7	2 500	3 000	
18,600	603,2	715,6	2 000	2 400	**HJ 326E**
30,000	848,9	1 107,5	1 900	2 400	
4,070	184,1	259,3	3 300	3 800	
8,240	305,0	387,7	2 500	3 000	**HJ 228**
9,440	385,1	502,0	2 300	2 800	**HJ 228E**
14,400	520,0	840,0	2 400	2 900	
17,050	636,0	951,8	2 300	2 800	
22,100	663,2	797,1	1 900	2 200	**HJ 328E**
37,600	1 018,8	1 384,5	1 900	2 200	
47,160	952,8	1 117,7	1 600	1 900	**HJ 428**
4,850	192,2	274,9	2 700	3 200	
10,550	367,7	480,5	2 200	2 700	**HJ 230**
12,000	440,2	581,3	2 200	2 700	**HJ 230E**
18,500	635,0	930,0	2 200	2 700	
26,800	757,6	921,6	1 800	2 100	**HJ 330E**
45,000	1 160,0	1 600,0	1 600	2 000	

Single Row Cylindrical Roller Bearings



Dimensions							Bearing Designation			
d	D	B	r_s	r_{1s}	F	E	NU	NJ	NUP	N
			mm							
160	240	38	2,1	2,1	180		**NU 1032M**			
	290	48	4	4	195	259	**NU 232EM**	**NJ 232EM**	**NUP 232EM**	**N 232EM**
	290	80	3	3	195		**NU 2232EM**	**NJ 2232EM**		
	340	68	4	4	204	300	**NU 332EM**	**NJ 332EM**		**N 332EM**
	340	114	4	4	208		**NU 2332EM**	**NJ 2332EM**		
170	260	42	2,1	2,1	193		**NU 1034M**			
	310	52	4	4	207	279	**NU 234EM**	**NJ 234EM**	**NUP 234EM**	**N 234EM**
	310	86	4	4	205		**NU 2234EM**	**NJ 2234EM**		
	360	72	4	4	220	310	**NU 334EM**	**NJ 334EM**		**N 334EM**
	360	120	4	4	220		**NU 2334EM**	**NJ 2334EM**		
180	280	46	2,1	2,1	205		**NU 1036M**			
	320	52	4	4	217	282	**NU 236EM**	**NJ 236EM**	**NUP 236EM**	**N 236EM**
	320	86	4	4	218		**NU 2236EM**	**NJ 2236EM**		
	380	75	4	4	231	330	**NU 336EM**	**NJ 336EM**		**N 336EM**
	380	126	4	4	232		**NU 2336EM**	**NJ 2336EM**		
190	290	46	2,1	2,1	215		**NU 1038M**			
	340	55	4	4	230	299	**NU 238EM**	**NJ 238EM**	**NUP 238EM**	**N 238EM**
	340	92	4	4	228		**NU 2238EM**	**NJ 2238EM**		
	400	78	5	5	245	345	**NU 338EM**	**NJ 338EM**		**N 338EM**
	400	132	5	5	245		**NU 2338EM**	**NJ 2338EM**		
200	310	51	2,1	2,1	229		**NU 1040M**			
	360	58	4	4	243	316	**NU 240EM**	**NJ 240EM**	**NUP 240EM**	**N 240EM**
	360	98	4	4	241		**NU 2240EM**	**NJ 2240EM**		
	420	80	5	5	260		**NU 340EM**	**NJ 340EM**		
	420	138	5	5	260		**NU 2340EM**	**NJ 2340EM**		
220	340	56	3	3	250		**NU 1044M**			
	400	65	4	4	270	350	**NU 244EM**	**NJ 244EM**	**NUP 244EM**	**N 244EM**
	400	108	4	4	270		**NU 2244EM**	**NJ 2244EM**		
	460	88	5	5	284	396	**NU 344EM**	**NJ 344EM**		**N 344EM**
	460	145	5	5	284		**NU 2344EM**	**NJ 2344EM**		
240	360	56	3	3	270		**NU 1048M**			
	440	72	4	4	295		**NU 248EM**	**NJ 248EM**		
	500	95	5	5	310		**NU 348M**			
260	400	65	4	4	296		**NU 1052M**			
280	420	65	4	4	316		**NU 1056M**	**NJ 1056M**		
300	460	74	4	4	340		**NU 1060M**	**NJ 1060M**		
320	480	74	4	4	360		**NU 1064M**	**NJ 1064M**		
340	520	82	5	5	385		**NU 1068M**			
360	540	82	5	5	405		**NU 1072M**			
400	600	90	5	5	450		**NU 1080M**			
	720	185	6	6	480		**NU 2280M**			

Single Row Cylindrical Roller Bearings



HJ

Weight	Basic Load Rating Dynamic C_r	Basic Load Rating Static C_{or}	Limiting Speed for Lubrication with Grease	Limiting Speed for Lubrication with Oil	Angle Ring
kg	kN		rpm		
5,960	235,0	380,0	2 400	3 000	
14,700	498,6	666,4	2 000	2 400	**HJ 232E**
24,000	810,0	1 190,0	2 000	2 400	
32,200	857,8	1 053,2	1 700	2 000	**HJ 332E**
54,400	1 320,0	1 860,0	1 500	1 800	
7,900	277,5	399,7	2 200	2 700	
19,000	589,0	777,2	1 900	2 300	**HJ 234E**
30,000	970,0	1 400,0	1 900	2 300	
38,000	927,9	1 152,5	1 400	1 700	**HJ 334E**
63,000	1 366,0	1 846,0	1 400	1 700	
9,858	334,6	474,5	2 100	2 500	
19,500	611,3	826,0	1 800	2 100	**HJ 236E**
31,200	1 010,0	1 510,0	1 800	2 100	
42,800	984,1	1 228,9	1 300	1 600	**HJ 336E**
73,000	1 400,0	2 040,0	1 300	1 600	
9,510	354,8	520,3	1 900	2 200	
24,000	695,0	955,0	1 700	2 000	**HJ 238E**
39,000	1 100,0	1 670,0	1 700	2 000	
49,400	1 140,0	1 500,0	1 200	1 500	**HJ 338E**
85,000	1 440,0	2 070,0	1 200	1 500	
13,804	381,9	567,1	1 900	2 200	
27,300	749,9	1 033,7	1 500	1 800	**HJ 240E**
46,000	1 210,0	1 870,0	1 500	1 800	
55,800	990,0	1 320,0	1 300	1 600	**HJ 340**
96,800	1 440,0	2 090,0	1 100	1 400	
18,800	485,0	810,0	1 800	2 200	
37,800	760,0	1 220,0	1 500	1 800	**HJ 244E**
61,800	1 130,0	1 810,0	1 400	1 700	
73,600	1 200,0	1 570,0	1 200	1 500	**HJ 344E**
114,000	1 970,0	3 270,0	1 000	1 300	
21,200	495,0	855,0	1 700	2 100	
50,000	935,0	1 340,0	1 400	1 600	**HJ 248E**
96,000	1 430,0	1 950,0	1 100	1 300	
29,000	643,0	962,0	1 600	1 800	
32,500	681,0	1 020,0	1 500	1 700	
44,000	891,0	1 310,0	1 400	1 500	**HJ 1060**
48,500	909,0	1 390,0	1 300	1 400	
65,900	1 050,0	1 670,0	1 200	1 300	
68,800	1 070,0	1 750,0	1 100	1 250	
90,600	1 310,0	2 470,0	950	1 100	
350,000	3 410,0	5 960,0	710	840	

Double Row Cylindrical Roller Bearings

Double row cylindrical roller bearings, NN design, have two rows of cylindrical rollers guided by three ribs on the inner ring. The outer ring has no guide ribs, making the outer ring separable. This is why these bearings cannot carry axial loads. Double row cylindrical roller bearings, type NN30K, are commonly produced with a tapered bore (1:12 taper).
These bearings are also available with cylindrical bores upon request.

Lubrication Groove and Holes on Outer Ring

Double row cylindrical roller bearings with tapered bore can be delivered with groove and lubrication holes on the outer ring (W33).

Cage

Double row cylindrical roller bearings are produced with a machined brass (M) cage.

Boundary Dimensions

Boundary dimensions comply with the standard ISO 15.

Tolerance

Double row cylindrical roller bearings with tapered bores are produced in higher tolerance classes P5 and P4.
Bearings NNU49 and NN39 are produced in normal tolerance class ABEC 1 or P0.

Radial Clearance

Double row cylindrical roller bearings with a tapered bore are produced with reduced radial clearance and with non-interchangeable rings (C1NA and C2NA). Symbols C1NA and C2NA are connected with tolerance class symbols P5 and P4; e.g., P5 + C1NA is designated P51NA.
The NNU49 bearings are produced with normal radial clearance (C0).
Listed in the chart below are values for radial clearance.

Radial Clearance of Double Row Cylindrical Roller Bearings with Tapered Bore with Non-Interchangeable Rings Determined for Machine Tool Spindles

Bore Diameter		Radial Clearance			
d		C1NA		C2NA	
over	to	min	max	min	max
mm		μm			
24	30	15	25	25	35
30	40	15	25	25	40
40	50	17	30	30	45
50	65	20	35	35	50
65	80	25	40	40	60
80	100	35	55	45	70
100	120	40	60	50	80
120	140	45	70	60	90
140	160	50	75	65	100
160	180	55	85	75	110
180	200	60	90	80	120
200	225	60	95	90	135
225	250	65	100	100	150
250	280	75	110	110	165
280	315	80	120	120	180
315	355	90	135	135	200
355	400	100	150	150	225
400	450	110	170	170	255

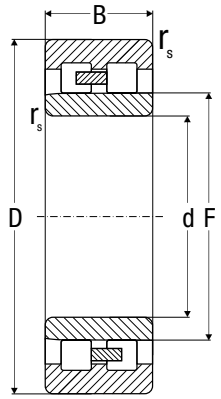
Designation

Listed below are some common designations for double row cylindrical roller bearings.

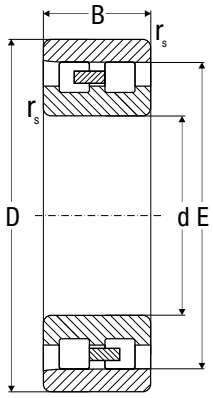
Double Row Cylindrical Roller Bearings

Suffix	Description	Example of Designation
K	Tapered bearing bore at a 1:12 ratio	NN3010K
W33	Lubrication groove and holes in the outer ring	NN3024K W33
M	Machined brass cage guided on the rolling elements	NN3068K MC3
MB	Machined brass cage guided on the inner ring	NN3944K MB
P6	Higher tolerance class than normal	NNU49/630K P6
P5	Higher tolerance class than P6	NN3040K P5
P4	Higher tolerance class than P5	NN3026K P4
C1	Radial clearance less than C2	NN3012K C1
C2	Radial clearance less than normal	NN3020K C2
C3	Radial clearance greater than normal	NN3068K MC3
C4	Radial clearance greater than C3	NN3072K C4
C5	Radial clearance grater than C4	NN3056K C5
P51	Tolerance class P5 and radial clearance C1	NN3009K P51
P41	Tolerance class P4 and radial clearance C1	NN3008K P41
P51NA	Tolerance class P5, radial clearance C1, non-interchangeable rings	NN3016K P51NA

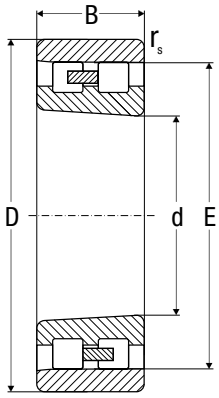
Double Row Cylindrical Roller Bearings



NNU



NN



NN..K

Dimensions						Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation		Weight
						Dynamic	Static					
d	D	B	r_s	E	F	C_r	C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore	
mm						kN		rpm				kg
30	55	19	1,0	48,5		28,7	32,5	16 000	18 000		**NN3006K**	0,190
35	62	20	1,0	55,0		36,9	43,8	14 000	16 000		**NN3007K**	0,250
40	68	21	1,0	61,0		38,3	44,7	12 600	14 000		**NN3008K**	0,300
45	75	23	1,0	67,5		44,7	53,1	11 000	12 600		**NN3009K**	0,380
50	80	23	1,0	72,5		48,2	59,6	10 600	12 000		**NN3010K**	0,420
55	90	26	1,1	81,0		64,3	81,0	9 400	11 000		**NN3011K**	0,620
60	95	26	1,1	86,1		68,1	89,1	8 900	10 000		**NN3012K**	0,660
65	100	26	1,1	91,0		70,8	98,1	8 400	9 400		**NN3013K**	0,710
70	110	30	1,1	100,0		90,9	128,0	7 500	8 400		**NN3014K**	1,000
75	115	30	1,1	105,0		90,9	128,0	7 100	7 900		**NN3015K**	1,100
80	125	34	1,1	113,0		114,0	162,0	6 700	7 500		**NN3016K**	1,500
85	130	34	1,1	118,0		119,0	178,0	6 300	7 100		**NN3017K**	1,600
90	140	37	1,5	127,0		131,0	192,0	6 000	6 700		**NN3018K**	2,000
95	145	37	1,5	132,0		139,0	207,0	5 600	6 300		**NN3019K**	2,100
100	140	40	1,1		113,0	119,0	215,0	3 800	4 700	**NNU4920M**		1,920
	150	37	1,5	137,0		144,0	224,0	5 300	6 000		**NN3020K**	2,200
105	160	41	2,0	146,0		188,0	282,0	5 000	5 600		**NN3021K**	2,800
110	170	45	2,0	155,0		220,0	329,0	4 700	5 300		**NN3022K**	3,550
120	165	40	1,1		134,5	168,0	304,0	3 200	4 000	**NNU4924M**		2,810
	180	46	2,0	165,0		228,0	355,0	4 500	5 000		**NN3024K**	3,850
130	200	52	2,0	182,0		282,0	447,0	4 000	4 500		**NN3026K**	5,750
140	210	53	2,0	192,0		299,0	482,0	3 800	4 200		**NN3028K**	6,200
150	225	56	2,1	206,0		322,0	521,0	3 500	4 000		**NN3030K**	7,500
160	240	60	2,1	219,0		362,0	596,0	3 300	3 800		**NN3032K**	9,080
170	260	67	2,1	236,0		447,0	750,0	3 000	3 300		**NN3034K**	12,400
180	280	74	2,1	255,0		562,0	926,0	2 800	3 200		**NN3036K**	16,500
190	290	75	2,1	265,0		596,0	1020,0	2 700	3 000		**NN3038K**	17,000
200	310	82	2,1	282,0		643,0	1060,0	2 400	2 700		**NN3040K**	22,000
220	300	60	3,5	278,0		299,0	668,0	1 800	2 200	**NN3944**		12,000
	340	90	3,0	310,0		810,0	1360,0	2 200	2 500		**NN3044K**	28,500
240	320	60	3,5	298,0		316,0	750,0	1 600	2 000	**NN3948**		13,000
	360	92	3,0	330,0		841,0	1470,0	2 100	2 400		**NN3048K**	32,000
260	400	104	4,0	364,0		1040,0	1850,0	1 900	2 100		**NN3052K**	46,000
280	420	106	4,0	384,0		1100,0	2000,0	1 800	2 000		**NN3056K**	49,500
320	480	121	4,0	438,0		1360,0	2510,0	1 600	1 800		**NN3064K**	74,000
340	520	133	5,0	473,0		1680,0	3100,0	1 400	1 600		**NN3068K**	97,500
360	540	134	5,0	493,0		1740,0	3350,0	1 300	1 500		**NN3072K**	105,000
440	650	157	6,0	596,0		2460,0	4920,0	1 000	1 200		**NN3088K**	183,000
630	850	218	8,0		704,0	3910,0	10200,0	470	600	**NNU49/630**		363,000

Notes

Double Row Spherical Roller Bearings

ZVL-ZKL double row spherical roller bearings have two rows of barrel-shaped rollers with a common spherical raceway in the outer ring. By virtue of their design, spherical roller bearings are self-aligning.
Double row spherical roller bearings can carry heavy radial and combined axial loads in both directions simultaneously. They are available with either cylindrical or tapered bores to suit your application requirements.
Some sizes of double row spherical roller bearings are available in the „C“ or „E“ design which have increased basic load carrying capacity.

Lubrication Groove and Holes on Outer Ring

Double row spherical roller bearings are produced with groove and lubrication holes on the outer ring (W33).

Cage

Double row spherical roller bearings are produced with either a machined brass (M) or a pressed steel (J) cage.

Boundary Dimensions

Boundary dimensions comply with the standard ISO 15.

Tolerance

Double row spherical roller bearings are produced within P0 (ABEC1) tolerance class. Standard ISO 199 and ISO 492 specify these tolerances.

Radial Clearance

Double row spherical roller bearings are produced with a radial clearance of C0 or C3 as normal production. Other radial clearances may be produced upon request. All radial clearance values comply with standard ISO 5753 and are listed in the charts below.

Radial Clearance of Double Row Spherical Roller Bearings											
Bore Diameter		Cylindrical Bore Radial Clearance									
d		C2		normal		C3		C4		C5	
over	to	min	max	min	max	min	max	min	max	min	max
mm		μm									
30	40	15	30	30	45	45	60	60	80	80	100
40	50	20	35	35	55	55	75	75	100	100	125
50	65	20	40	40	65	65	90	90	120	120	150
65	80	30	50	50	80	80	110	110	145	145	180
80	100	35	60	60	100	100	135	135	180	180	225
100	120	40	75	75	120	120	160	160	210	210	260
120	140	50	95	95	145	145	190	190	240	240	300
140	160	60	110	110	170	170	220	220	280	280	350
160	180	65	120	120	180	180	240	240	310	310	390
180	200	70	130	130	200	200	260	260	340	340	430
200	225	80	140	140	220	220	290	290	380	380	470
225	250	90	150	150	240	240	320	320	420	420	520
250	280	100	170	170	260	260	350	350	460	460	570
280	315	110	190	190	280	280	370	370	500	500	630
315	355	120	200	200	310	310	410	410	550	550	690
355	400	130	220	220	340	340	450	450	600	600	760
400	450	140	240	240	370	370	500	500	660	660	820
450	500	140	260	260	410	410	550	550	720	720	900
500	560	150	280	280	440	440	600	600	780	780	1000
560	630	170	310	310	480	480	650	650	850	850	1100
630	710	190	350	350	530	530	700	700	920	920	1190
710	800	210	390	390	580	580	770	770	1010	1010	1300
800	900	230	430	430	650	650	860	860	1120	1120	1440

Radial Clearance of Double Row Spherical Roller Bearings											
Bore Diameter		Tapered Bore Radial Clearance									
d		C2		normal		C3		C4		C5	
over	to	min	max	min	max	min	max	min	max	min	max
mm		μm									
30	40	25	35	35	50	50	65	65	85	85	105
40	50	30	45	45	60	60	80	80	100	100	130
50	65	40	55	55	75	75	95	95	120	120	160
65	80	50	70	70	95	95	120	120	150	150	200
80	100	55	80	80	110	110	140	140	180	180	230
100	120	65	100	100	135	135	170	170	220	220	280
120	140	80	120	120	160	160	200	200	260	260	330
140	160	90	130	130	180	180	230	230	300	300	380
160	180	100	140	140	200	200	260	260	340	340	430
180	200	110	160	160	220	220	290	290	370	370	470
200	225	120	180	180	250	250	320	320	410	410	520
225	250	140	200	200	270	270	350	350	450	450	570
250	280	150	220	220	300	300	390	390	490	490	620
280	315	170	240	240	330	330	430	430	540	540	680
315	355	190	270	270	360	360	470	470	590	590	740
355	400	210	300	300	400	400	520	520	650	650	820
400	450	230	330	330	440	440	570	570	720	720	910
450	500	260	370	370	490	490	630	630	790	790	1000
500	560	290	410	410	540	540	680	680	870	870	1100
560	630	320	460	460	600	600	760	760	980	980	1230
630	710	350	510	510	670	670	850	850	1090	1090	1360
710	800	390	570	570	750	750	950	950	1220	1220	1500
800	900	440	640	640	840	840	1070	1070	1370	1370	1690

Tapered Bore

Bearings with a tapered bore have a taper of 1:12. Bearings in the 240 and 241 design have a taper of 1:30, designation K30.

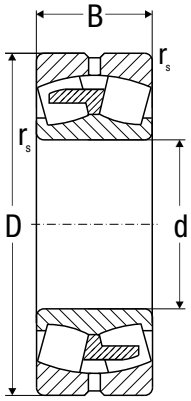
Designation

Listed below are some common designations for double row spherical roller bearings.

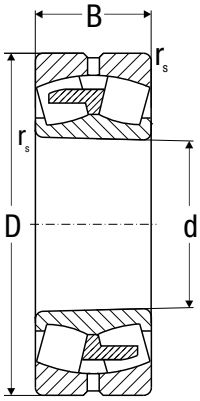
Double Row Spherical Roller Bearings		
Prefix	Description	Example of Designation
WB	Bearing with oversize width	WB22218EW33J-2RS
Suffix	**Description**	**Example of Designation**
K	Tapered bearing bore at a 1:12 ratio	22214KJ
K30	Tapered bearing bore at a 1:30 ratio, series 240 and 241	24040K30M
W33	Lubrication groove and holes in the outer ring	22320W33M
J	Pressed steel cage guided on the rolling elements	22308J
M	One-part machined brass cage guided on the rolling elements	23156M
MB	Two-part machined brass cage rolling elements centered	23264CW33MB
E	Internal design change for enhanced load carrying capacity	22320EW33J
C	Difference of internal design	24038CW33M
2RS	Nitrile rubber seal on both sides	22324EW33J-2RS
TP1	Special internal design - bearings for vibratory equipment	22308W33MA C4TP1
C2	Radial clearance less than normal	23032M C2
C3	Radial clearance greater than normal	22220J C3
C4	Radial clearance greater than C3	23164M C4
S0	Heat stabilized for an operating temperature up to 150°C	22320M C3S0
S1	Heat stabilized for an operating temperature up to 200°C	23048M C4S1
S2	Heat stabilized for an operating temperature up to 250°C	22219M S2
S3	Heat stabilized for an operating temperature up to 300°C	23224KM C3S3
S4	Heat stabilized for an operating temperature up to 350°C	23032M C2S4
S5	Heat stabilized for an operating temperature up to 400°C	23226M S5

Notes

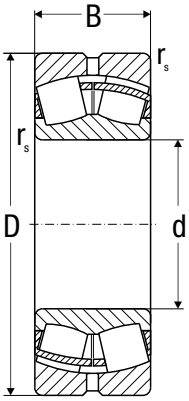
Double Row Spherical Roller Bearings



W33M



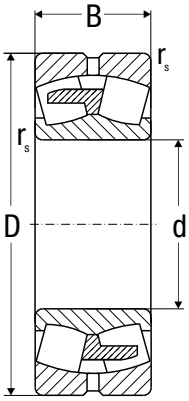
KW33M



EW33J

Dimensions				Basic Load Rating Dynamic	Static	Limiting Speed for Lubrication with		Bearing Designation		Weight	Used Adapter Sleeve
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore		
mm				kN		rpm				kg	
25	52	18	1	44	43	8 000	10 000	**22205M**	**22205KM**	0,18	H305
	62	17	1,1	49	44	7 000	8 000	**21305M**	**21305KM**	0,28	H305
30	62	20	1	56	61	6 700	8 500	**22206M**	**22206KM**	0,28	H306
	72	19	1,1	58	64	5 500	7 000	**21306M**	**21306KM**	0,41	H306
35	72	23	1,1	75	82	6 300	7 700	**22207M**	**22207KM**	0,43	H307
	80	21	1,5	66	75	5 000	6 400	**21307M**	**21307KM**	0,54	H307
40	80	23	1,1	93	105	6 000	7 000	**22208EJ**	**22208EKJ**	0,51	H308
	80	23	1,1	87	94	6 000	7 000	**22208M**	**22208KM**	0,54	H308
	90	23	1,5	89	99	4 600	5 500	**21308M**	**21308KM**	0,75	H308
	90	33	1,5	140	145	5 300	6 300	**22308EJ**	**22308EKJ**	0,97	H2308
	90	33	1,5	124	142	5 300	6 300	**22308M**	**22308KM**	1,00	H2308
45	85	23	1,1	97	113	5 500	7 000	**22209EJ**	**22209EKJ**	0,56	H309
	85	23	1,1	93	102	5 500	7 000	**22209M**	**22209KM**	0,58	H309
	100	25	1,5	106	118	3 200	4 000	**21309M**	**21309KM**	1,02	H309
	100	36	1,5	165	190	4 800	5 800	**22309EJ**	**22309EKJ**	1,37	H2308
	100	36	1,5	156	175	4 800	5 800	**22309M**	**22309KM**	1,38	H2308
50	90	23	1,1	105	125	4 600	5 400	**22210EJ**	**22210EKJ**	0,60	H310
	90	23	1,1	95	112	4 600	5 400	**22210M**	**22210KM**	0,62	H310
	110	27	2	128	144	2 800	3 800	**21310M**	**21310KM**	1,30	H310
	110	40	2	190	226	4 600	5 600	**22310EJ**	**22310EKJ**	1,79	H2310
	110	40	2	185	216	4 600	5 600	**22310M**	**22310KM**	1,85	H2310
55	100	25	1,5	124	148	4 000	5 000	**22211EJ**	**22211EKJ**	0,80	H311
	100	25	1,5	115	139	4 000	5 000	**22211M**	**22211KM**	0,84	H311
	120	29	2	146	175	2 600	3 400	**21311M**	**21311KM**	1,65	H311
	120	43	2	230	279	4 000	4 800	**22311EJ**	**22311EKJ**	2,31	H2311
	120	43	2	226	260	4 000	4 800	**22311M**	**22311KM**	2,40	H2311
60	110	28	1,5	145	175	3 800	4 600	**22212EJ**	**22212EKJ**	1,15	H312
	110	28	1,5	140	166	3 800	4 600	**22212M**	**22212KM**	1,20	H312
	130	31	2,1	167	201	2 400	3 200	**21312M**	**21312KM**	2,08	H312
	130	46	2,1	270	320	3 600	4 400	**22312EJ**	**22312EKJ**	2,88	H2312
	130	46	2,1	255	294	3 600	4 400	**22312M**	**22312KM**	2,95	H2312
65	120	31	1,5	180	220	3 600	4 400	**22213EJ**	**22213EKJ**	1,54	H313
	120	31	1,5	165	207	3 600	4 400	**22213M**	**22213KM**	1,60	H313
	140	33	2,1	188	235	2 200	3 000	**21313M**	**21313KM**	2,57	H313
	140	48	2,1	305	360	3 600	4 200	**22313EJ**	**22313EKJ**	3,47	H2313
	140	48	2,1	282	342	3 600	4 200	**22313M**	**22313KM**	3,55	H2313
70	125	31	1,5	189	239	3 400	4 200	**22214EJ**	**22214EKJ**	1,60	H314
	125	31	1,5	170	221	3 400	4 200	**22214M**	**22214KM**	1,70	H314
	150	35	2,1	218	276	2 000	2 800	**21314M**	**21314KM**	3,11	H314
	150	51	2,1	375	455	3 600	4 000	**22314EJ**	**22314EKJ**	4,20	H2314
	150	51	2,1	321	373	3 600	4 000	**22314M**	**22314KM**	4,34	H2314

Double Row Spherical Roller Bearings



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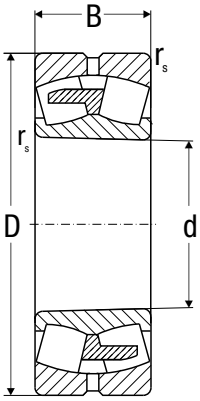

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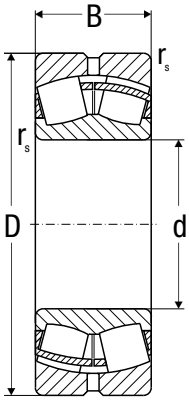
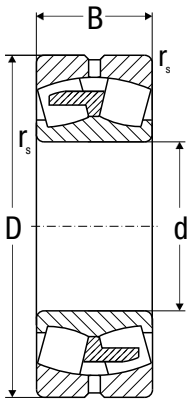


EW33J

Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation		Weight	Used Adapter Sleeve
				Dynamic	Static						
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore		
mm				kN		rpm				kg	
75	130	31	1,5	196	255	3 400	4 200	**22215EJ**	**22215EKJ**	1,70	H315
	130	31	1,5	172	222	3 400	4 200	**22215M**	**22215KM**	1,80	H315
	160	37	2,1	245	311	1 900	2 600	**21315M**	**21315KM**	3,76	H315
	160	55	2,1	415	520	3 000	3 600	**22315EJ**	**22315EKJ**	5,25	H2315
	160	55	2,1	358	461	3 000	3 600	**22315M**	**22315KM**	5,40	H2315
80	140	33	2	224	295	3 200	3 800	**22216EJ**	**22216EKJ**	2,11	H316
	140	33	2	210	265	3 200	3 800	**22216M**	**22216KM**	2,20	H316
	170	39	2,1	268	359	1 800	2 400	**21316M**	**21316KM**	4,47	H316
	170	58	2,1	450	550	2 800	3 400	**22316EJ**	**22316EKJ**	6,30	H2316
	170	58	2,1	410	513	2 800	3 400	**22316M**	**22316KM**	6,39	H2316
85	150	36	2	260	337	3 000	3 800	**22217EJ**	**22217EKJ**	2,61	H317
	150	36	2	256	330	3 000	3 800	**22217M**	**22217KM**	2,70	H317
	180	41	3	307	397	1 700	2 200	**21317M**	**21317KM**	5,23	H317
	180	60	3	500	620	2 500	3 200	**22317EJ**	**22317EKJ**	7,10	H2317
	180	60	3	433	556	2 500	3 200	**22317M**	**22317KM**	7,25	H2317
90	160	40	2	305	410	2 800	3 600	**22218EJ**	**22218EKJ**	3,25	H318
	160	40	2	278	358	2 800	3 600	**22218M**	**22218KM**	3,28	H318
	160	52,4	2	365	492	1 700	2 200	**23218M**	**23218KM**	4,60	H2318
	190	43	3	330	433	1 600	2 200	**21318M**	**21318KM**	6,17	H318
	190	64	3	570	730	2 400	3 000	**22318EJ**	**22318EKJ**	8,50	H2318
	190	64	3	489	641	2 400	3 000	**22318M**	**22318KM**	8,60	H2318
95	170	43	2,1	340	450	2 800	3 400	**22219EJ**	**22219EKJ**	4,17	H319
	170	43	2,1	310	402	2 800	3 400	**22219M**	**22219KM**	4,20	H319
	200	45	3	366	500	1 700	2 200	**21319M**	**21319KM**	7,15	H319
	200	67	3	620	800	2 200	2 800	**22319EJ**	**22319EKJ**	9,80	H2319
	200	67	3	536	709	2 200	2 800	**22319M**	**22319KM**	10,10	H2319
100	150	50	1,5	251	448	1 800	2 400	**24020M**	**24020K30M**	3,04	
	165	52	2	360	540	1 600	2 000	**23120M**	**23120KM**	4,31	H3120
	180	46	2,1	379	510	2 600	3 200	**22220EJ**	**22220EKJ**	5,00	H320
	180	46	2,1	352	438	2 600	3 200	**22220M**	**22220KM**	5,03	H320
	180	60,3	2,1	428	637	1 600	2 000	**23220M**	**23220KM**	6,70	H2320
	215	47	3	397	546	1 600	2 000	**21320M**	**21320KM**	8,81	H320
	215	73	3	730	960	2 200	2 600	**22320EJ**	**22320EKJ**	12,30	H2320
	215	73	3	626	840	2 200	2 600	**22320M**	**22320KM**	13,00	H2320

Double Row Spherical Roller Bearings



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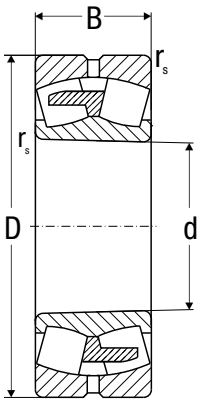

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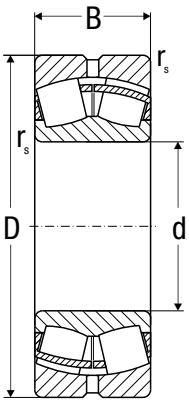
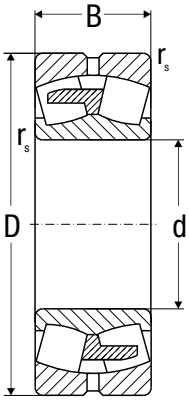


EW33J

Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation		Weight	Used Adapter Sleeve
d	D	B	r_s	Dynamic C_r	Static C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore		
mm				kN		rpm				kg	
110	170	45	2	295	485	2 000	2 600	**23022M**	**23022KM**	3,90	H322
	170	60	2	375	690	1 800	2 200	**24022M**	**24022K30M**	5,04	
	180	56	2	386	613	1 300	1 700	**23122M**	**23122KM**	5,51	H3122
	180	69	2	472	798	1 600	2 000	**24122M**	**24122K30M**	6,63	
	200	53	2,1	590	770	2 200	3 000	**22222EJ**	**22222EKJ**	7,09	H322
	200	53	2,1	447	592	2 200	3 000	**22222M**	**22222KM**	7,20	H322
	200	69,8	2,1	530	809	1 400	1 800	**23222M**	**23222KM**	9,70	H2322
	240	50	3	460	635	1 400	1 800	**21322M**	**21322KM**	11,80	H322
	240	80	3	870	1 160	1 800	2 200	**22322EJ**	**22322EKJ**	17,20	H2322
	240	80	3	786	993	1 800	2 200	**22322M**	**22322KM**	18,00	H2322
120	180	46	2	354	560	1 800	2 400	**23024M**	**23024KM**	4,01	H3024
	180	60	2	390	700	1 500	2 000	**24024M**	**24024K30M**	5,05	
	200	62	2	531	780	1 700	2 200	**23124M**	**23124KM**	7,63	H3124
	200	80	2	645	1 028	1 400	1 800	**24124M**	**24124K30M**	9,65	
	215	58	2,1	560	800	1 700	2 200	**22224EJ**	**22224EKJ**	8,70	H3124
	215	58	2,1	520	730	1 700	2 200	**22224M**	**22224KM**	9,00	H3124
	215	76	2,1	660	968	1 300	1 700	**23224M**	**23224KM**	11,70	H2324
	260	86	3	1 010	1 340	1 300	1 700	**22324EJ**	**22324EKJ**	21,50	H2324
	260	86	3	867	1 154	1 300	1 700	**22324M**	**22324KM**	22,00	H2324
130	200	52	2	410	670	1 700	2 200	**23026M**	**23026KM**	6,10	H3026
	200	69	2	530	900	1 400	1 800	**24026M**	**24026K30M**	7,55	
	210	64	2	540	860	1 500	2 000	**23126M**	**23126KM**	8,49	H3126
	210	80	2	650	1 100	1 200	1 600	**24126M**	**24126K30M**	10,30	
	230	64	3	709	1 040	1 700	2 200	**22226EJ**	**22226EKJ**	11,20	H3126
	230	64	3	625	864	1 700	2 200	**22226M**	**22226KM**	11,20	H3126
	230	80	3	760	1 170	1 200	1 600	**23226M**	**23226KM**	14,00	H2326
	280	93	4	1 170	1 580	1 200	1 600	**22326EJ**	**22326EKJ**	26,80	H2326
	280	93	4	970	1 340	1 200	1 600	**22326M**	**22326KM**	28,60	H2326
140	210	53	2	444	750	1 500	2 000	**23028M**	**23028KM**	6,70	H3028
	210	69	2	550	990	1 200	1 600	**24028M**	**24028K30M**	8,01	
	225	68	2,1	561	953	1 400	1 800	**23128M**	**23128KM**	10,90	H3128
	225	85	2,1	740	1 280	1 100	1 500	**24128M**	**24128K30M**	12,50	
	250	68	3	793	1 170	1 600	2 000	**22228EJ**	**22228EKJ**	14,10	H3128
	250	68	3	720	990	1 600	2 000	**22228M**	**22228KM**	14,50	H3128
	250	88	3	826	1 320	1 200	1 500	**23228M**	**23228KM**	18,50	H2328
	300	102	4	1 140	1 620	1 200	1 600	**22328M**	**22328KM**	34,50	H2328

Double Row Spherical Roller Bearings



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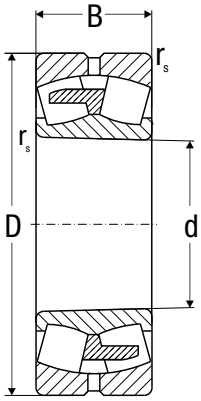

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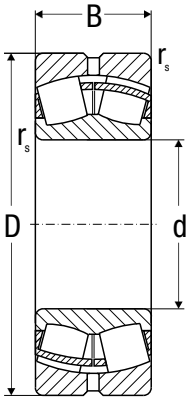
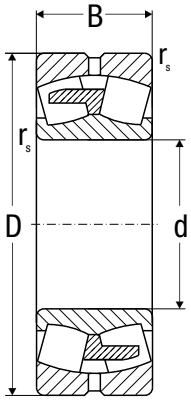


EW33J

Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation		Weight	Used Adapter Sleeve
				Dynamic	Static						
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore		
mm				kN		rpm				kg	
150	225	56	2,1	480	830	1 400	1 800	**23030M**	**23030KM**	8,14	H3030
	225	75	2,1	620	1 140	1 100	1 400	**24030M**	**24030K30M**	10,60	
	250	80	2,1	800	1 320	1 300	1 700	**23130M**	**23130KM**	16,10	H3130
	250	100	2,1	890	1 600	1 000	1 300	**24130M**	**24130K30M**	19,00	
	270	73	3	956	1 404	1 500	1 900	**22230EJ**	**22230EKJ**	17,60	H3130
	270	73	3	810	1 190	1 500	1 900	**22230M**	**22230KM**	18,60	H3130
	270	96	3	963	1 560	1 100	1 400	**23230M**	**23230KM**	24,00	H2330
	320	108	4	1 270	1 850	1 100	1 500	**22330M**	**22330KM**	42,50	H2330
160	240	60	2,1	560	970	1 300	1 700	**23032M**	**23032KM**	10,00	H3032
	240	80	2,1	720	1 320	1 000	1 300	**24032M**	**24032K30M**	12,20	
	270	86	2,1	930	1 510	1 200	1 600	**23132M**	**23132KM**	19,70	H3132
	270	109	2,1	1 040	1 880	900	1 200	**24132M**	**24132K30M**	24,60	
	290	80	3	1 040	1 550	1 400	1 800	**22232EJ**	**22232EKJ**	22,70	H3132
	290	80	3	895	1 280	1 400	1 800	**22232M**	**22232KM**	23,10	H3132
	290	104	3	1 140	1 860	900	1 200	**23232M**	**23232KM**	30,00	H2332
	340	114	4	1 370	1 820	1 000	1 400	**22332M**	**22332KM**	51,00	H2332
170	260	67	2,1	726	1 172	1 200	1 600	**23034M**	**23034KM**	13,00	H3034
	260	90	2,1	880	1 610	900	1 200	**24034M**	**24034K30M**	16,70	
	280	88	2,1	990	1 650	1 100	1 500	**23134M**	**23134KM**	21,10	H3134
	280	109	2,1	1 070	1 930	900	1 200	**24134M**	**24134K30M**	25,50	
	310	86	2,4	975	1 500	1 300	1 600	**22234M**	**22234KM**	29,00	H3134
	310	110	4	1 340	2 120	850	1 100	**23234M**	**23234KM**	35,70	H2334
	360	120	4	1 600	2 120	940	1 200	**22334M**	**22334KM**	59,20	H2334
180	280	74	2,1	830	1 350	1 100	1 500	**23036M**	**23036KM**	17,60	H3036
	280	100	2,1	928	1 820	900	1 200	**24036M**	**24036K30M**	22,10	
	300	96	3	1 160	1 940	1 100	1 400	**23136M**	**23136KM**	27,10	H3136
	300	118	4	1 210	2 220	800	1 000	**24136M**	**24136K30M**	32,00	
	320	86	4	1 010	1 590	1 300	1 500	**22236M**	**22236KM**	30,00	H3136
	320	112	4	1 420	2 330	900	1 200	**23236M**	**23236KM**	37,90	H2336
	380	126	4	1 540	2 330	850	1 100	**22336M**	**22336KM**	70,00	H2336
190	290	75	2,1	867	1 490	1 100	1 400	**23038M**	**23038KM**	18,80	H3038
	290	100	2,1	1 080	1 980	850	1 100	**24038M**	**24038K30M**	23,00	
	320	104	3	1 200	2 120	1 100	1 400	**23138M**	**23138KM**	35,30	H3138
	320	128	3	1 450	2 660	700	1 000	**24138M**	**24138K30M**	40,20	
	340	92	4	1 100	1 655	1 200	1 500	**22238M**	**22238KM**	35,30	H3138
	340	120	4	1 450	2 490	850	1 100	**23238M**	**23238KM**	48,50	H2338
	400	132	5	1 750	2 600	840	1 000	**22338M**	**22338KM**	81,00	H2338

Double Row Spherical Roller Bearings



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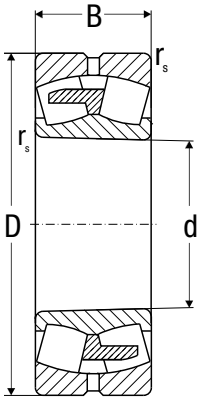

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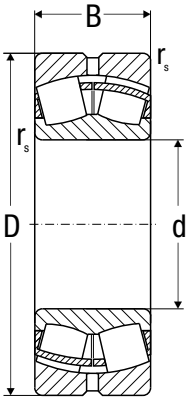
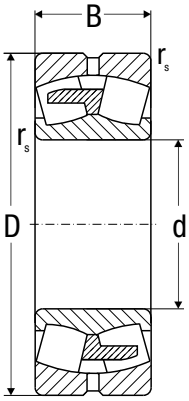


EW33J

Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation		Weight	Used Adapter Sleeve
				Dynamic	Static						
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore		
mm				kN		rpm				kg	
200	310	82	2,1	915	1 650	1 100	1 400	**23040M**	**23040KM**	24,00	H3040
	310	109	2,1	1 150	2 280	850	1 100	**24040M**	**24040K30M**	29,30	
	340	112	3	1 320	2 280	900	1 200	**23140M**	**23140KM**	44,00	H3140
	340	140	3	1 620	3 030	700	900	**24140M**	**24140K30M**	49,90	
	360	98	4	1 164	1 890	1 100	1 400	**22240M**	**22240KM**	46,00	H3140
	360	128	4	1 620	2 590	850	1 100	**23240M**	**23240KM**	57,60	H2340
	420	138	5	1 820	2 880	800	1 000	**22340M**	**22340KM**	94,00	H2340
220	300	60	2,1	600	1 155	1 100	1 400	**23944M**	**23944KM**	12,80	
	340	90	3	1 020	2 120	1 000	1 300	**23044M**	**23044KM**	31,00	H3044
	340	118	3	1 370	2 760	750	1 000	**24044M**	**24044K30M**	39,10	
	370	120	4	1 515	2 710	850	1 100	**23144M**	**23144KM**	54,70	H3144
	370	150	4	1 990	3 690	530	700	**24144M**	**24144K30M**	65,00	
	400	108	4	1 380	2 400	950	1 350	**22244M**	**22244KM**	63,00	H3144
	400	144	4	2 020	3 260	750	950	**23244M**	**23244KM**	82,00	H2344
	460	145	5	2 110	3 130	750	890	**22344M**	**22344KM**	125,00	H2344
240	360	92	3	1 175	2 190	1 000	1 300	**23048M**	**23048KM**	34,20	H3048
	360	118	3	1 460	2 840	800	1 000	**24048M**	**24048K30M**	42,50	
	400	128	4	1 690	2 860	800	1 000	**23148M**	**23148KM**	68,20	H3148
	400	160	4	2 280	4 260	480	600	**24148M**	**24148K30M**	79,00	
	440	120	4	1 820	2 720	900	1 200	**22248M**	**22248KM**	85,00	H3148
	440	160	4	2 470	4 188	670	850	**23248M**	**23248KM**	109,00	H2348
	500	155	5	2 650	3 900	670	790	**22348M**	**22348KM**	153,00	H2348
260	400	104	4	1 425	2 590	900	1 200	**23052M**	**23052KM**	49,80	H3052
	400	140	4	1 775	3 494	700	900	**24052M**	**24052K30M**	64,50	
	440	144	4	2 240	3 720	800	1 000	**23152M**	**23152KM**	90,50	H3152
	440	180	4	2 790	5 320	430	530	**24152M**	**24152K30M**	115,00	
	480	130	5	2 150	3 330	850	1 100	**22252M**	**22252KM**	106,00	H3152
	480	174	5	2 800	4 750	630	800	**23252M**	**23252KM**	141,00	H2352
	540	165	6	3 000	4 700	630	800	**22352M**	**22352KM**	184,00	H2352
280	380	75	2,1	840	1 900	900	1 200	**23956M**	**23956KM**	26,00	
	420	106	4	1 440	2 850	850	1 100	**23056M**	**23056KM**	54,50	H3056
	420	140	4	2 000	4 000	670	850	**24056M**	**24056K30M**	68,50	
	460	146	5	2 180	4 150	750	950	**23156M**	**23156KM**	99,50	H3156
	460	180	5	2 880	5 630	400	500	**24156M**	**24156K30M**	119,00	
	500	130	5	2 280	3 600	800	1 000	**22256M**	**22256KM**	115,00	H3156
	500	176	5	2 850	5 100	600	750	**23256M**	**23256KM**	152,00	H2356
	580	175	6	3 300	5 600	600	750	**22356M**	**22356KM**	232,00	H2356

Double Row Spherical Roller Bearings



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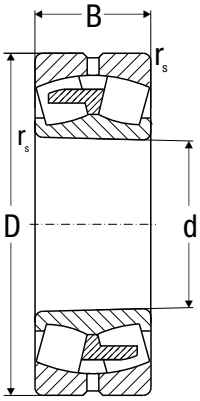

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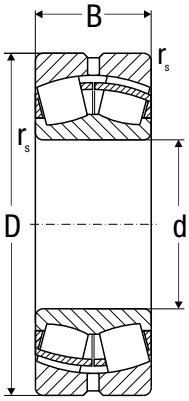
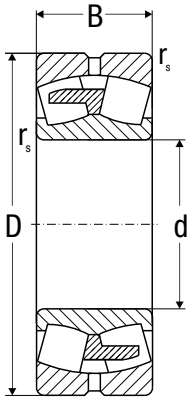


EW33J

Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation		Weight	Used Adapter Sleeve
				Dynamic	Static						
d	D	B	r_s	C_r	C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore		
mm				kN		rpm				kg	
300	460	118	4	1 780	3 240	800	1 000	**23060M**	**23060KM**	75,00	H3060
	460	160	4	2 385	4 700	600	750	**24060M**	**24060K30M**	99,00	
	500	160	5	2 560	4 750	700	900	**23160M**	**23160KM**	129,00	H3160
	500	200	5	3 420	6 790	360	450	**24160M**	**24160K30M**	159,00	
	540	140	5	2 670	4 200	750	950	**22260M**	**22260KM**	142,00	H3160
	540	192	5	3 350	5 570	530	670	**23260M**	**23260KM**	192,00	H3260
320	480	121	4	1 890	3 510	700	950	**23064M**	**23064KM**	81,20	H3064
	480	160	4	2 540	5 050	560	700	**24064M**	**24064K30M**	106,00	
	540	176	5	3 020	5 390	630	850	**23164M**	**23164KM**	171,00	H3164
	540	218	5	4 020	7 870	340	430	**24164M**	**24164K30M**	208,00	
	580	150	5	2 700	4 430	670	850	**22264M**	**22264KM**	180,00	H3164
	580	208	5	3 920	6 820	500	630	**23264M**	**23264KM**	247,00	H3264
340	520	133	5	2 320	4 330	670	900	**23068M**	**23068KM**	108,00	H3068
	520	180	5	3 055	6 135	530	670	**24068M**	**24068K30M**	140,00	
	580	190	5	3 510	6 230	600	750	**23168M**	**23168KM**	211,00	H3168
360	540	134	5	2 360	4 460	630	850	**23072M**	**23072KM**	114,00	H3072
	540	180	5	3 150	6 530	480	630	**24072M**	**24072K30M**	150,00	
	600	192	5	3 630	6 550	560	700	**23172M**	**23172KM**	228,00	H3172
	600	243	5	4 510	8 525	360	480	**24172M**	**24172K30M**	279,00	
	650	232	6	4 900	9 150	400	560	**23272M**	**23272KM**	330,00	H3272
380	560	135	5	2 480	5 000	600	800	**23076M**	**23076KM**	117,00	H3076
	620	194	5	3 740	7 540	400	500	**23176M**	**23176KM**	244,40	H3176
	680	240	6	5 160	8 920	380	480	**23276M**	**23276KM**	390,00	H3276
400	600	148	5	2 860	5 500	560	750	**23080M**	**23080KM**	156,00	H3080
	600	200	5	3 735	7 790	450	560	**24080M**	**24080K30M**	205,00	
	650	200	6	4 040	7 580	380	450	**23180M**	**23180KM**	273,00	H3180
	650	250	6	5 410	11 150	180	240	**24180M**	**24180K30M**	334,00	
	720	256	6	6 140	11 300	350	430	**23280M**	**23280KM**	465,00	H3280
420	620	150	5	2 950	5 850	380	450	**23084M**	**23084KM**	164,00	H3084
	700	224	6	5 030	10 800	360	450	**23184M**	**23184KM**	362,50	H3184
	760	272	6	6 400	11 300	320	400	**23284M**	**23284KM**	535,00	H3284
440	650	157	6	3 210	6 410	350	420	**23088M**	**23088KM**	188,00	H3088
	720	226	6	4 480	9 350	330	400	**23188M**	**23188KM**	390,20	H3188
	790	280	7,5	6 820	12 030	320	380	**23288M**	**23288KM**	613,00	H3288
460	680	163	6	3 480	7 000	330	400	**23092M**	**23092KM**	213,70	H3092
	760	180	7,5	7 370	15 530	160	200	**24192M**	**24192K30M**	556,00	
	760	240	7,5	5 720	10 950	320	380	**23192M**	**23192KM**	456,00	H3192
480	650	128	5	2 900	6 430	500	630	**23996M**	**23996KM**	130,00	
	700	165	6	3 660	7 490	380	480	**23096M**	**23096KM**	230,00	H3096
	790	248	7,5	6 150	12 000	300	380	**23196M**	**23196KM**	485,00	H3196

Double Row Spherical Roller Bearings



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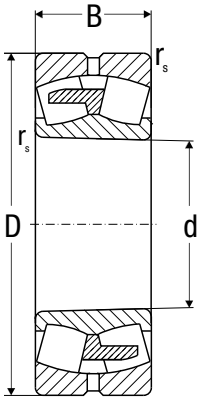

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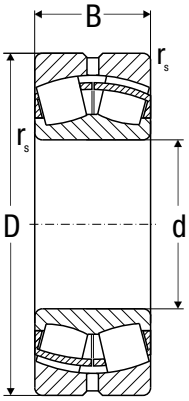
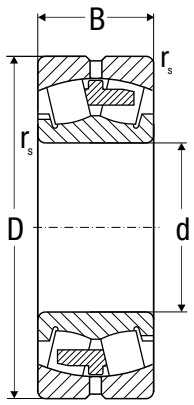


EW33J

Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation		Weight	Used Adapter Sleeve
d	D	B	r_s	Dynamic C_r	Static C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore		
mm				kN		rpm				kg	
500	670	128	5	2 930	6 680	470	600	**239/500M**	**239/500KM**	133,00	
	720	167	6	3 830	7 970	380	480	**230/500M**	**230/500KM**	236,00	H30/500
	830	164	7,5	6 800	13 040	280	360	**231/500M**	**231/500KM**	570,00	H31/500
530	780	185	6	4 470	9 310	340	430	**230/530M**	**230/530KM**	322,90	H30/530
560	820	195	6	5 110	12 050	320	400	**230/560M**	**230/560KM**	356,70	H30/560
600	870	200	6	5 500	12 900	260	300	**230/600M**	**230/600KM**	405,00	H30/600
	870	272	6	7 000	16 100	240	310	**240/600M**	**240/600K30M**	540,00	
630	920	212	7,5	6 270	13 360	240	300	**230/630M**	**230/630KM**	485,00	H30/630
	1030	315	7,5	9 700	19 600	220	280	**231/630M**	**231/630KM**	1080,00	H31/630
670	980	230	7,5	6 820	14 690	200	280	**230/670M**	**230/670KM**	715,00	H30/670
750	1000	185	6	5 280	13 200	220	370	**239/750M**	**239/750KM**	424,20	
	1360	475	7,5	19 600	44 000	150	190	**232/750M**	**232/750KM**	3070,00	H32/750
800	1150	258	7,5	8 620	19 650	180	220	**230/800M**	**230/800KM**	939,00	H30/800
850	1200	272	7,5	9 610	22 080	160	200	**230/850M**	**230/850KM**	1110,00	H30/850

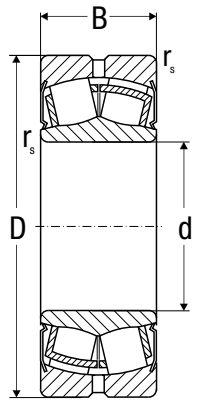
Double Row Spherical Roller Bearings
for Shaker Screens and Other Vibratory Equipment



Dimensions				Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation		Weight	Used Adapter Sleeve
d	D	B	r_s	Dynamic C_r	Static C_{or}	Grease	Oil	Cylindrical Bore	Tapered Bore		
mm				kN		rpm				kg	
40	90	33	1,5	127	142	5 300	6 300	**22308MAC4TP1**	**22308KMAC4TP1**	1,04	H 2308
45	100	36	1,5	150	175	5 000	6 000	**22309MAC4TP1**	**22309KMAC4TP1**	1,44	H 2309
50	110	40	2	193	226	4 600	5 600	**22310MAC4TP1**	**22310KMAC4TP1**	1,92	H 2310
55	120	43	2	226	268	4 000	4 800	**22311MAC4TP1**	**22311KMAC4TP1**	2,46	H 2311
60	130	46	2,1	262	313	3 800	4 400	**22312MAC4TP1**	**22312KMAC4TP1**	3,10	H 2312
65	140	48	2,1	285	343	3 600	4 200	**22313MAC4TP1**	**22313KMAC4TP1**	3,70	H 2313
70	150	51	2,1	321	394	3 400	4 000	**22314MAC4TP1**	**22314KMAC4TP1**	4,50	H 2314
75	160	55	2,1	374	474	3 000	3 600	**22315MAC4TP1**	**22315KMAC4TP1**	5,56	H 2315
80	170	58	2,1	410	500	2 800	3 200	**22316MAC4TP1**	**22316KMAC4TP1**	6,52	H 2316
85	180	60	3	460	570	2 700	3 100	**22317MAC4TP1**	**22317KMAC4TP1**	7,54	H 2317
90	190	64	3	518	677	2 600	3 000	**22318MAC4TP1**	**22318KMAC4TP1**	9,10	H 2318
95	200	67	3	568	744	2 400	2 800	**22319MAC4TP1**	**22319KMAC4TP1**	10,40	H 2319
100	215	73	3	659	875	2 200	2 600	**22320MAC4TP1**	**22320KMAC4TP1**	13,40	H 2320
110	240	80	3	815	1 080	2 100	2 500	**22322MAC4TP1**	**22322KMAC4TP1**	18,60	H 2322
120	260	86	3	930	1 230	1 900	2 400	**22324MAC4TP1**	**22324KMAC4TP1**	23,20	H 2324
130	280	93	4	1 080	1 450	1 700	2 200	**22326MAC4TP1**	**22326KMAC4TP1**	28,80	H 2326
140	300	102	4	1 240	1 720	1 500	2 000	**22328MAC4TP1**	**22328KMAC4TP1**	36,20	H 2328
150	320	108	4	1 300	1 800	1 100	1 800	**22330MAC4TP1**	**22330KMAC4TP1**	43,40	H 2330

Note: All bearings are produced with W33

Double Row Spherical Roller Bearings
with seals



Dimensions				Basic Load Rating		Limiting Speed	Bearing Designation Cylindrical Bore	Weight
				Dynamic	Static			
d	D	B	r_s	C_r	C_{or}			
mm				kN		rpm		kg
25	52	23	1	49	44	3 600	**WB22205EJ-2RS**	0,26
30	62	25	1	64	60	2 800	**WB22206EJ-2RS**	0,34
35	72	28	1,1	87	85	2 400	**WB22207EJ-2RS**	0,52
40	80	28	1,1	97	90	2 200	**WB22208EJ-2RS**	0,57
	90	38	1,5	150	140	1 900	**WB22308EJ-2RS**	1,20
45	85	28	1,1	102	98	2 000	**WB22209EJ-2RS**	0,66
	100	42	1,5	183	183	1 500	**WB22309EJ-2RS**	1,60
50	90	28	1,1	104	108	1 900	**WB22210EJ-2RS**	0,70
	110	45	2	220	224	1 400	**WB22310EJ-2RS**	2,10
55	100	31	1,5	125	127	1 700	**WB22211EJ-2RS**	1,00
	120	49	2	270	280	1 400	**WB22311EJ-2RS**	2,80
60	110	34	1,5	156	166	1 600	**WB22212EJ-2RS**	1,30
	130	53	2,1	310	335	1 100	**WB22312EJ-2RS**	3,40
65	120	38	1,5	193	216	1 500	**WB22213EJ-2RS**	1,60
	140	56	2,1	340	360	1 000	**WB22313EJ-2RS**	4,15
70	125	38	1,5	208	228	1 400	**WB22214EJ-2RS**	1,80
	150	60	2,1	400	430	900	**WB22314EJ-2RS**	5,10
75	130	38	1,5	212	240	1 300	**WB22215EJ-2RS**	2,10
	160	64	2,1	440	475	950	**WB22315EJ-2RS**	6,50
80	140	40	2	236	270	1 200	**WB22216EJ-2RS**	2,40
	170	67	2,1	490	540	800	**WB22316EJ-2RS**	7,20
85	150	44	2	285	325	1 100	**WB22217EJ-2RS**	3,00
90	160	48	2	325	375	1 000	**WB22218EJ-2RS**	3,70
100	150	50	1,5	285	415	800	**24020EJ-2RS**	3,15
	165	52	2	365	490	850	**23120EJ-2RS**	4,55
	165	65	2	455	640	670	**24120EJ-2RS**	5,65
	180	55	2,1	425	490	900	**WB22220EJ-2RS**	5,35
110	170	45	2	310	440	900	**23022EJ-2RS**	4,10
	170	60	2	415	620	670	**24022EJ-2RS**	5,00
	180	56	2	430	585	800	**23122EJ-2RS**	5,75
	180	69	2	520	750	630	**24122EJ-2RS**	7,10
	200	63	2,1	560	640	800	**WB22222EJ-2RS**	7,60
120	180	46	2	355	510	850	**23024EJ-2RS**	4,20
	180	60	2	430	670	670	**24024EJ-2RS**	5,45
	200	80	2	655	950	560	**24124EJ-2RS**	10,30
	215	69	2,1	630	765	750	**WB22224EJ-2RS**	9,75
	260	86	3	980	1 120	600	**22324EJ-2RS**	23,00

Note: All bearings are produced with W33

Notes

Single Row Tapered Roller Bearings

ZVL-ZKL tapered roller bearings are designed for use in a wide range of applications, including the automotive, tractor and machine tool industries and are available in both metric and inch dimensions. This is a separable type of bearing. The inner ring (cone) along with the cage and rollers is one assembly unit. The outer ring (cup) is the other assembly unit. This feature allows the bearings to be fitted separately and adjusted so that the optimum clearance or preload for each application is achieved.

Cage

Tapered roller bearings are produced with pressed steel cages. There are currently two designs of the steel cage, „J“ and „J2“ designations. The „J2“ design is a newer cage design that eliminates excess material from cage.

Boundary Dimensions

Boundary dimensions of metric single row tapered roller bearings comply with the standard ISO 355. Boundary dimensions of single row tapered roller bearings in inch dimensions comply with standard AFBMA 19.

Tolerance

Tapered roller bearings are produced in standard production in accordance to P0 (ABEC1) tolerance class.

Internal Clearance

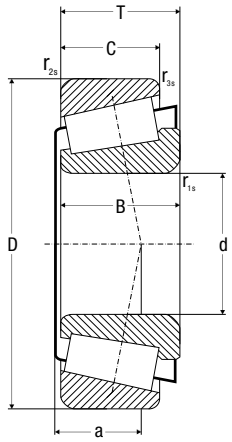
Tapered roller bearings are usually mounted in pairs in which required clearance or preload is adjusted at mounting. The specified clearance or preload should be determined on an application-by-application basis.

Designation

Listed below are some common designations for tapered roller bearings.

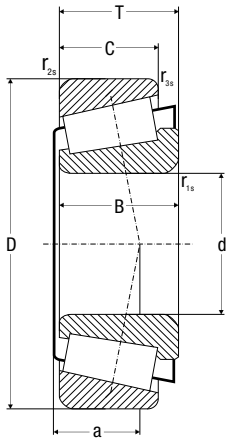
Tapered Roller Bearings		
Suffix	Description	Example of Designation
A	Internal design change for enhanced load carrying capacity	30204A
B	Contact angle α = 17°	32315B
J2	New pressed steel cage, eliminates excess material of cage	30210AJ2
X	Altered boundary dimensions introduced by revised ISO standards	32018AX
P6	Higher tolerance class than normal	30305A P6
C6	Reduced vibration level	30205A C6
S0	Heat stabilized for an operating temperature up to 150°C	30208A S0

Single Row Tapered Roller Bearings



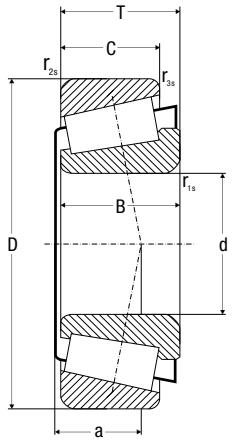
Dimensions									Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designtion	Weight
									Dynamic	Static				
d	D	B	C	T	r_{1s}	r_{2s}	r_{3s}	a	C_r	C_{or}	Grease	Oil		
				mm					kN		rpm			kg
17	40	12	11	13,25	1	1	0,3	10	20,8	20,7	10 000	15 000	**30203A**	0,081
	47	14	12	15,25	1	1	0,3	11	27,4	24,5	9 200	12 000	**30303A**	0,132
20	42	15	12	15	0,6	0,6	0,3	10	27,3	31,5	9 700	13 000	**32004AX**	0,102
	47	14	12	15,25	1	1	0,3	11	27,0	27,2	8 900	12 000	**30204A**	0,127
	52	15	13	16,25	1,5	1,5	0,6	11	30,4	29,9	8 400	11 000	**30304A**	0,170
	52	21	18	22,25	1,5	1,5	0,6	14	45,1	46,7	8 400	11 000	**32304A**	0,244
25	47	15	11,5	15	0,6	0,6	0,3	12	30,2	37,7	8 300	11 000	**32005AX**	0,117
	52	15	13	16,25	1	1	0,3	12	31,5	33,7	7 800	10 000	**30205A**	0,156
	52	18	16	19,25	1	1	0,3	13	39,8	44,8	7 900	11 000	**32205A**	0,188
	52	22	18	22	1	1	0,3	14	48,9	58,5	7 900	10 000	**33205A**	0,225
	62	17	15	18,25	1,5	1,5	0,6	13	43,8	42,1	6 900	9 200	**30305A**	0,273
	62	17	13	18,25	1,5	1,5	0,6	20	36,2	39,1	6 700	8 900	**31305A**	0,271
	62	24	20	25,25	1,5	1,5	0,6	15	61,2	64,1	6 900	9 100	**32305A**	0,386
30	55	17	13	17	1	1	0,3	13	35,5	43,8	7 100	9 400	**32006AX**	0,181
	55	20	16	20	1	1	0,3	13	43,7	58,8	7 100	9 400	**33006A**	0,201
	62	16	14	17,25	1	1	0,3	14	40,6	44,7	6 700	8 900	**30206A**	0,252
	62	20	17	21,25	1	1	0,3	15	50,1	59,6	6 700	8 900	**32206A**	0,320
	62	25	19,5	25	1	1	0,3	16	63,8	75,4	6 700	8 900	**33206A**	0,342
	72	19	16	20,75	1,5	1,5	0,6	15	53,1	53,1	5 600	7 500	**30306A**	0,400
	72	19	14	20,75	1,5	1,5	0,6	23	46,4	50,1	5 300	7 100	**31306A**	0,390
	72	27	23	28,75	1,5	1,5	0,6	20	76,4	85,8	5 600	7 500	**32306A**	0,560
32	58	17	13	17	1	1	0,3	14	39,8	48,2	7 100	9 400	**320/32AX**	0,196
35	62	18	14	18	1	1	0,3	15	43,0	53,1	6 300	8 400	**32007AX**	0,230
	62	21	17	21	1	1	0,3	14	51,3	68,0	6 300	8 400	**33007A**	0,254
	72	17	15	18,25	1,5	1,5	0,6	15	46,4	51,1	5 300	7 100	**30207A**	0,327
	72	23	19	24,25	1,5	1,5	0,6	17	64,3	76,4	5 300	7 100	**32207A**	0,480
	72	28	22	28	1,5	1,5	0,6	18	82,6	102,0	5 700	7 500	**33207A**	0,515
	80	21	18	22,75	2	1,5	0,6	16	65,6	69,4	5 000	6 700	**30307A**	0,551
	80	21	15	22,75	2	1,5	0,6	26	57,3	63,1	4 700	6 300	**31307A**	0,520
	80	31	25	32,75	2	1,5	0,6	20	94,4	110,0	4 700	6 300	**32307A**	0,827
40	62	15	12	15	0,6	0,6	0,3	12	33,5	48,5	5 900	7 800	**32908A**	0,164
	68	19	14,5	19	1	1	0,3	15	48,2	64,3	5 600	7 400	**32008AX**	0,290
	68	22	18	22	1	1	0,3	14	60,4	84,6	5 600	7 400	**33008A**	0,306
	75	26	20,5	26	1,5	1,5	0,6	18	82,2	108,0	5 200	6 900	**33108A**	0,496
	80	18	16	19,75	1,5	1,5	0,6	17	55,2	60,7	4 700	6 300	**30208A**	0,452
	80	23	19	24,75	1,5	1,5	0,6	18	70,8	85,5	4 700	6 300	**32208A**	0,594
	80	32	25	32	1,5	1,5	0,6	21	106,0	136,0	5 000	6 700	**33208A**	0,715
	90	23	20	25,25	2	1,5	0,6	19	82,5	94,4	4 500	6 000	**30308A**	0,765
	90	23	17	25,25	2	1,5	0,6	29	76,4	85,8	4 000	5 300	**31308A**	0,738
	90	33	27	35,25	2	1,5	0,6	22	114,0	141,0	4 200	5 600	**32308A**	1,120

Single Row Tapered Roller Bearings



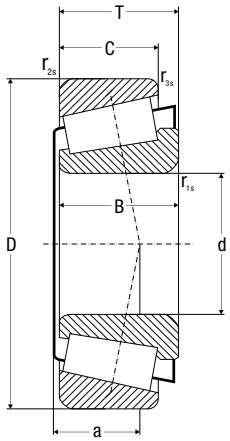
Dimensions									Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designtion	Weight
									Dynamic	Static				
d	D	B	C	T	r_{1s}	r_{2s}	r_{3s}	a	C_r	C_{or}	Grease	Oil		
				mm					kN		rpm			kg
45	68	15	12	15	0,6	0,6	0,3	13	34,7	52,4	5 300	7 100	**32909A**	0,190
	75	20	15,5	20	1	1	0,3	17	57,3	79,4	5 000	6 600	**32009AX**	0,355
	75	24	19	24	1	1	0,3	16	69,6	101,0	5 000	6 600	**33009A**	0,398
	80	26	20,5	26	1,5	1,5	0,6	19	87,1	117,0	4 600	6 200	**33109A**	0,535
	85	19	16	20,75	1,5	1,5	0,6	18	61,9	70,8	4 500	6 000	**30209A**	0,529
	85	23	19	24,75	1,5	1,5	0,6	20	73,6	90,9	4 500	6 000	**32209A**	0,641
	85	32	25	32	1,5	1,5	0,6	22	110,0	145,0	4 600	6 200	**33209A**	0,771
	100	25	22	27,25	2	1,5	0,6	21	104,0	117,0	4 000	5 300	**30309A**	1,030
	100	25	18	27,25	2	1,5	0,6	32	92,6	104,0	3 800	5 000	**31309A**	0,955
	100	36	30	38,25	2	1,5	0,6	25	144,0	181,0	3 800	5 000	**32309A**	1,460
50	72	15	12	15	0,6	0,6	0,3	14	35,9	56,3	4 900	6 600	**32910A**	0,195
	80	20	15,5	20	1	1	0,3	18	59,6	87,4	4 600	6 100	**32010AX**	0,395
	80	24	19	24	1	1	0,3	17	76,8	110,9	4 600	6 100	**33010A**	0,433
	85	26	20	26	1,5	1,5	0,6	20	89,3	124,0	4 400	5 900	**33110A**	0,572
	90	20	17	21,75	1,5	1,5	0,6	20	70,8	87,4	4 200	5 600	**30210A**	0,602
	90	23	19	24,75	1,5	1,5	0,6	21	81,0	102,0	4 200	5 600	**32210A**	0,667
	90	32	24,5	32	1,5	1,5	0,6	23,4	113,0	155,0	4 200	5 600	**33210A**	0,825
	110	27	23	29,25	2,5	2	0,6	23	121,0	141,0	3 800	5 000	**30310A**	1,300
	110	27	19	29,25	2,5	2	0,6	35	102,0	114,0	3 300	4 500	**31310A**	1,290
	110	40	33	42,25	2,5	2	0,6	27	174,0	224,0	3 300	4 500	**32310A**	2,010
55	80	17	14	17	1	1	0,6	15	44,6	73,3	4 400	5 900	**32911A**	0,285
	90	23	17,5	23	1,5	1,5	0,6	20	76,4	108,0	4 100	5 500	**32011AX**	0,592
	90	27	21	27	1,5	1,5	0,6	19	94,9	145,0	4 100	5 500	**33011A**	0,651
	95	30	23	30	1,5	1,5	0,6	22	115,0	165,0	4 000	5 300	**33111A**	0,843
	100	21	18	22,75	2	1,5	0,6	21	81,0	96,2	3 800	5 000	**30211A**	0,732
	100	25	21	26,75	2	1,5	0,6	22	102,0	128,0	3 800	5 000	**32211A**	0,915
	100	35	27	35	2	1,5	0,6	26	143,0	197,0	3 800	5 000	**33211A**	1,150
	120	29	25	31,5	2,5	2	0,6	25	136,0	162,0	3 300	4 500	**30311A**	1,710
	120	29	21	31,5	2,5	2	0,6	38	117,0	136,0	3 000	4 000	**31311A**	1,630
	120	43	35	45,5	2,5	2	0,6	29	200,0	256,0	3 300	4 500	**32311A**	2,500
60	85	17	14	17	1	1	0,6	16	46,2	78,2	4 100	5 500	**32912A**	0,306
	95	23	17,5	23	1,5	1,5	0,6	21	81,0	119,0	3 900	5 200	**32012AX**	0,632
	95	27	21	27	1,5	1,5	0,6	20	101,0	162,0	3 900	5 200	**33012A**	0,691
	100	30	23	30	1,5	1,5	0,6	23	118,0	170,0	3 700	5 000	**33112A**	0,895
	110	22	19	23,75	2	1,5	0,6	23	94,4	117,0	3 300	4 500	**30212A**	0,951
	110	28	24	29,75	2	1,5	0,6	25	126,0	162,0	3 300	4 500	**32212A**	1,260
	110	38	29	38	2	1,5	0,6	28	174,0	239,0	3 600	4 700	**33212A**	1,510
	130	31	26	33,5	3	2,5	1	26	162,0	188,0	3 000	4 000	**30312A**	2,090
	130	31	22	33,5	3	2,5	1	41	136,0	158,0	2 800	3 800	**31312A**	2,030
	130	46	37	48,5	3	2,5	1	31	228,0	299,0	2 800	3 800	**32312A**	3,070

Single Row Tapered Roller Bearings



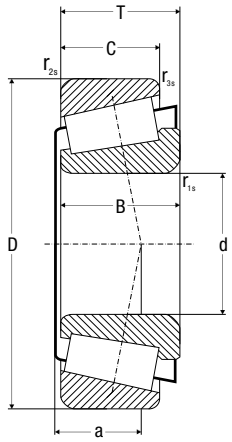
Dimensions									Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designtion	Weight
									Dynamic	Static				
d	D	B	C	T	r_{1s}	r_{2s}	r_{3s}	a	C_r	C_{or}	Grease	Oil		
				mm					kN		rpm			kg
65	90	17	14	17	1	1	0,6	17	47,4	83,1	3 900	5 200	**32913A**	0,327
	100	23	17,5	23	1,5	1,5	0,6	23	81,0	123,0	3 600	4 800	**32013AX**	0,675
	100	27	21	27	1,5	1,5	0,6	21	98,1	158,0	3 600	4 800	**33013A**	0,732
	110	34	26,5	34	1,5	1,5	0,6	26	143,0	220,0	3 400	4 600	**33113A**	1,300
	120	23	20	24,75	2	1,5	0,6	24	112,0	136,0	3 000	4 000	**30213A**	1,170
	120	31	27	32,75	2	1,5	0,6	28	150,0	200,0	3 000	4 000	**32213A**	1,660
	120	41	32	41	2	1,5	0,6	30	202,0	282,0	3 000	4 000	**33213A**	1,990
	140	33	28	36	3	2,5	1	28	185,0	220,0	2 800	3 800	**30313A**	2,550
	140	33	23	36	3	2,5	1	44	150,0	178,0	2 800	3 800	**31313A**	2,450
	140	48	39	51	3	2,5	1	33	261,0	331,0	2 800	3 800	**32313A**	3,770
70	100	20	16	20	1	1	0,6	18	71,0	115,0	3 500	4 700	**32914A**	0,496
	110	25	19	25	1,5	1,5	0,6	24	98,1	147,0	3 300	4 500	**32014AX**	0,893
	110	31	25,5	31	1,5	1,5	0,6	22	134,0	220,0	3 300	4 500	**33014A**	1,070
	120	37	29	37	2	1,5	0,6	28	181,0	266,0	3 100	4 200	**33114A**	1,700
	125	24	21	26,25	2	1,5	0,6	26	121,0	153,0	3 000	4 000	**30214A**	1,310
	125	31	27	33,25	2	1,5	0,6	29	155,0	203,0	2 800	3 800	**32214A**	1,730
	125	41	32	41	2	1,5	0,6	31	209,0	298,0	2 800	3 800	**33214A**	2,100
	150	35	30	38	3	2,5	1	30	211,0	251,0	2 700	3 500	**30314A**	3,070
	150	35	25	38	3	2,5	1	47	178,0	211,0	2 700	3 500	**31314A**	3,010
	150	51	42	54	3	2,5	1	36	293,0	398,0	2 700	3 500	**32314A**	4,550
75	105	20	16	20	1	1	0,6	19	73,6	123,0	3 300	4 400	**32915A**	0,526
	115	25	19	25	1,5	1,5	0,6	25	104,0	158,0	3 100	4 200	**32015AX**	0,955
	115	31	25,5	31	1,5	1,5	0,6	23	141,0	225,0	3 100	4 200	**33015A**	1,120
	125	37	29	37	2	1,5	0,6	30	186,0	280,0	3 000	4 000	**33115A**	1,780
	130	25	22	27,25	2	1,5	0,6	28	128,0	165,0	2 800	3 800	**30215A**	1,470
	130	31	27	33,25	2	1,5	0,6	30	162,0	220,0	2 800	3 800	**32215A**	1,820
	130	41	31	41	2	1,5	0,6	32	212,0	310,0	2 800	3 800	**33215A**	2,170
	160	37	31	40	3	2,5	1	32	242,0	287,0	2 500	3 300	**30315A**	3,720
	160	37	26	40	3	2,5	1	48	202,0	241,0	2 000	2 800	**31315A**	3,450
	160	55	45	58	3	2,5	1	38	341,0	464,0	2 400	3 200	**32315A**	5,620
80	110	20	16	20	1	1	0,6	20	76,1	131,0	3 100	4 200	**32916A**	0,556
	125	29	22	29	1,5	1,5	0,6	27	131,0	207,0	2 900	3 900	**32016AX**	1,320
	125	36	29,5	36	1,5	1,5	0,6	26	173,0	288,0	2 900	3 900	**33016A**	1,630
	130	37	29	37	2	1,5	0,6	31	191,0	294,0	2 800	3 800	**33116A**	1,870
	140	26	22	28,25	2,5	2	0,6	29	144,0	178,0	2 700	3 600	**30216A**	1,750
	140	33	28	35,25	2,5	2	0,6	32	181,0	251,0	2 700	3 600	**32216A**	2,290
	140	46	35	46	2,5	2	0,6	35	250,0	371,0	2 700	3 600	**33216A**	2,830
	170	39	33	42,5	3	2,5	1	33	277,0	329,0	2 300	3 100	**30316A**	4,460
	170	39	27	42,5	3	2,5	1	52	222,0	275,0	1 900	2 800	**31316A**	4,070
	170	58	48	61,5	3	2,5	1	41	364,0	448,0	2 300	3 100	**32316A**	6,310

Single Row Tapered Roller Bearings



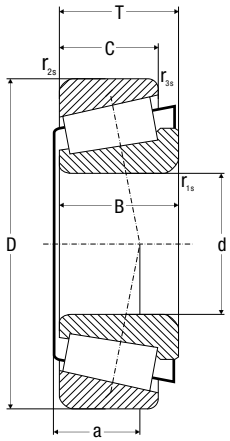
Dimensions									Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designtion	Weight
									Dynamic	Static				
d	D	B	C	T	r_{1s}	r_{2s}	r_{3s}	a	C_r	C_{or}	Grease	Oil		
				mm					kN		rpm			kg
85	120	23	18	23	1,5	1,5	0,6	21	97,1	165,0	2 900	3 900	**32917A**	0,794
	130	29	22	29	1,5	1,5	0,6	28	136,0	215,0	2 800	3 800	**32017AX**	1,410
	130	36	29,5	36	1,5	1,5	0,6	26	180,0	305,0	2 800	3 800	**33017A**	1,690
	140	41	32	41	2,5	2,5	0,6	33	224,0	354,0	2 600	3 500	**33117A**	2,430
	150	28	24	30,5	2,5	2	0,6	30	170,0	228,0	2 500	3 400	**30217A**	2,140
	150	36	30	38,5	2,5	2	0,6	34	237,0	293,0	2 500	3 400	**32217A**	2,850
	150	49	37	49	2,5	2	0,6	37	294,0	439,0	2 500	3 400	**33217A**	3,520
	180	41	34	44,5	4	3	1	35	298,0	354,0	2 200	2 900	**30317A**	5,150
	180	41	28	44,5	4	3	1	55	245,0	298,0	1 800	2 600	**31317A**	5,080
	180	60	49	63,5	4	3	1	42	400,0	555,0	2 200	3 000	**32317A**	6,850
90	125	23	18	23	1,5	1,5	0,6	22	101,0	175,0	2 800	3 700	**32918A**	0,834
	140	32	24	32	2	1,5	0,6	30	150,0	228,0	2 700	3 500	**32018AX**	1,780
	140	39	32,5	39	2	1,5	0,6	28	233,0	389,0	2 700	3 500	**33018A**	2,200
	150	45	35	45	2,5	2	0,6	36	258,0	415,0	2 500	3 300	**33118A**	3,130
	160	30	26	32,5	2,5	2	0,6	31	185,0	242,0	2 400	3 200	**30218A**	2,710
	160	40	34	42,5	2,5	2	0,6	37	251,0	355,0	2 400	3 200	**32218A**	3,600
	160	55	42	55	3	3	1	41	343,0	527,0	2 400	3 200	**33218A**	4,550
	190	43	36	46,5	4	3	1	36	328,0	394,0	2 100	2 700	**30318A**	5,500
	190	43	30	46,5	4	3	1	57	270,0	330,0	1 700	2 400	**31318A**	5,920
	190	64	53	67,5	4	3	1	44	461,0	612,0	2 100	2 700	**32318A**	8,210
95	130	23	18	23	1,5	1,5	0,6	24	104,0	186,0	2 700	3 500	**32919A**	0,876
	145	32	24	32	2	1,5	0,6	31	174,0	280,0	2 500	3 300	**32019AX**	1,870
	145	39	32,5	39	2	1,5	0,6	29	231,0	390,0	2 500	3 300	**33019A**	2,260
	160	49	38	49	2,5	2	0,6	37	304,0	473,0	2 300	3 100	**33119A**	3,940
	170	32	27	34,5	3	2,5	1	33	214,0	272,0	2 200	3 000	**30219A**	3,160
	170	43	37	45,5	3	2,5	1	38	310,0	437,0	2 200	3 000	**32219A**	4,320
	170	58	44	58	3	2,5	1	42	374,0	582,0	2 200	2 900	**33219A**	5,480
	200	45	38	49,5	4	3	1	39	350,0	449,0	2 000	2 600	**30319A**	6,700
	200	45	32	49,5	4	3	1	60	300,0	365,0	1 700	2 400	**31319A**	6,950
	200	67	55	71,5	4	3	1	47	500,0	670,0	2 000	2 600	**32319A**	11,000
100	140	25	20	25	1,5	1,5	0,6	24	126,0	217,0	2 400	3 300	**32920A**	1,190
	150	32	24	32	2	1,5	0,6	33	178,0	261,0	2 400	3 200	**32020AX**	1,940
	150	39	32,5	39	2	1,5	0,6	29	230,0	391,0	2 400	3 200	**33020A**	2,330
	165	52	40	52	2,5	2	0,6	37	325,0	523,0	2 200	3 000	**33120A**	4,290
	180	34	29	37	3	2,5	1	37	266,0	346,0	2 100	2 800	**30220A**	3,810
	180	46	39	49	3	2,5	1	41	348,0	496,0	2 100	2 800	**32220A**	5,210
	180	63	48	63	3	2,5	1	45	431,0	680,0	2 100	2 800	**33220A**	6,710
	215	47	39	51,5	4	3	1	40	404,0	492,0	1 800	2 400	**30320A**	7,900
	215	73	60	77,5	4	3	1	53	578,0	780,0	1 800	2 400	**32320A**	14,000

Single Row Tapered Roller Bearings



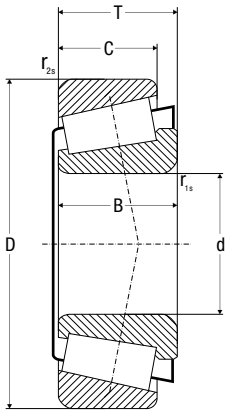
Dimensions									Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designtion	Weight
									Dynamic	Static				
d	D	B	C	T	r_{1s}	r_{2s}	r_{3s}	a	C_r	C_{or}	Grease	Oil		
				mm					kN		rpm			kg
105	160	35	26	35	2,5	2	0,6	35	205,0	337,0	2 200	3 000	**32021AX**	2,510
	160	43	34	43	2,5	2	0,6	31	267,0	461,0	2 200	3 000	**33021A**	2,970
	190	36	30	39	3	2,5	1	37	293,0	387,0	2 000	2 700	**30221A**	4,940
	190	50	43	53	3	2,5	1	44	393,0	570,0	2 000	2 700	**32221A**	6,380
	225	77	63	81,5	4	3	1	53	405,0	815,0	1 800	2 300	**32321A**	14,500
110	150	25	20	25	1,5	1,5	0,6	26	129,0	231,0	2 300	3 000	**32922A**	1,280
	170	38	29	38	2,5	2	0,6	37	246,0	390,0	2 100	2 800	**32022AX**	3,090
	170	47	39	47	2,5	2	0,6	33	289,0	503,0	2 100	2 800	**33022A**	3,740
	180	56	43	56	2,5	2	0,6	44	369,0	634,0	2 000	2 700	**33122A**	5,500
	200	38	32	41	3	2,5	1	39	304,0	402,0	1 900	2 500	**30222A**	5,320
	200	53	46	56	3	2,5	1	46	433,0	630,0	1 900	2 500	**32222A**	7,560
	240	50	42	54,5	4	3	1	43	479,0	588,0	1 600	2 200	**30322A**	11,400
	240	80	65	84,5	4	3	1	55	699,0	956,0	1 600	2 200	**32322A**	16,400
120	165	29	23	29	1,5	1,5	0,6	29	172,0	298,0	2 100	2 700	**32924A**	1,770
	180	38	29	38	2,5	2	0,6	40	254,0	430,0	2 000	2 600	**32024AX**	3,320
	180	48	38	48	2,5	2	0,6	36	299,0	540,0	2 000	2 600	**33024A**	4,200
	215	40	34	43,5	3	2,5	1	43	339,0	452,0	1 700	2 300	**30224A**	6,330
	215	58	50	61,5	3	2,5	1	52	462,0	685,0	1 700	2 300	**32224A**	9,040
	260	55	46	59,5	4	3	1	47	568,0	712,0	1 500	2 000	**30324A**	14,500
	260	86	69	90,5	4	3	1	60	799,0	1 104,0	1 500	2 000	**32324A**	22,200
130	180	32	25	32	2	1,5	0,6	31	200,0	368,0	1 900	2 500	**32926A**	2,420
	200	45	34	45	2,5	2	0,6	43	330,0	560,0	1 800	2 300	**32026AX**	5,050
	200	55	43	55	2,5	2	0,6	39	390,0	705,0	1 700	2 300	**33026A**	6,200
	230	40	34	43,75	4	3	1	45	367,0	485,0	1 600	2 100	**30226A**	7,240
	230	64	54	67,75	4	3	1	56	551,0	836,0	1 600	2 100	**32226A**	10,700
	280	58	49	63,75	5	4	1,5	51	640,0	820,0	1 400	1 800	**30326A**	18,100
	280	93	78	98,75	5	4	1,5	66	852,0	1 160,0	1 400	1 800	**32326A**	26,500
140	190	32	25	32	2	1,5	0,6	33,6	206,0	390,0	1 800	2 300	**32928A**	2,570
	210	45	34	45	2,5	2	0,6	46	335,0	580,0	1 700	2 200	**32028AX**	5,260
	210	56	44	56	2,5	2	0,6	42	406,0	758,0	1 600	2 200	**33028A**	6,610
	250	42	36	45,75	4	3	1	47	396,0	527,0	1 500	1 900	**30228A**	8,500
	250	68	58	71,75	4	3	1	60	602,0	907,0	1 500	1 900	**32228A**	13,900
150	210	38	30	38	2,5	2	1	36	286,0	536,0	1 600	2 100	**32930A**	3,960
	225	48	36	48	3	2,5	1	49	355,0	620,0	1 500	2 000	**32030AX**	6,350
	270	45	38	49	4	3	1	50	457,0	618,0	1 300	1 800	**30230A**	10,700
	270	73	60	77	4	3	1	64	705,0	1 080,0	1 300	1 800	**32230A**	17,900
160	220	38	30	38	2,5	2	1	38	295,0	568,0	1 500	2 000	**32932A**	4,190
	240	51	38	51	3	2,5	1	53	440,0	758,0	1 400	1 900	**32032AX**	7,750
170	230	38	30	38	2,5	2	1,5	42	296,0	606,0	1 400	1 900	**32934A**	4,490
	260	57	43	57	3	2,5	1,5	57	526,0	905,0	1 300	1 700	**32034AX**	10,500
	310	52	43	57	5	4	1,5	61	690,0	995,0	1 100	1 500	**30234A**	17,400

Single Row Tapered Roller Bearings



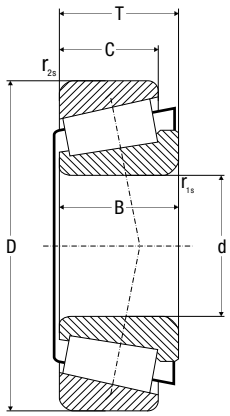
Dimensions									Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designtion	Weight
									Dynamic	Static				
d	D	B	C	T	r_{1s}	r_{2s}	r_{3s}	a	C_r	C_{or}	Grease	Oil		
				mm					kN		rpm			kg
180	250	45	34	45	2,5	2	0,6	54	357,0	735,0	1 300	1 700	**32936A**	6,640
	280	64	48	64	3	2,5	0,6	60	644,0	1 100,0	1 200	1 600	**32036AX**	14,100
	320	52	43	57	5	4	1,5	64	615,0	870,0	1 100	1 400	**30236A**	18,300
190	260	45	34	45	2,5	2	0,6	55	371,0	799,0	1 200	1 600	**32938A**	6,890
	290	64	48	64	3	2,5	0,6	63	654,0	1 170,0	1 100	1 500	**32038AX**	14,700
200	280	51	39	51	3	2,5	1	54	486,0	958,0	1 100	1 500	**32940A**	9,440
	310	70	53	70	3	2,5	1	67	755,0	1 340,0	1 100	1 400	**32040AX**	19,100
220	300	51	39	51	3	2,5	1	59	498,0	1 010,0	1 000	1 400	**32944A**	10,100
	340	76	57	76	4	3	1	73	894,0	1 620,0	940	1 300	**32044AX**	25,200
240	320	51	39	51	3	2,5	1	65	515,0	1 090,0	940	1 300	**32948A**	10,900
	360	76	57	76	4	3	1	79	924,0	1 720,0	870	1 200	**32048AX**	26,800
260	360	63,5	48	63,5	3	2,5	1	70	741,0	1 550,0	830	1 100	**32952A**	18,900
	400	87	65	87	5	4	1	85	1 170,0	2 170,0	770	1 000	**32052AX**	39,500
280	380	63,5	48	63,5	3	2,5	1	75	760,0	1 630,0	770	1 000	**32956A**	20,100
	420	87	65	87	5	4	1	91	1 200,0	2 280,0	720	960	**32056AX**	41,700

Single Row Tapered Roller Bearings
in Inch Dimensions



Dimensions							Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
							Dynamic	Static				
d	D	B	C	T	r_{1s}	r_{2s}	C_r	C_{or}	Grease	Oil		
mm							kN		rpm			kg
15,875	42,862	14,288	9,525	14,288	1,6	1,6	18,0	18,3	9 500	14 000	**11590 / 11520**	0,105
17,462	39,878	14,605	10,668	13,843	1,2	1,2	25,4	26,0	11 000	14 000	**LM11749 / LM11710**	0,086
19,050	45,237	16,637	12,065	15,494	1,2	1,2	28,0	28,5	9 000	13 000	**LM11949 / LM11910**	0,125
21,436	45,250	16,637	12,065	15,494	1,2	1,2	30,2	35,3	8 500	12 000	**LM12748 / LM12710**	0,112
	50,005	18,288	13,970	17,526	1,2	1,2	38,0	39,0	8 500	12 000	**M12649 / M12610**	0,174
21,986	45,237	16,637	12,065	15,494	1,2	1,2	28,5	32,5	8 500	12 000	**LM12749 / LM12710**	0,119
	45,975	16,637	12,065	15,494	1,2	1,2	30,1	34,6	8 500	12 000	**LM12749 / LM12711**	0,121
25,400	50,292	14,732	10,668	14,224	1,2	1,2	31,2	37,0	7 300	10 000	**L44643 / L44610**	0,132
	57,150	19,431	14,732	19,431	1,6	1,6	44,9	52,9	6 400	8 600	**M84548 / M84510**	0,241
26,988	50,292	14,732	10,668	14,224	3,6	1,2	31,2	37,0	7 800	10 000	**L44649 / L44610**	0,122
29,006	50,292	14,732	10,668	14,224	3,6	1,2	28,9	37,2	7 600	10 000	**L45449 / L45410**	0,115
30,162	64,292	21,432	16,670	21,432	1,6	1,6	55,2	70,7	6 400	8 500	**M86649 / M86610**	0,340
30,213	62,000	20,638	14,288	19,050	0,8	1,2	46,5	54,0	6 400	8 600	**15120 / 15245**	0,264
31,750	59,131	16,764	11,811	15,875	*	1,2	36,5	44,6	6 600	8 800	**LM67048 / LM67010**	0,182
	62,000	19,050	14,288	18,161	*	1,2	46,8	53,9	6 400	8 600	**15123 / 15245**	0,238
	62,000	20,638	14,288	19,050	0,8	1,2	46,8	53,9	6 400	8 600	**15126 / 15245**	0,252
	69,012	19,583	15,875	19,845	3,6	1,2	50,6	61,7	5 500	7 500	**14125A / 14276**	0,356
34,925	65,088	18,288	13,970	18,034	*	1,2	50,5	63,1	6 000	8 000	**LM48548 / LM48510**	0,250
	73,025	24,608	19,050	23,812	1,6	0,8	72,2	87,3	5 600	7 400	**25877 / 25821**	0,468
34,987	59,131	16,764	11,938	15,875	*	1,2	35,5	49,3	6 400	8 500	**L68149 / L68110**	0,168
	59,975	16,764	11,938	15,875	*	1,2	35,5	49,3	6 400	8 500	**L68149 / L68111**	0,175
38,000	63,000	17,000	13,500	17,000	*	1,2	43,5	58,2	6 000	8 000	**JL69349 / JL69310**	0,198
38,100	65,088	18,288	13,970	18,034	*	1,2	42,9	56,5	5 800	7 800	**LM29748 / LM29710**	0,233
	65,088	18,288	13,970	18,034	2,4	1,2	49,2	56,5	5 600	7 500	**LM29749 / LM29710**	0,241
	82,550	28,575	23,020	29,370	0,8	3,2	87,0	117,0	4 900	6 600	**HM801346 / HM801310**	0,765
40,988	67,975	18,000	13,500	17,500	*	1,6	46,5	63,0	5 300	7 100	**LM300849 / LM300811**	0,239
41,275	73,431	19,812	14,732	19,558	3,6	0,8	57,8	73,0	5 200	7 000	**LM501349 / LM501310**	0,334
	73,431	19,812	16,604	21,430	3,6	0,8	57,8	73,0	5 200	7 000	**LM501349 / LM501314**	0,353
44,450	82,931	25,400	19,050	23,812	3,6	0,8	83,8	111,0	4 500	6 000	**25580 / 25520**	0,555
	93,264	30,302	23,813	30,163	3,6	3,2	103,0	137,0	3 500	4 900	**3782 / 3720**	0,947
	95,250	28,575	22,225	30,958	3,6	0,8	99,7	120,0	3 700	5 100	**HM903249 / HM903210**	0,997
45,242	73,431	19,812	15,748	19,558	3,6	0,8	55,6	78,1	5 100	6 700	**LM102949 / LM102910**	0,309
	77,788	19,842	15,080	19,842	3,6	0,8	57,1	73,5	4 900	6 500	**LM603049 / LM603011**	0,363
45,618	82,931	25,400	19,050	23,812	3,6	0,8	81,5	106,0	4 500	6 000	**25590 / 25520**	0,540
	82,931	25,400	19,114	23,876	3,6	2	81,5	106,0	4 500	6 000	**25590 / 25522**	0,545
	82,931	25,400	22,225	26,988	3,6	2,3	81,5	106,0	4 500	6 000	**25590 / 25523**	0,585
46,038	79,375	17,463	13,495	17,463	2,8	1,6	47,1	59,1	4 800	6 400	**18690 / 18620**	0,331
50,000	82,000	21,501	17,000	21,501	3	0,5	71,7	97,9	4 500	6 000	**JLM104948 / JLM104910**	0,432
	90,000	28,000	23,000	28,000	3	2,5	105,0	138,0	4 300	5 800	**JM205149 / JM205110**	0,751

Single Row Tapered Roller Bearings
in Inch Dimensions



Dimensions							Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
							Dynamic	Static				
d	D	B	C	T	r_{1s}	r_{2s}	C_r	C_{or}	Grease	Oil		
mm							kN		rpm			kg
50,800	82,000	22,225	17,000	21,976	3,6	0,5	69,5	94,0	4 300	5 700	**LM104949 / LM104910**	0,417
	82,550	22,225	16,510	21,590	3,6	1,2	69,5	94,0	4 300	5 700	**LM104949 / LM104911**	0,418
	85,000	17,462	13,495	17,462	3,6	1,6	49,5	65,0	4 400	5 900	**18790 / 18720**	0,369
	88,900	22,225	16,513	20,638	3,6	1,2	74,3	87,3	4 400	5 800	**368A / 362A**	0,495
	92,075	25,400	19,845	24,608	3,6	0,8	84,8	119,0	4 200	5 600	**28580 / 28521**	0,700
	93,264	30,302	23,813	30,163	3,6	3,2	103,0	137,0	4 200	5 500	**3780 / 3720**	0,835
	104,775	36,512	28,575	36,512	3,6	3,2	147,0	201,0	3 800	5 100	**HM807046 / HM807010**	1,492
55,000	90,000	23,000	18,500	23,000	1,6	0,5	81,4	115,0	4 200	5 500	**JLM506849 / JLM506810**	0,553
	95,000	29,000	23,500	29,000	1,6	2,8	110,0	150,0	4 000	5 300	**JM207049 / JM20710**	0,823
55,562	97,630	24,608	19,446	24,608	3,6	0,8	89,6	131,0	3 900	5 200	**28680 / 28622**	0,759
57,150	96,838	21,946	15,875	21,000	2,4	0,8	80,4	101,0	3 900	5 200	**387 / 382A**	0,605
	96,838	21,946	15,875	21,000	3,6	0,8	80,4	101,0	3 900	5 200	**387A / 382A**	0,603
	98,425	21,946	17,826	21,000	3,6	0,8	80,4	101,0	3 900	5 200	**387A / 382**	0,628
63,500	110,000	21,996	18,824	22,000	3,6	1,2	89,5	120,0	3 400	4 500	**395 / 394A**	0,834
	112,713	30,048	23,813	30,163	3,6	3,2	116,0	174,0	3 400	4 500	**3982 / 3920**	1,230
66,675	110,000	21,996	18,824	21,999	0,8	1,2	86,4	116,0	3 400	4 500	**395A / 394A**	0,783
	112,713	30,048	23,813	30,163	3,6	3,2	113,0	172,0	3 400	4 500	**3984 / 3920**	1,180
	112,713	30,163	23,813	30,163	3,6	3,2	147,0	207,0	3 300	4 500	**39590 / 39520**	0,187
	122,238	38,354	29,718	38,100	3,6	3,2	191,0	249,0	3 200	4 300	**HM212049 / HM212011**	1,860
68,262	110.000	21,966	18,824	22,000	2,4	1,2	87,5	117,0	3 400	4 500	**399A / 394A**	0,752
	110.000	21,966	18,824	22,000	5,2	1,2	87,5	117,0	3 400	4 500	**399AS / 394A**	0,744
71,438	117,475	30,162	23,812	30,162	3,6	3,2	117,0	175,0	3 200	4 200	**33281 / 33462**	1,240
73,025	112,712	25,400	19,050	25,400	3,6	3,2	95,5	151,0	3 200	4 300	**29685 / 29620**	0,872
	117,475	30,162	23,812	30,162	3,6	3,2	117,0	175,0	3 200	4 200	**33287 / 33462**	1,190
76,200	139.992	36,098	28,575	36,512	3,6	3,2	175,0	262,0	2 700	3 600	**575 / 572**	2,419
82,550	133,350	33,338	26,195	33,338	3,6	3,2	153,0	235,0	2 700	3 600	**47686 / 47620**	1,720
	139.992	36,098	28,575	36,512	3,6	3,2	171,0	255,0	2 700	3 600	**580 / 572**	2,189
	146,050	41,275	31,750	41,275	3,6	3,2	208,0	301,0	2 600	3 400	**663 / 653**	2,790
85,725	146,050	41,275	31,750	41,275	3,6	3,2	213,0	307,0	2 600	3 400	**665 / 653**	2,650
88,900	152.400	36,322	30,163	39,688	3,6	3,2	183,0	287,0	2 400	3 200	**593 / 592A**	2,780
	152,400	36,322	33,338	39,688	3,6	3,2	183,0	287,0	2 400	3 200	**593 / 592**	2,830
	152.400	39,688	30,163	39,688	6,4	3,2	248,0	359,0	2 400	3 200	**HM518445 / HM518410**	2,868
89,974	146.975	40,000	32,499	40,000	7,1	3,6	206,0	310,0	2 500	3 300	**HM218248 / HM218210**	2,440
92,075	152.400	36,322	30,162	39,688	3,6	3,2	185,0	288,0	2 400	3 300	**598 / 592A**	2,690
95,250	152,400	36,322	30,163	39,688	3,6	3,2	183,0	287,0	2 400	3 300	**594 / 592A**	2,510
	152,400	36,322	33,338	39,668	3,6	3,2	183,0	287,0	2 400	3 300	**594 / 592**	2,560
	152,400	36,322	33,338	39,668	5	3,2	183,0	287,0	2 400	3 300	**594A / 592**	2,540

Thrust Ball Bearings

Thrust ball bearings are used in application where axial loads are too high to be supported by radial bearings or when rigid axial guidance is required.
Thrust ball bearings are divided into two basic groups, single direction and double direction. Single direction thrust ball bearings have one row of balls within a cage, running between two grooved washers. The washers have flat seating surfaces that must be completely supported so that all of the balls can be evenly loaded. This bearing design is solely for carrying axial loads in one direction.

Double direction thrust ball bearings are used for reversing axial loads. There are two grooved housing washers, two ball and retainer assemblies and an intermediate face. The housing washers and ball and retainer assemblies are the same as those of the corresponding single direction thrust ball bearing. Double direction thrust ball bearings can withstand axial loads in both directions.

Cage
All standard production thrust ball bearings are produced with a steel cage.

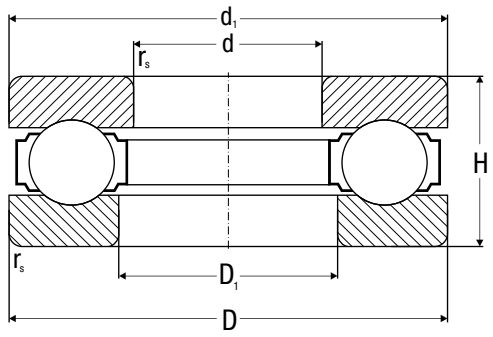
Boundary Dimensions
All boundary dimensions comply with standard ISO 15.

Tolerance
Thrust ball bearings are produced in standard production in accordance to P0 (ABEC1) tolerance class.

Designation
Listed below are some common designations for thrust ball bearings.

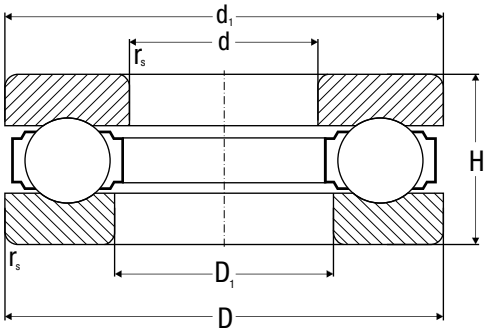
Thrust Ball Bearings		
Suffix	Description	Example of Designation
A	Internal design change for enhanced limiting speed	51106A
F	Machined steel cage guided on the rolling elements	51148F
M	Machined brass cage guided on the rolling elements	51144M
TNGN	Polyamide cage reinforced with glass fiber, guided on the rolling elements	51408TNGN
P6	Higher tolerance class than normal	51307 P6
P5	Higher tolerance class than P6	51216 P5

Single Direction Thrust Ball Bearings



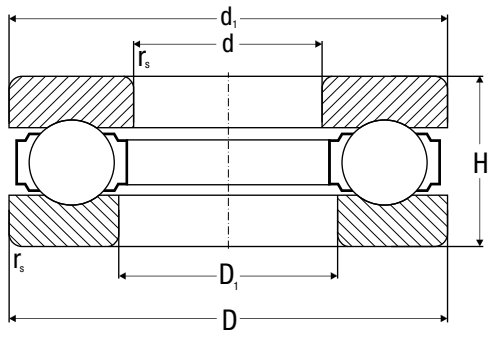
Dimensions						Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
						Dynamic	Static				
d	D	d_1	D_1	H	r_s	C_r	C_{or}	Grease	Oil		
mm						kN		rpm			kg
10	24	24	11	9	0,3	11,2	14,0	7 900	10 600	**51100**	0,02
	26	26	12	11	0,6	12,7	17,1	7 100	9 400	**51200**	0,03
12	26	26	13	9	0,3	11,5	15,4	7 500	10 000	**51101**	0,02
	28	28	14	11	0,6	13,2	19,0	6 700	8 900	**51201**	0,03
15	28	28	16	9	0,3	11,8	16,8	7 100	9 400	**51102**	0,02
	32	13	17	12	0,6	17,3	24,4	6 000	7 900	**51202**	0,05
17	30	30	18	9	0,3	12,7	19,6	7 100	9 400	**51103**	0,03
	35	35	19	12	0,6	17,8	26,6	5 600	7 500	**51203**	0,05
20	35	35	21	10	0,3	16,8	26,6	6 300	8 400	**51104**	0,04
	40	40	22	14	0,6	24,5	37,7	5 000	6 700	**51204**	0,08
25	42	42	26	11	0,6	20,3	35,5	5 300	7 100	**51105**	0,06
	47	47	27	15	0,6	30,6	50,5	4 500	6 000	**51205**	0,12
	52	52	27	18	1	38,9	61,5	3 800	5 000	**51305**	0,18
	60	60	27	24	1	60,5	89,4	3 200	4 200	**51405**	0,34
30	47	47	32	11	0,6	21,1	39,9	5 000	6 700	**51106**	0,07
	52	52	32	16	0,6	30,3	58,2	4 000	5 300	**51206**	0,14
	60	60	32	21	1	44,8	78,7	3 300	4 500	**51306**	0,27
	70	70	32	28	1	79,2	126,0	2 700	3 500	**51406**	0,53
35	52	52	37	12	0,6	22,5	46,6	4 700	6 300	**51107**	0,08
	62	62	37	18	1	41,8	78,2	3 500	4 700	**51207**	0,22
	68	68	37	24	1	58,8	105,0	2 800	3 800	**51307**	0,39
	80	80	37	32	1,1	94,7	155,0	2 200	3 000	**51407**	0,79
40	60	60	42	13	0,6	30,1	62,9	4 200	5 600	**51108**	0,12
	68	68	42	19	1	48,4	92,4	3 200	4 200	**51208**	0,27
	78	78	42	26	1	73,5	135,0	2 700	3 500	**51308**	0,55
	90	90	42	36	1,1	122,1	205,0	2 000	2 700	**51408**	1,14
45	65	65	47	14	0,6	31,3	69,2	4 000	5 300	**51109**	0,15
	73	73	47	20	1	47,0	105,0	3 000	4 000	**51209**	0,32
	85	85	47	28	1	87,2	164,0	2 400	3 200	**51309**	0,69
	100	100	47	39	1,1	141,7	243,0	1 900	2 500	**51409**	1,47
50	70	70	52	14	0,6	32,3	75,5	3 800	5 000	**51110**	0,16
	78	78	52	22	1	51,9	111,0	2 800	3 800	**51210**	0,39
	95	95	52	31	1,1	96,5	202,0	2 100	2 800	**51310**	1,00
	110	110	52	43	1,5	156,0	310,0	1 700	2 200	**51410**	1,99
55	78	78	57	16	0,6	36,5	93,2	3 300	4 500	**51111**	0,24
	90	90	57	25	1	69,5	159,0	2 500	3 300	**51211**	0,61
	105	105	57	35	1,1	122,6	246,0	1 900	2 500	**51311**	1,34
	120	120	57	48	1,5	178,0	360,0	1 600	2 100	**51411**	2,64

Single Direction Thrust Ball Bearings



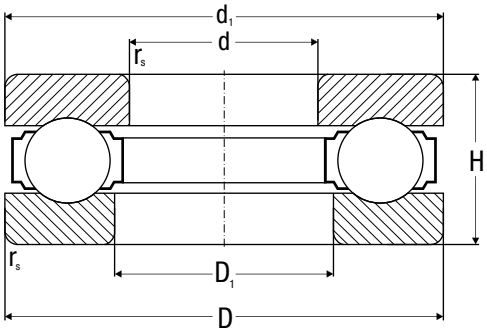
Dimensions						Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
						Dynamic	Static				
d	D	d_1	D_1	H	r_s	C_r	C_{or}	Grease	Oil		
mm						kN		rpm			kg
60	85	85	62	17	1	41,5	113,0	3 200	4 200	**51112**	0,29
	95	95	62	26	1	73,5	179,0	2 400	3 200	**51212**	0,69
	110	110	62	35	1,1	125,2	270,0	1 900	2 500	**51312**	1,43
	130	130	62	51	1,5	213,0	435,0	1 400	1 900	**51412**	3,51
65	90	90	67	18	1	44,6	117,0	2 800	3 800	**51113**	0,33
	100	100	67	27	1	76,4	189,0	2 400	3 200	**51213**	0,77
	115	115	67	36	1,1	129,3	287,0	1 800	2 400	**51313**	1,57
	140	140	68	56	2	231,0	495,0	1 300	1 800	**51413**	4,47
70	95	95	72	18	1	46,6	127,0	2 800	3 800	**51114**	0,36
	105	105	72	27	1	76,9	199,0	2 200	3 000	**51214**	0,81
	125	125	72	40	1,1	158,4	340,0	1 700	2 200	**51314**	2,06
	150	150	73	60	2	250,0	555,0	1 200	1 600	**51414**	5,48
75	100	100	77	19	1	49,8	136,0	2 700	3 500	**51115**	0,42
	110	110	77	27	1	81,2	209,0	2 200	3 000	**51215**	0,86
	135	135	77	44	1,5	170,0	395,0	1 600	2 100	**51315**	2,68
	160	160	78	65	2	252,0	560,0	1 000	1 300	**51415**	6,75
80	105	105	82	19	1	50,0	141,0	2 700	3 500	**51116**	0,43
	115	115	82	28	1	86,4	219,0	2 000	2 700	**51216**	0,95
	140	140	82	44	1,5	176,0	425,0	1 500	2 000	**51316**	2,82
	170	170	83	68	2,1	270,0	620,0	900	1 300	**51416**	7,97
85	110	110	87	19	1	51,5	150,0	2 700	3 500	**51117**	0,46
	125	125	88	31	1	104,9	264,0	2 000	2 700	**51217**	1,29
	150	150	88	49	1,5	227,5	517,0	1 300	1 800	**51317**	3,66
	180	177	88	72	2,1	288,0	685,0	890	1 200	**51417**	9,45
90	120	120	92	22	1	66,9	190,0	2 200	3 000	**51118**	0,68
	135	135	93	35	1,1	133,0	282,0	1 700	2 200	**51218**	1,77
	155	155	93	50	1,5	236,6	556,0	1 100	1 500	**51318**	3,88
	190	187	93	77	2,1	305,0	750,0	790	1 060	**51418**	11,20
100	135	135	102	25	1	85,0	268,0	2 000	2 700	**51120**	0,99
	150	150	103	38	1,1	162,0	348,0	1 600	2 100	**51220**	2,36
	170	170	103	55	1,5	266,1	628,0	1 060	1 400	**51320**	5,11
	210	205	103	85	3	345,0	895,0	750	1 000	**51420**	15,00
110	145	145	112	25	1	87,0	288,0	1 900	2 500	**51122**	1,08
	160	160	113	38	1,1	171,0	391,0	1 300	1 800	**51222**	2,57
	190	187	113	63	2	323,3	807,0	890	1 200	**51322**	7,87
	230	225	113	95	3	435,0	1240,0	670	890	**51422**	20,20
120	155	155	122	25	1	95,1	308,0	1 600	2 100	**51124**	1,16
	170	170	123	39	1,1	174,0	422,0	1 200	1 600	**51224**	2,86
	210	205	123	70	2,1	368,9	977,0	790	1 060	**51324**	10,90
	250	245	123	102	4	455,0	1340,0	630	840	**51424**	25,50

Single Direction Thrust Ball Bearings



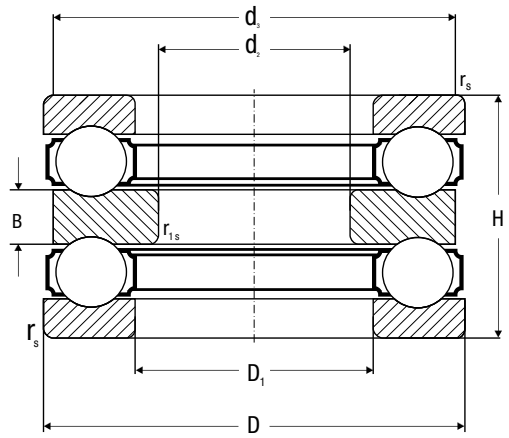
Dimensions						Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
						Dynamic	Static				
d	D	d_1	D_1	H	r_s	C_r	C_{or}	Grease	Oil		
mm						kN		rpm			kg
130	170	170	132	30	1	119,0	355,0	1 400	1 900	**51126**	1,87
	190	187	133	45	1,5	237,0	562,0	1 170	1 600	**51226**	4,10
	225	220	134	75	2,1	389,0	1070,0	750	1 000	**51326**	13,30
	270	265	134	110	4	555,0	1750,0	560	750	**51426**	32,00
140	180	178	142	31	1	121,0	369,0	1 400	1 900	**51128**	2,03
	200	197	143	46	1,5	242,0	596,0	1 060	1 400	**51228**	4,88
	240	235	144	80	2,1	407,0	1250,0	710	940	**51328**	15,50
150	190	188	152	31	1	131,6	448,0	1 300	1 800	**51130**	2,20
	215	212	153	50	1,5	281,8	835,0	900	1 300	**51230**	6,10
	250	245	154	80	2,1	360,0	1130,0	670	1 000	**51330**	16,30
160	200	198	162	31	1	133,8	476,0	1 300	1 800	**51132**	2,33
	225	222	163	51	1,5	288,8	874,0	890	1 200	**51232**	6,67
	270	265	164	87	3	410,0	1340,0	610	920	**51332**	21,00
170	215	213	172	34	1,1	160,1	582,0	1 200	1 600	**51134**	3,31
	240	237	173	55	1,5	300,7	897,0	840	1 100	**51234**	8,28
	280	275	174	87	3	420,0	1430,0	600	900	**51334**	22,00
180	225	222	183	34	1,1	165,6	639,0	1 100	1 500	**51136**	3,04
	250	247	183	56	1,5	325,3	1030,0	840	1 100	**51236**	8,29
	300	295	184	95	3	485,0	1700,0	550	820	**51336**	26,70
190	240	237	193	37	1,1	170,0	655,0	1 060	1 400	**51138**	4,06
	270	267	194	62	2	334,0	1170,0	830	1 100	**51238**	11,60
200	250	247	203	37	1,1	197,4	738,0	1 060	1 400	**51140**	4,24
	280	277	204	62	2	339,0	1220,0	750	1 000	**51240**	12,40
220	270	267	223	37	1,1	200,1	804,5	1 000	1 300	**51144**	4,40
	300	295	224	63	2	355,0	1340,0	710	940	**51244**	13,10
240	300	297	243	45	1,5	261,0	1040,0	840	1 100	**51148**	7,55
	340	335	244	78	2,1	460,8	2000,0	600	800	**51248**	23,00
260	320	317	263	45	1,5	271,6	1120,0	800	1 100	**51152M**	8,10
	360	355	264	79	2,1	470,5	2160,0	560	750	**51252M**	25,00
280	350	347	283	53	1,5	312,3	1460,0	700	950	**51156M**	12,00
	380	375	284	80	2,1	483,1	2320,0	560	750	**51256M**	26,50
300	380	376	304	62	2	358,9	1770,0	630	850	**51160M**	17,50
	420	415	304	95	3	610,0	2750,0	500	670	**51260M**	43,10
320	400	396	324	63	2	363,8	1860,0	600	800	**51164M**	19,00
	440	435	325	95	3	620,0	2900,0	470	630	**51264M**	45,50
340	420	416	344	64	2	368,6	1990,0	600	800	**51168M**	20,50
	460	455	345	96	3	640,0	3150,0	450	600	**51268M**	48,50
360	440	436	364	65	2	378,3	2080,0	560	750	**51172M**	22,00
	500	495	365	110	4	727,5	4200,0	400	530	**51272M**	70,00
380	460	456	384	65	2	383,2	2200,0	550	740	**51176M**	23,00
400	480	476	404	65	2	410,0	2300,0	530	700	**51180M**	24,00
420	500	495	424	65	2	412,0	2410,0	510	680	**51184M**	25,50

Single Direction Thrust Ball Bearings



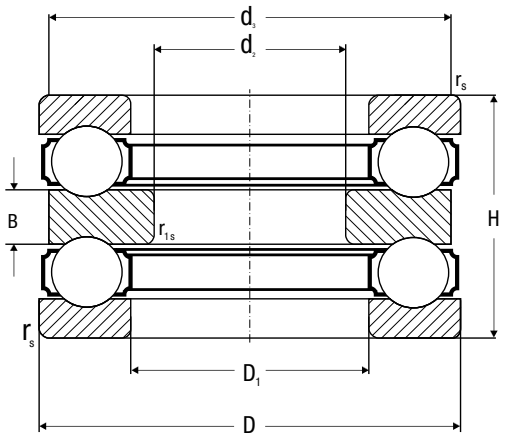
Dimensions						Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
						Dynamic	Static				
d	D	d_1	D_1	H	r_s	C_r	C_{or}	Grease	Oil		
mm						kN		rpm			kg
440	540	536	444	80	2,1	525,0	3200,0	450	600	**51188M**	42,00
460	560	556	464	80	2,1	530,0	3230,0	440	580	**51192M**	43,50
480	580	576	484	80	2,1	540,0	3290,0	430	560	**51196M**	45,50
500	600	596	504	80	2,1	560,0	3370,0	420	550	**511/500M**	46,50
530	640	636	534	85	3	645,0	4380,0	400	530	**511/530M**	58,50
600	710	706	604	85	3	663,0	4800,0	370	490	**511/600M**	65,00
670	800	795	675	105	4	850,0	6680,0	300	400	**511/670M**	105,00

Double Direction Thrust Ball Bearings



Dimensions								Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
								Dynamic	Static				
d_2	D	d_3	D_1	H	B	r_s	r_{1s}	C_r	C_{or}	Grease	Oil		
				mm				kN		rpm			kg
10	32	32	17	22	5	0,6	0,3	17,3	24,4	6 000	7 900	**52202**	0,08
15	40	40	22	26	6	0,6	0,3	24,5	37,7	5 000	6 700	**52204**	0,15
	60	60	27	45	11	1	0,6	60,5	89,4	3 200	4 200	**52405**	0,63
20	47	47	27	28	7	0,6	0,3	30,6	50,5	4 500	6 000	**52205**	0,23
	52	52	27	34	8	1	0,3	38,9	61,5	3 800	5 000	**52305**	0,33
	70	70	32	52	12	1	0,6	79,2	126,0	2 700	3 500	**52406**	1,00
25	52	52	32	29	7	0,6	0,3	30,3	58,2	4 000	5 300	**52206**	0,27
	60	60	32	38	9	1	0,3	44,8	78,7	3 300	4 500	**52306**	0,49
	80	80	37	59	14	1,1	0,6	94,7	155,0	2 200	3 000	**52407**	1,44
30	62	62	37	34	8	1	0,3	41,5	78,2	3 500	4 700	**52207**	0,42
	68	68	37	44	10	1	0,3	60,5	105,0	2 800	3 800	**52307**	0,71
	68	68	42	36	9	1	0,6	48,4	92,4	3 200	4 200	**52208**	0,54
	78	78	42	49	12	1	0,6	74,2	135,0	2 700	3 500	**52308**	1,06
	90	90	42	65	15	1,1	0,6	122,1	205,0	2 000	2 700	**52408**	2,03
35	73	73	47	37	9	1	0,6	47,0	105,0	3 000	4 000	**52209**	0,62
	85	85	47	52	12	1	0,6	87,2	164,0	2 400	3 200	**52309**	1,29
	100	100	47	72	17	1,1	0,6	141,7	243,0	1 900	2 500	**52409**	2,71
40	78	78	52	39	9	1	0,6	51,9	111,0	2 800	3 800	**52210**	0,71
	95	95	52	58	14	1,1	0,6	96,5	202,0	2 100	2 800	**52310**	1,86
45	90	90	57	45	10	1	0,6	69,5	159,0	2 500	3 300	**52211**	1,12
	105	105	57	64	15	1,1	0,6	123,8	246,0	1 900	2 500	**52311**	2,51
	120	120	57	87	20	1,5	0,6	212,2	397,0	1 600	2 100	**52411**	4,70
50	95	95	62	46	10	1	0,6	73,5	179,0	2 400	3 200	**52212**	1,25
	110	110	62	64	15	1,1	0,6	125,2	270,0	1 900	2 500	**52312**	2,68
55	100	100	67	47	10	1	0,6	76,4	189,0	2 400	3 200	**52213**	1,36
	115	115	67	65	15	1,1	0,6	129,3	287,0	1 800	2 400	**52313**	2,90
	105	105	72	47	10	1	1	77,6	198,0	2 200	3 000	**52214**	1,48
	125	125	72	72	16	1,1	1	161,3	340,0	1 700	2 200	**52314**	3,90
	150	150	73	107	24	2	1	272,5	553,0	1 200	1 600	**52414**	9,71
60	110	110	77	47	10	1	1	77,9	209,0	2 200	3 000	**52215**	1,57
	135	135	77	79	18	1,5	1	193,2	426,0	1 600	2 100	**52315**	4,83
65	115	115	82	48	10	1	1	86,4	219,0	2 000	2 700	**52216**	1,69
	140	140	82	79	18	1,5	1	221,0	470,0	1 500	2 000	**52316**	5,06
	170	170	83	120	27	2,1	1	336,0	751,0	890	1 200	**52416**	14,00
70	125	125	88	55	12	1	1	104,9	264,0	1 900	2 500	**52217**	2,34
	150	150	88	87	19	1,5	1	243,1	517,0	1 300	1 800	**52317**	6,43
	190	189,5	93	135	30	2,1	1,1	403,9	970,0	790	1 060	**52418**	19,60
75	135	135	93	62	14	1,1	1	133,0	282,0	1 700	2 200	**52218**	3,22
	155	155	93	88	19	1,5	1	245,9	556,0	1 100	1 500	**52318**	6,60
85	150	150	103	67	15	1,1	1	162,0	348,0	1600	2100	**52220**	4,29
	170	170	103	97	21	1,5	1,1	251,0	464,0	1060	1400	**52320**	8,90

Double Direction Thrust Ball Bearings



Dimensions								Basic Load Rating		Limiting Speed for Lubrication with		Bearing Designation	Weight
								Dynamic	Static				
d_2	D	d_3	D_1	H	B	r_s	r_{1s}	C_r	C_{or}	Grease	Oil		
mm								kN		rpm			kg
100	170	170	123	68	15	1,1	1,1	174,0	422,0	1200	1600	**52224**	5,24
	210	209,5	123	123	27	2,1	1,1	368,9	977,0	790	1 060	**52324**	17,20
110	190	189,5	133	80	18	1,5	1,1	237,0	562,0	1 100	1 500	**52226**	7,74
120	200	199,5	143	81	18	1,5	1,1	242,0	596,0	1 060	1 400	**52228**	8,95
130	215	214,5	153	89	20	1,5	1,1	271,0	681,0	1 000	1 300	**52230**	10,60
	250	249,5	154	140	31	3	2,1	455,0	980,0	670	900	**52330**	27,00
140	225	224,5	163	90	20	1,5	1,1	294,3	874,0	890	1 200	**52232**	12,20

Spherical Roller Thrust Bearings

ZVL-ZKL spherical roller thrust bearings contain a large number of asymmetrical barrel-shaped rollers, inclined so steeply that the bearing accommodates high axial loads in addition to considerable radial loads at relatively high rotational speeds.The spherical-shaped raceway of the housing washers accommodates misalignment between the shaft and housing. Spherical roller thrust bearings are separable, which allows the shaft washer, cage and roller assembly to be mounted separately from the housing washer. Due to their internal design these bearings need to be lubricated with oil, except under extremely low speeds where grease lubrication is adequate. Application for this bearing type include column bearings for cranes, heavy worm gears and screw pumps.

Cage
Spherical roller thrust bearings are designed and produced with steel and brass cages. Each design is designated by „J“ for steel and „M“ for brass cages.

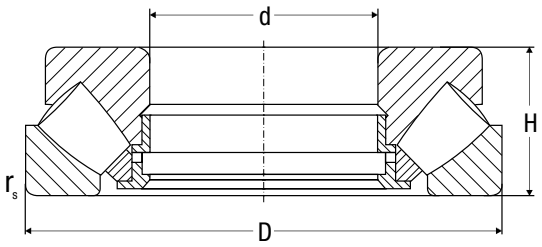
Boundary Dimensions
All boundary dimensions of spherical roller thrust bearings comply with standard ISO 104.

Tolerance
Spherical roller thrust bearings are produced in accordance to P0 (ABEC1) tolerance class. All of these tolerances comply with standard ISO 492.

Designation
Listed below are some common designations forspherical roller thrust bearings.

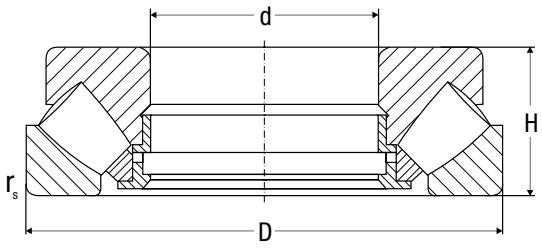
Spherical Roller Thrust Bearings		
Suffix	Description	Example of Designation
J	Pressed steel cage	29340J
M	Machined brass cage	29412M
E	Internal design change for enhanced load carrying capacity	29416EM

Spherical Roller Thrust Bearings



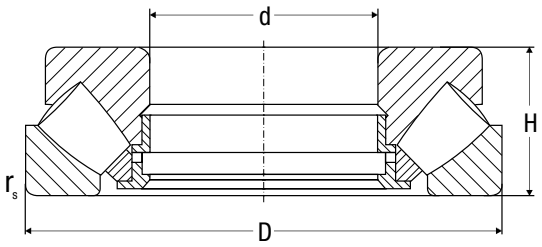
Dimensions				Basic Load Rating		Minimum	Limiting	Bearing Designation	Weight
				Dynamic	Static	Axial Load	Speed		
d	D	H	r_s	C_r	C_{or}	Factor	Oil		
mm				kN			rpm		kg
60	130	42	1,5	287	809	0,08	2 400	**29412M**	2,60
	130	42	1,5	345	951	0,11	2 600	**29412EM**	2,60
65	140	45	2	340	973	0,12	2 200	**29413M**	3,30
	140	45	2	417	1 155	0,17	2 400	**29413EM**	3,30
70	150	48	2	371	1 070	0,14	2 000	**29414M**	4,00
	150	48	2	453	1 280	0,20	2 200	**29414EM**	4,00
75	160	51	2	429	1 250	0,20	2 000	**29415M**	4,90
	160	51	2	527	1 500	0,28	2 200	**29415EM**	4,90
80	170	54	2,1	464	1 370	0,23	1 900	**29416M**	5,80
	170	54	2,1	625	1 640	0,34	2 000	**29416EM**	5,80
85	150	39	1,5	320	1 000	0,12	2 100	**29317EM**	2,80
	180	58	2,1	527	1 570	0,31	1 800	**29417M**	6,90
	180	58	2,1	713	1 945	0,47	1 900	**29417EM**	6,90
90	155	39	2	330	1 040	0,15	2 100	**29318EM**	2,90
	190	60	2,1	578	1 780	0,40	1 700	**29418M**	8,10
	190	60	2,1	724	2 172	0,59	1 800	**29418EM**	8,10
100	170	42	1,5	355	1 260	0,16	2 000	**29320M**	3,95
	170	42	1,5	449	1 400	0,25	2 000	**29320EM**	3,95
	210	67	3	705	2 170	0,59	1 500	**29420M**	11,80
	210	67	3	891	2 578	0,83	1 600	**29420EM**	11,80
110	190	48	2	442	1 420	0,25	1 600	**29322M**	5,50
	190	48	2	587	1 760	0,39	1 600	**29322EM**	5,50
	230	73	3	817	2 600	0,85	1 400	**29422M**	14,50
	230	73	3	1 053	3 078	1,20	1 400	**29422EM**	14,50
120	210	54	2,1	577	1 830	0,42	1 400	**29324M**	7,60
	210	54	2,1	670	2 100	0,55	1 600	**29324EM**	7,60
	250	78	4	934	3 000	1,10	1 300	**29424M**	18,10
	250	78	4	1 215	3 590	1,60	1 300	**29424EM**	18,10
130	225	58	2,1	647	2 070	0,54	1 300	**29326M**	9,30
	225	58	2,1	788	2 950	1,10	1 500	**29326EM**	9,30
	270	85	4	1 090	3 540	1,60	1 200	**29426M**	22,50
	270	85	4	1 437	4 300	2,30	1 200	**29426EM**	22,50
140	240	60	2,1	695	2 310	0,67	1 300	**29328M**	11,00
	240	60	2,1	876	3 150	1,20	1 400	**29328EM**	11,00
	280	85	4	1 164	3 750	1,80	1 200	**29428M**	24,20
	280	85	4	1 554	4 686	2,70	1 200	**29428EM**	24,20
150	250	60	2,1	718	2 430	0,74	1 200	**29330M**	11,50
	250	60	2,1	889	3 236	1,30	1 400	**29330EM**	11,50
	300	90	4	1 318	4 270	2,30	1 100	**29430M**	29,40
	300	90	4	1 675	5 241	3,40	1 100	**29430EM**	29,40

Spherical Roller Thrust Bearings



Dimensions				Basic Load Rating		Minimum	Limiting	Bearing Designation	Weight
				Dynamic	Static	Axial Load	Speed		
d	D	H	r_s	C_r	C_{or}	Factor	Oil		
mm				kN			rpm		kg
160	270	67	3	831	2 810	0,99	1 100	**29332M**	15,20
	270	67	3	1 067	3 977	2,00	1 200	**29332EM**	15,20
	320	95	5	1 504	4 810	2,90	1 000	**29432M**	35,50
	320	95	5	1 854	5 930	4,40	1 000	**29432EM**	35,50
170	280	67	3	858	2 950	1,10	1 100	**29334M**	16,00
	280	67	3	1 090	4 098	2,10	1 200	**29334EM**	16,00
	340	103	5	1 669	5 380	3,60	940	**29434M**	43,70
	340	103	5	2 029	6 230	4,90	950	**29434EM**	43,70
180	300	73	3	1 014	3 530	1,60	1 000	**29336M**	20,30
	300	73	3	1 280	4 813	2,90	1 100	**29336EM**	20,30
	360	109	5	1 854	6 010	4,50	890	**29436M**	52,00
	360	109	5	2 297	7 160	6,40	900	**29436EM**	52,00
190	320	78	4	1 120	4 010	2,00	940	**29338M**	24,80
	320	78	4	1 483	4 840	2,90	1 100	**29338EM**	24,80
	380	115	5	2 019	6 610	5,50	840	**29438M**	60,00
	380	115	5	2 493	7 750	7,50	850	**29438EM**	60,00
200	280	48	2,1	731	3 150	1,20	1 200	**29240EM**	8,76
	340	85	4	1 300	4 740	2,80	890	**29340M**	33,00
	340	85	4	1 669	5 480	3,80	950	**29340EM**	33,00
	400	122	5	2 210	7 510	7,10	790	**29440M**	69,00
	400	122	5	2 791	8 790	9,70	800	**29440EM**	69,00
220	300	48	2,1	757	3 350	1,40	1 180	**29244EM**	9,64
	360	85	4	1 340	4 970	3,10	840	**29344M**	33,00
	360	85	4	1 792	6 300	5,00	950	**29344EM**	33,00
	420	122	6	2 328	7 970	7,90	750	**29444M**	74,00
	420	122	6	2 905	9 070	10,00	750	**29444EM**	74,00
240	340	60	2,1	793	3 450	1,50	890	**29248M**	16,70
	380	85	4	1 340	5 190	3,40	790	**29348M**	35,30
	380	85	4	1 844	6 490	5,30	900	**29348EM**	35,30
	440	122	6	2 410	8 420	8,90	750	**29448M**	79,00
	440	122	6	3 039	9 770	12,00	750	**29448EM**	79,00
260	360	60	2,1	825	3 650	1,70	890	**29252M**	18,50
	420	95	5	1 780	6 820	5,80	750	**29352M**	48,50
	420	95	5	2 307	8 310	8,60	800	**29352EM**	48,50
	480	132	6	2 812	9 870	12,00	670	**29452M**	105,00
	480	132	6	3 667	12 080	18,00	670	**29452EM**	105,00
280	380	60	2,1	872	3 950	2,00	840	**29256M**	19,50
	440	95	5	1 780	7 100	6,30	710	**29356M**	52,50
	440	95	5	2 310	8 490	9,00	800	**29356EM**	52,50
	520	145	6	3 327	11 840	18,00	630	**29456M**	132,00
	520	145	6	4 604	15 750	31,00	630	**29456EM**	132,00

Spherical Roller Thrust Bearings



Dimensions				Basic Load Rating		Minimum	Limiting	Bearing Designation	Weight
				Dynamic	Static	Axial Load	Speed		
d	D	H	r_s	C_r	C_{or}	Factor	Oil		
mm				kN			rpm		kg
300	420	73	3	1 061	4 670	2,70	750	**29260M**	30,50
	480	190	5	2 180	8 500	9,00	630	**29360M**	74,00
	480	190	5	2 730	11 000	15,00	700	**29360EM**	74,00
	540	145	6	3 659	11 850	18,00	600	**29460M**	140,00
	540	145	6	4 645	16 460	34,00	600	**29460EM**	140,00
320	440	73	3	1 102	4 930	3,00	710	**29264M**	32,90
	500	109	5	2 180	8 850	9,80	630	**29364M**	77,00
	500	109	5	2 850	11 260	15,00	680	**29364EM**	77,00
	580	155	7,5	4 007	14 690	27,00	560	**29464M**	175,00
	580	155	7,5	5 160	21 200	56,00	560	**29464EM**	175,00
340	460	73	3	1 442	6 600	5,40	850	**29268EM**	33,00
	540	122	5	2 719	10 550	14,00	560	**29368M**	103,00
	620	170	7,5	4 481	16 410	34,00	500	**29468M**	218,00
	620	170	7,5	5 995	25 080	79,00	500	**29468EM**	218,00
360	500	85	4	1 442	6 600	5,40	630	**29272M**	51,80
	560	122	5	2 730	11 030	15,00	560	**29372M**	107,00
380	520	85	4	1 597	7 510	7,10	600	**29276M**	52,80
	670	175	7,5	4 600	18 300	42,00	470	**29476M**	254,00
	670	175	7,5	4 841	19 100	46,00	470	**29476EM**	263,00
400	540	85	4	1 648	7 900	7,80	600	**29280M**	55,30
	620	132	6	3 389	14 120	25,00	500	**29380M**	150,00
	710	185	7,5	7 014	26 500	88,00	450	**29480EM**	306,00
420	580	95	5	2 369	11 230	16,00	700	**29284EM**	73,00
	650	140	6	3 512	14 700	27,00	450	**29384M**	170,00
	730	185	7,5	5 650	22 400	63,00	400	**29484**	323,00
	730	185	7,5	7 056	31 020	120,00	430	**29484EM**	323,00
440	680	145	6	3 976	16 850	35,00	450	**29388M**	190,00
	780	206	9,5	6 468	24 650	76,00	400	**29488M**	407,00
480	650	103	6	1 978	11 000	15,00	500	**29296M**	96,50
	850	224	9,5	9 935	44 398	250,00	340	**29496EM**	518,00
500	670	103	5	2 472	12 120	18,00	470	**292/500M**	101,00
	750	150	6	4 347	18 660	44,00	400	**293/500M**	220,00
	870	224	9,5	10 326	48 568	290,00	340	**294/500EM**	548,00
530	800	160	7,5	5 284	22 730	65,00	380	**293/530M**	286,00
600	800	122	5	3 832	19 060	45,00	450	**292/600EM**	160,00
	900	180	7,5	7 004	31 500	120,00	330	**293/600EM**	390,00
630	850	132	6	4 378	22 500	63,00	350	**292/630M**	211,00
	950	190	9,5	8 940	38 700	190,00	320	**293/630EM**	488,00
	1090	280	12	15 244	63 200	500,00	260	**294/630EM**	1 108,00

Notes

Insert Ball Bearings

Insert ball bearings are single row deep groove ball bearings with double sealing on both sides. The outer ring has a spherical surface and that is why it can tilt in the housing with the same spherical surface. It can accommodate eventual misalignments. The inner bearing ring is wider than the outer one and it is fixed on the shaft by means of screws, design UC.
Bearings are filled with grease for the whole bearing life. Bearings are suitable for arrangements on short shafts and for arrangements where small thermal contraction occur which are compensated by bearing axial clearance or design adaptability, on which bearing housings are fixed.

Boundary Dimensions
Boundary dimensions of insert ball bearings correspond to the standard ISO 2264, ISO 3228.

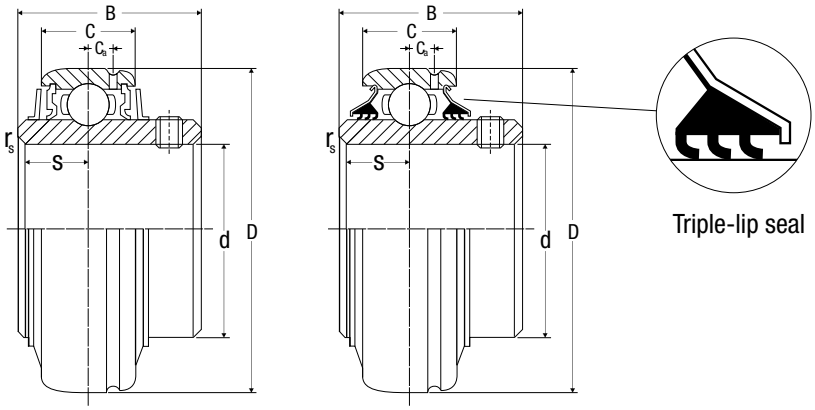
Cage
Bearings have cages pressed of steel which are not designated.

Tolerance
Bearings have a uniform bore diameter tolerance H6. This tolerance secures by shaft machining in the tolerance h always a loose fit.
For shaft manufacturing usually tolerances h8 and h11 are sufficient. For greater loads and rotational speeds it is necessary to select tolerances h6, h7.

Radial Clearance
Commonly manufactured insert ball bearings have normal radial clearance which is not indicated and its size and extent is the same as for single row deep groove ball bearings of the same dimensions.

Designation
Designation of insert ball bearings is in the dimension tables of this publication.

Insert Ball Bearings



Dimensions							Basic Load Rating		Bearing Designation	Weight
							Dynamic	Static		
d	D	B	C	r_s	S	C_a	C_r	C_{or}		
			mm				kN			kg
17	47	31	17	1	12,7	4,5	12,80	6,70	**UC 203**	0,18
	47	31	17	1	12,7	4,5	12,80	6,70	**UC 203TRL**	0,18
20	47	31	17	1,5	12,7	4,5	12,80	6,70	**UC204**	0,16
	47	31	17	1,5	12,7	4,5	12,80	6,70	**UC 204TRL**	0,16
25	52	34	17	1,5	14,3	4,5	14,02	7,88	**UC205**	0,19
	52	34	17	1,5	14,3	4,5	14,02	7,88	**UC 205TRL**	0,19
30	62	38,1	19	1,5	15,9	5,1	19,46	11,31	**UC206**	0,31
	62	38,1	19	1,5	15,9	5,1	19,46	11,31	**UC 206TRL**	0,31
35	72	42,9	20	2	17,5	5,8	25,67	15,30	**UC207**	0,46
	72	42,9	20	2	17,5	5,8	25,67	15,30	**UC 207TRL**	0,46
40	80	49,2	21	2	19	6,2	29,52	18,14	**UC208**	0,62
	80	49,2	21	2	19	6,2	29,52	18,14	**UC 208TRL**	0,62
45	85	49,2	22	2	19	6,5	31,68	20,68	**UC209**	0,68
	85	49,2	22	2	19	6,5	31,68	20,68	**UC 209TRL**	0,68
50	90	51,6	23	2	19	6,5	35,07	23,18	**UC210**	0,78
	90	51,6	23	2	19	6,5	35,07	23,18	**UC 210TRL**	0,78
55	100	55,6	24	2,5	22,2	7,3	43,38	29,22	**UC211**	1,07
	100	55,6	24	2,5	22,2	7,3	43,38	29,22	**UC 211TRL**	1,07
60	110	65,1	26	2,5	25,4	7,7	47,76	32,93	**UC212**	1,52
	110	65,1	26	2,5	25,4	7,7	47,76	32,93	**UC 212TRL**	1,52
65	120	65,1	28	2,5	25,4	8,3	57,21	40,00	**UC 213**	1,80
	120	65,1	28	2,5	25,4	8,3	57,21	40,00	**UC 213TRL**	1,80
70	125	74,6	29	2,5	30,2	8,7	60,82	45,03	**UC 214**	2,06
	125	74,6	29	2,5	30,2	8,7	60,82	45,03	**UC 214TRL**	2,06
75	130	77,8	30	2,5	33,3	9,2	66,11	49,50	**UC 215**	2,19
	130	77,8	30	2,5	33,3	9,2	66,11	49,50	**UC 215TRL**	2,19
80	140	82,6	32	3	33,3	9,6	72,50	53,00	**UC 216**	2,82
	140	82,6	32	3	33,3	9,6	72,50	53,00	**UC 216TRL**	2,82
85	150	85,7	34	3	34,1	10,5	83,21	63,96	**UC 217**	3,38
	150	85,7	34	3	34,1	10,5	83,21	63,96	**UC 217TRL**	3,38

Spherical Plain Bearings

Spherical plain bearings are radial sliding bearings, consisting of one inner and one outer ring, which have spherical working surfaces. These bearings are used in applications where large radial forces are applied at a slow tilting rotation or oscillating motion. Besides radial loads these bearings can also accomodate a certain amount of axial load in both directions. Spherical plain bearings are produced from standard bearing steel. The rings are hardened, ground or phosphatized.

Boundary Dimensions

Boundary dimensions for spherical plain bearings designations GE comply with the standard ISO 6124/1.

Tolerance

Spherical plain bearings are produced with P0 (ABEC1) tolerance class. Values for these tolerances comply with standard ISO 6125.

Radial Clearance

Spherical plain bearings are commonly produced with normal (C0) radial clearance.

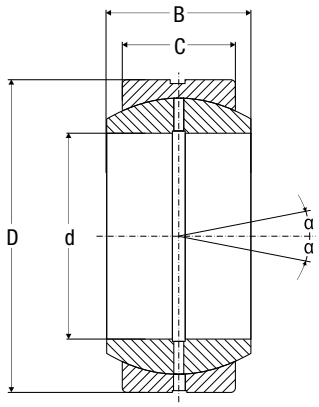
Listed in the chart below are values for radial clearance.

Bore Diameter		Radial Clearance of Spherical Plain Bearings					
d		C2		normal		C3	
over	to	min	max	min	max	min	max
mm		μm					
12	20	10	40	40	82	82	124
20	35	12	50	50	100	100	150
35	60	15	60	60	120	120	180

Designation

Spherical plain bearings have a designation that consists of prefix letters GE followed by a number which indicates the bore diameter in millimeters; e.g., GE30.
Suffix „E“ in designation is used to identify a phosphatized surface.

Spherical Plain Bearings



GE

Dimensions					Radial clearance		Basic Load Rating Dynamic	Basic Load Rating Static	Bearing Designation		Weight
d	D	B	C	α	min	max	C_r	C_{or}			
mm				°	µm		kN				kg
15	26	12	9	8	40,00	82,00	17	85	**GE15E**	**GE15E-2RS**	0,025
20	35	16	12	9	40,00	82,00	30	146	**GE20E**	**GE20E-2RS**	0,061
25	42	20	16	7	50,00	100,00	48	240	**GE25E**	**GE25E-2RS**	0,110
30	47	22	18	6	50,00	100,00	62	310	**GE30E**	**GE30E-2RS**	0,140
35	55	25	20	6	50,00	100,00	80	400	**GE35E**	**GE35E-2RS**	0,220
40	62	28	22	7	60,00	120,00	100	500	**GE40E**	**GE40E-2RS**	0,300
45	68	32	25	7	60,00	120,00	127	640	**GE45E**	**GE45E-2RS**	0,400
50	75	35	28	6	60,00	120,00	156	780	**GE50E**	**GE50E-2RS**	0,540
55	85	40	32	7	60,00	120,00	190	950	**GE55E**	**GE55E-2RS**	0,710
60	90	44	36	6	60,00	120,00	245	1220	**GE60E**	**GE60E-2RS**	1,050
70	105	49	44	6	72,00	142,00	313	1560	**GE70E**	**GE70E-2RS**	1,550
80	120	55	45	6	72,00	142,00	400	2000	**GE80E**	**GE80E-2RS**	2,310
90	130	60	50	5	72,00	142,00	488	2440	**GE90E**	**GE90E-2RS**	2,750
100	150	70	55	7	85,00	165,00	607	3030	**GE100E**	**GE100E-2RS**	4,450

Notes

Accessories of Rolling Bearings

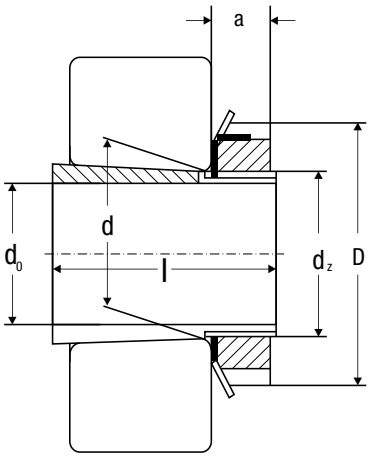
Adapter Sleeves
Adapter sleeves are used for mounting double row self-aligning ball bearings and double row spherical roller bearings with tapered bores on a cylindrical shaft. Boundary dimensions for adapter sleeves comply with standard ISO 113/1.

Withdrawal Sleeves
Withdrawal sleeves are used for mounting tapered-bore double row spherical roller bearings on a cylindrical shaft and to facilitate easy removal for inspection of machine parts and maintenance operations. The taper of a withdrawal sleeve is in the opposite direction of an adapter sleeve.
Boundary dimensions of withdrawal sleeves comply with standard ISO 2982.

Locknuts and Lockwashers
Locknuts and Lockwashers are used to locate a bearing´s inner ring on an adapter sleeve or directly on a tapered shaft. A locknut is also used when dismounting a double row spherical roller bearing that was previously mounted on a withdrawal sleeve.
Boundary dimensions for locknuts and lockwashers comply with standard ISO 2982.

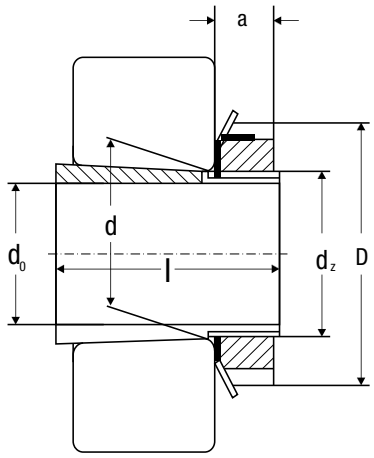
Adapter Assemblies
Adapter assemblies consist of the adapter, locknut and lockwasher. The assemblies are listed in the dimension tables and are noted by nomenclature H.

Adapter Sleeves



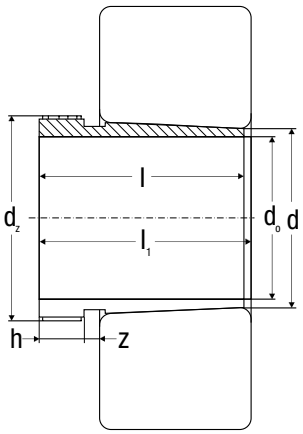
Dimensions						Sleeve Designation incl. Nut and Locking	Appropriate Components		Weight
d_o	d	d_z	D	l	a		Nut	Locking	
mm									kg
20	25	M25X1,5	38	26	8	**H205**	KM5	MB5	0,070
	25	M25X1,5	38	29	8	**H305**	KM5	MB5	0,075
	25	M25X1,5	38	35	8	**H2305**	KM5	MB5	0,087
25	30	M30X1,5	45	27	8	**H206**	KM6	MB6	0,099
	30	M30X1,5	45	31	8	**H306**	KM6	MB6	0,109
	30	M30X1,5	45	38	8	**H2306**	KM6	MB6	0,126
30	35	M35X1,5	52	29	9	**H207**	KM7	MB7	0,125
	35	M35X1,5	52	35	9	**H307**	KM7	MB7	0,142
	35	M35X1,5	52	43	9	**H2307**	KM7	MB7	0,165
35	40	M40X1,5	58	31	10	**H208**	KM8	MB8	0,174
	40	M40X1,5	58	36	10	**H308**	KM8	MB8	0,189
	40	M40X1,5	58	46	10	**H2308**	KM8	MB8	0,224
40	45	M45X1,5	65	33	11	**H209**	KM9	MB9	0,227
	45	M45X1,5	65	39	11	**H309**	KM9	MB9	0,248
	45	M45X1,5	65	50	11	**H2309**	KM9	MB9	0,280
45	50	M50X1,5	70	35	12	**H210**	KM10	MB10	0,274
	50	M50X1,5	70	42	12	**H310**	KM10	MB10	0,303
	50	M50X1,5	70	55	12	**H2310**	KM10	MB10	0,362
50	55	M55X2	75	37	12	**H211**	KM11	MB11	0,308
	55	M55X2	75	45	12	**H311**	KM11	MB11	0,345
	55	M55X2	75	59	12	**H2311**	KM11	MB11	0,420
55	60	M60X2	80	38	13	**H212**	KM12	MB12	0,346
	60	M60X2	80	47	13	**H312**	KM12	MB12	0,394
	60	M60X2	80	62	13	**H2312**	KM12	MB12	0,481
60	65	M65X2	85	40	14	**H213**	KM13	MB13	0,401
	65	M65X2	85	50	14	**H313**	KM13	MB13	0,458
	65	M65X2	85	65	14	**H2313**	KM13	MB13	0,557
65	75	M75X2	98	43	15	**H215**	KM15	MB15	0,707
	75	M75X2	98	55	15	**H315**	KM15	MB15	0,831
	75	M75X2	98	73	15	**H2315**	KM15	MB15	1,050
70	80	M80X2	105	46	17	**H216**	KM16	MB16	0,882
	80	M80X2	105	59	17	**H316**	KM16	MB16	1,030
	80	M80X2	105	78	17	**H2316**	KM16	MB16	1,280
75	85	M85X2	110	50	18	**H217**	KM17	MB17	1,020
	85	M85X2	110	63	18	**H317**	KM17	MB17	1,180
	85	M85X2	110	82	18	**H2317**	KM17	MB17	1,450
80	90	M90X2	120	62	18	**H218**	KM18	MB18	1,190
	90	M90X2	120	65	18	**H318**	KM18	MB18	1,370
	90	M90X2	120	86	18	**H2318**	KM18	MB18	1,690
85	95	M95X2	125	55	19	**H219**	KM19	MB19	1,370
	95	M95X2	125	68	19	**H319**	KM19	MB19	1,560
	95	M95X2	125	90	19	**H2319**	KM19	MB19	1,920

Adapter Sleeves



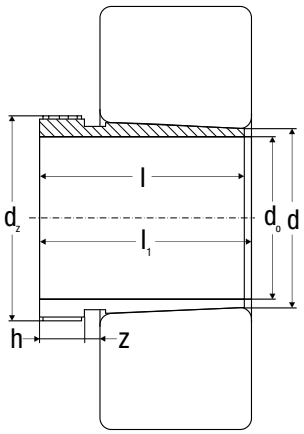
Dimensions						Sleeve Designation incl. Nut and Locking	Appropriate Components		Weight
d_o	d	d_z	D	l	a		Nut	Locking	
mm									kg
90	100	M100X2	130	58	20	**H220**	KM20	MB20	1,490
	100	M100X2	130	71	20	**H320**	KM20	MB20	1,690
	100	M100X2	130	97	20	**H2320**	KM20	MB20	2,150
100	110	M110X2	145	81	21	**H3122**	KM22	MB22	2,250
	110	M110X2	145	63	21	**H222**	KM22	MB22	1,930
	110	M110X2	145	77	21	**H322**	KM22	MB22	2,180
	110	M110X2	145	105	21	**H2322**	KM22	MB22	2,740
110	120	M120X2	145	72	22	**H3024**	KML24	MBL24	1,930
	120	M120X2	155	88	22	**H3124**	KM24	MB24	2,640
	120	M120X2	155	112	22	**H2324**	KM24	MB24	3,190
115	130	M130X2	155	80	23	**H3026**	KML26	MBL26	2,850
	130	M130X2	165	92	23	**H3126**	KM26	MB26	3,660
	130	M130X2	165	121	23	**H2326**	KM26	MB26	4,600
125	140	M140X2	165	82	24	**H3028**	KML28	MBL28	3,160
	140	M140X2	180	97	24	**H3128**	KM28	MB28	4,340
	140	M140X2	180	131	24	**H2328**	KM28	MB28	5,550
135	150	M150X2	180	87	26	**H3030**	KML30	MBL30	3,890
	150	M150X2	195	111	26	**H3130**	KM30	MB30	5,520
	150	M150X2	195	139	26	**H2330**	KM30	MB30	6,630
140	160	M160X3	190	93	28	**H3032**	KML32	MBL32	5,210
	160	M160X3	210	119	28	**H3132**	KM32	MB32	7,670
	160	M160X3	210	147	28	**H2332**	KM32	MB32	9,140
150	170	M170X3	200	101	29	**H3034**	KML34	MBL34	5,990
	170	M170X3	220	122	29	**H3134**	MB34	MB34	8,360
	170	M170X3	220	154	29	**H2334**	KM34	MB34	10,200
160	180	M180X3	210	109	30	**H3036**	KML36	MBL36	6,830
	180	M180X3	230	131	30	**H3136**	KM36	MB36	9,500
	180	M180X3	230	161	30	**H2336**	KM36	MB36	11,300
170	190	M190X3	220	112	31	**H3038**	KML38	MBL38	7,450
	190	M190X3	240	141	31	**H3138**	KM38	MB38	10,800
	190	M190X3	240	169	31	**H2338**	KM38	MB38	12,600
180	200	M200X3	240	120	32	**H3040**	KML40	MBL40	9,190
	200	M200X3	250	150	32	**H3140**	KM40	MB40	12,100
	20	M200X3	250	176	32	**H2340**	KM40	MB40	13,900

Withdrawal Sleeves



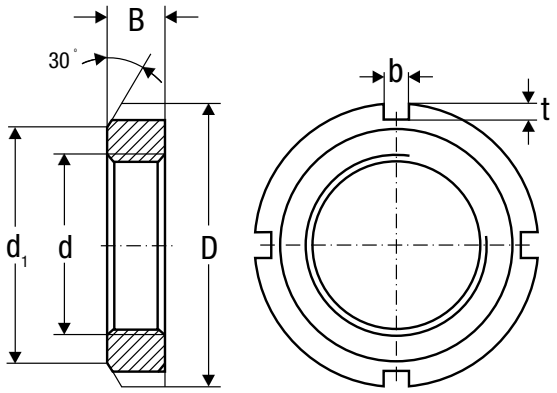
Dimensions							Sleeve Designation	Corresp. Withdrawal Nut	Weight
d_o	d	d_z	l	l_1	h	z			
mm									kg
35	40	M45X1,5	30	32	6	5	**AH308**	KM9	0,093
	40	M45X1,5	40	43	7	6	**AH2308**	KM9	0,129
40	45	M50X1,5	32	34	6	6	**AH309**	KM10	0,112
	45	M50X1,5	44	47	7	6	**AH2309**	KM10	0,163
45	50	M55X2	35	38	7	6	**AH310X**	KM11	0,138
	50	M55X2	50	53	8	6	**AH2310X**	KM11	0,236
50	55	M60X2	37	40	7	6	**AH311X**	KM12	0,162
	55	M60X2	54	57	9	6	**AH2311X**	KM12	0,257
55	60	M65X2	40	43	8	7	**AH312X**	KM13	0,194
	60	M65X2	57	61	10	7	**AH2312X**	KM13	0,299
60	65	M75X2	42	45	8	7	**AH313**	KM15	0,256
	65	M75X2	61	64	11	7	**AH2313**	KM15	0,399
65	70	M80X2	44	47	8	7	**AH314**	KM16	0,290
	70	M80X2	65	68	12	7	**AH2314X**	KM16	0,466
70	75	M85X2	46	49	8	7	**AH315**	KM17	0,326
	75	M85X2	69	72	12	7	**AH2315X**	KM17	0,536
75	80	M90X2	48	52	8	7	**AH316**	KM18	0,367
	80	M90X2	72	75	12	7	**AH2316X**	KM18	0,602
80	85	M95X2	52	56	9	7	**AH317X**	KM19	0,431
	85	M95X2	75	78	13	7	**AH2317X**	KM19	0,676
85	90	M100X2	53	57	9	7	**AH318X**	KM20	0,465
	90	M100X2	63	68	10	7	**AH3218X**	KM20	0,578
	90	M100X2	80	83	14	7	**AH2318X**	KM20	0,777
90	95	M105X2	57	61	10	8	**AH319X**	KM21	0,537
	95	M105X2	85	89	15	8	**AH2319X**	KM21	0,888
95	100	M110X2	59	63	10	8	**AH320X**	KM22	0,586
	100	M110X2	75	77	12	7	**AH3220X**	KM22	0,768
	100	M110X2	90	94	15	8	**AH2320X**	KM22	1,000
100	110	M125X2	68	72	11	8	**AH3122**	KM25	1,280
105	110	M120X2	68	72	11	8	**AH3122X**	KM24	0,786
	110	M125X2	82	86	12	8	**AH3222X**	KM25	1,060
	110	M125X2	98	102	16	8	**AH2322X**	KM25	1,350
110	120	M140X2	75	79	12	8	**AH3124**	KM28	1,670
	120	M140X2	105	109	17	8	**AH2324**	KM28	2,470
115	120	M130X2	60	64	13	8	**AH3024X**	KM26	0,737
	120	M130X2	75	79	12	8	**AH3124X**	KM26	0,948
	120	M135X2	90	94	14	8	**AH3224X**	KM27	1,310
	120	M135X2	105	109	17	8	**AH2324X**	KM27	1,610
125	130	M140X2	67	71	14	8	**AH3026X**	KM28	0,907
	130	M140X2	78	82	12	8	**AH3126X**	KM28	1,080
	130	M140X2	98	102	15	8	**AH3226X**	KM29	1,580
	130	M145X2	115	119	19	8	**AH2326X**	KM29	1,970

Withdrawal Sleeves



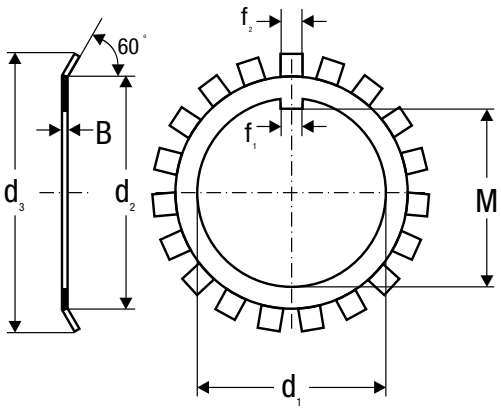
Dimensions							Sleeve Designation	Corresp. Withdrawal Nut	Weight
d_o	d	d_z	l	l_1	h	z			
mm									kg
135	140	M150X2	68	73	14	10	**AH3028X**	KM30	0,996
	140	M150X2	83	88	14	10	**AH3128X**	KM30	1,260
	140	M155X3	104	109	15	10	**AH3228X**	KM31	1,810
	140	M155X3	125	130	20	10	**AH2328X**	KM31	2,340
145	150	M160X3	72	77	15	10	**AH3030X**	KM32	1,120
	150	M165X3	96	101	15	10	**AH3130X**	KM33	1,750
	150	M165X3	114	119	18	10	**AH3230X**	KM33	2,210
	150	M165X3	135	140	24	10	**AH2330X**	KM33	2,820
150	160	M170X3	77	82	16	10	**AH3032**	KM34	2,010
	160	M180X3	103	108	16	10	**AH3132**	KM36	3,180
	160	M180X3	124	130	20	12	**AH3232**	KM36	4,020
	160	M180X3	140	146	24	12	**AH2332**	KM36	4,690
160	170	M180X3	85	90	17	10	**AH3034**	KM36	2,400
	170	M190X3	104	109	16	10	**AH3134**	KM38	3,410
	170	M190X3	134	140	24	12	**AH3234**	KM38	3,410
	170	M190X3	146	152	24	12	**AH2334**	KM38	5,230
170	180	M190X3	92	98	17	12	**AH3036**	KM38	2,800
	180	M200X3	116	122	19	12	**AH3136**	KM40	4,160
	180	M200X3	105	110	17	10	**AH2236**	KM40	3,670
	180	M200X3	140	146	24	12	**AH3236**	KM40	5,290
	180	M200X3	154	160	26	12	**AH2336**	KM40	5,940
180	190	Tr205X4	96	102	17	12	**AH3038**	HML41T	3,280
	190	Tr210X4	125	131	19	12	**AH3138**	HM42T	4,730
	190	Tr210X4	112	117	18	10	**AH2238**	HM42T	4,150
	190	Tr210X4	160	167	26	14	**AH2338**	HM42T	6,530
	190	Tr210X4	145	152	25	14	**AH3238**	HM42T	5,800

Locknuts



Dimensions						Nut Designation		Corresp. Locking Washer	Weight
d	D	d_1	B	b	t	KM	KMA		
		mm							kg
M10X0,75	18	13,5	4	3	2	**KM0**		MB0	0,004
M12X1	22	17	4	3	2	**KM1**		MB1	0,007
M15X1	25	21	5	4	2	**KM2**		MB2	0,010
M17X1	28	24	5	4	2	**KM3**		MB3	0,013
M20X1	32	26	6	4	2	**KM4**		MB4	0,019
M25X1,5	38	32	7	5	2	**KM5**	**KMA5**	MB5	0,025
M30X1,5	45	38	7	5	2	**KM6**	**KMA6**	MB6	0,043
M35X1,5	52	44	8	5	2	**KM7**	**KMA7**	MB7	0,053
M40X1,5	58	50	9	6	2,5	**KM8**	**KMA8**	MB8	0,085
M45X1,5	65	56	10	6	2,5	**KM9**	**KMA9**	MB9	0,120
M50X1,5	70	61	11	6	2,5	**KM10**	**KMA10**	MB10	0,150
M55X2	75	67	11	7	3	**KM11**	**KMA11**	MB11	0,160
M60X2	80	73	11	7	3	**KM12**	**KMA12**	MB12	0,170
M65X2	85	79	12	7	3	**KM13**	**KMA13**	MB13	0,200
M70X2	92	85	12	8	3,5	**KM14**	**KMA14**	MB14	0,240
M75X2	98	90	13	8	3,5	**KM15**	**KMA15**	MB15	0,290
M80X2	105	95	15	8	3,5	**KM16**	**KMA16**	MB16	0,400
M85X2	110	102	16	8	3,5	**KM17**	**KMA17**	MB17	0,450
M90X2	120	108	16	10	4	**KM18**	**KMA18**	MB18	0,560
M95X2	125	113	17	10	4	**KM19**		MB19	0,660
M100X2	130	120	18	10	4	**KM20**	**KMA20**	MB20	0,700
M105X2	140	126	18	12	5	**KM21**	**KMA21**	MB21	0,840
M110X2	145	133	19	12	5	**KM22**	**KMA22**	MB22	0,970
M115X2	150	137	19	12	5	**KM23**		MB23	1,010
M120X2	155	138	20	12	5	**KM24**	**KMA24**	MB24	1,080
M125X2	160	148	21	12	5	**KM25**	**KMA25**	MB25	1,190
M130X2	165	149	21	12	6	**KM26**	**KMA26**	MB26	1,250
M135X2	175	160	22	14	6	**KM27**		MB27	1,550
M140X2	180	160	22	14	6	**KM28**		MB28	1,600
M150X2	195	171	24	14	6	**KM30**		MB30	2,030
M160X3	210	182	25	16	7	**KM32**		MB32	2,590
M170X3	220	193	26	16	7	**KM34**		MB34	2,800
M180X3	230	203	27	18	8	**KM36**		MB36	3,070
M190X3	240	214	28	18	8	**KM38**		MB38	3,390
M200X3	250	226	29	18	8	**KM40**		MB40	3,690

Locking Washers



Dimensions							Designation Locking Washer	Weight
d_1	d_2	d_3	B	f_1	f_2	M		
mm								kg
10	13,5	21	1,00	3	3	8,5	**MB0**	0,13
12	17	25	1,00	3	3	10,5	**MB1**	0,20
15	21	28	1,00	4	4	13,5	**MB2**	0,26
17	24	32	1,00	4	4	15,5	**MB3**	0,32
20	26	36	1,00	4	4	18,5	**MB4**	0,35
25	32	42	1,25	5	5	23	**MB5**	0,64
30	38	49	1,25	5	5	27,5	**MB6**	0,78
35	44	57	1,25	6	5	32,5	**MB7**	1,04
40	50	62	1,25	6	6	37,5	**MB8**	1,23
45	56	69	1,25	6	6	42,5	**MB9**	1,52
50	61	74	1,25	6	6	47,5	**MB10**	1,60
55	67	81	1,50	8	7	52,5	**MB11**	1,96
60	73	86	1,50	8	7	57,5	**MB12**	2,53
65	79	92	1,50	8	7	62,2	**MB13**	2,90
70	85	98	1,50	8	8	66,5	**MB14**	3,34
75	90	104	1,50	8	8	71,5	**MB15**	3,56
80	95	112	1,80	10	8	76,5	**MB16**	4,64
85	102	119	1,80	10	8	81,5	**MB17**	5,24
90	108	126	1,80	10	10	86,5	**MB18**	6,23
95	113	133	1,80	10	10	91,5	**MB19**	6,70
100	120	140	1,80	12	10	96,5	**MB20**	7,65
105	126	145	1,80	12	12	100,5	**MB21**	8,26
110	133	154	1,80	12	12	105,5	**MB22**	9,40
115	137	159	2,00	12	12	110,5	**MB23**	10,80
120	135	148	2,00	14	12	115	**MBL24**	7,00
	138	164	2,00	14	12	115	**MB24**	10,50
125	148	170	2,00	14	12	120	**MB25**	11,80
130	149	175	2,00	14	12	125	**MB26**	11,30
135	160	185	2,00	14	14	130	**MB27**	14,40
140	160	192	2,00	16	14	135	**MB28**	14,20
150	171	205	2,00	16	14	145	**MB30**	15,50
160	182	217	2,50	18	16	154	**MB32**	22,20
170	193	232	2,50	18	16	164	**MB34**	24,70
180	203	242	2,50	20	18	174	**MB36**	16,80
190	214	252	2,50	20	18	184	**MB38**	27,80
200	226	262	2,50	20	18	194	**MB40**	29,30

Notes

General Index

General Index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