

# CATALOG 2009

TENGEN BEARING COMPANY



SELF-ALIGNING BALL BEARINGS

Catalog No. BA1200



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## FOREWORD

We would like to thank you for your interest of our catalog 2009, after months of researches and preparations, we are proud to publish this catalog for all our valued customers. We promise we have contributed our best efforts ensuring the correctness, accuracy and completeness of information made available in this catalog. We sincerely hope this publish will help to fill your needs.

The main objective of this catalog is to act as a bearing handbook for bearings substitution from one brand to a product of China. We assure that bearings which are listed in this catalog are within the competitive edge of China market, which means that they are technically established, available in stocks or within the shortest possible delivery lead-time, and lowest requirement of minimum order. Bearing numbers that are not listed in this book might probably available too, please contact us for further information if your bearing numbers are not listed.

The reason why we design this catalog in a way of bearings interchangeability, having few main internationally renowned brands lined up for comparison, is intending to save our customers' hassles when they are looking for bearings substitutions in China. More brands of bearings' numbers will be added for comparison in future version of this catalog. We believe with information published in this book, in cooperation with our professional product consultation, we certainly are the Ease of Buying Solution for you to source from China.

Note:

Relevant information of bearings such as Basic Load Ratings, Speed Ratings, Factor, Bearings Weight and etc... published here are extracted from one manufacturers' catalog, these statistics may not be applicable for all brands of bearings, please use these information for reference purpose only.

## ABOUT THE COMPANY

TENGEN Bearing Company is established by a group of people who possess vast experiences, professional knowledge of bearings, and bearings' industrial applications. Most of our managers and engineers have been in the bearings market for over 10 years and now closely tightened up with the Chinese market and being constantly updated about the local market information. This has consequently granted us the exclusive access to the rich market resources from around the China regions, and that enabling us the great advantages in aspect of both cost and quality of products.

Locally in China, we are not only dealing with Chinese bearings. We are also a reseller of most internationally renowned brands of bearings such as SKF, FAG, NSK, TIMKEN and etc... This provides us the capability and greater technical knowledge of bearings exchangeability in China market.

### ***OUR MISSION***

*“We aim to be one of the most preferred Chinese bearings suppliers to all our customers and potential customers worldwide”*



# FREQUENTLY APPLIED TECHNICAL DATA OF BEARINGS

Bearings Tolerance Class  
Bearings Tolerance Symbols  
Tolerance Tables  
Bearings Series Symbols  
Bearings Supplementary Designations

## BEARINGS TOLERANCES CLASSES

Types of Bearings		Tolerance Classes				
Deep Groove Ball Bearings		Normal	Class 6	Class 5	Class 4	Class 2
Angular Contact Ball Bearings		Normal	Class 6	Class 5	Class 4	Class 2
Self-aligning Ball Bearings		Normal	Class 6 equivalent	Class 5 equivalent	—	—
Cylindrical Roller Bearings		Normal	Class 6	Class 5	Class 4	Class 2
Solid Type Needle Roller Bearings		Normal	Class 6	Class 5	Class 4	—
Spherical Roller Bearings		Normal	Class 6 equivalent	Class 5 equivalent	—	—
Thrust Ball Bearings		Normal	Class 6	Class 5	Class 4	—
Spherical Thrust Roller Bearings		Normal	—	—	—	—
Metric-design Tapered Roller Bearings		Normal Class 6X	—	Class 5	Class 4	—
Inch-design Tapered Roller Bearings		ABMA CLASS 4	ABMA CLASS 2	ABMA CLASS 3	ABMA CLASS 0	ABMA CLASS 00
Equivalent standards						
GB/T 307.1 Chinese National Standard		Class 0	Class 6	Class 5	Class 4	Class 2
JIS B1514 Japanese Industrial Standard		Class 0	Class 6	Class 5	Class 4	Class 2
DIN 620 (Deutsches Institut für Normung) German Institute for Standardization		P0	P6	P5	P4	P2
ABMA American Bearing Manufacturers Association	Ball Bearings	ABEC 1	ABEC 3	ABEC 5 (CLASS 5P)	ABEC 7 (CLASS 7P)	ABEC 9 (CLASS 9P)
	Roller Bearings	RBEC 1	RBEC 3	RBEC 5	—	—
	Tapered Roller Bearings	CLASS 4	CLASS 2	CLASS 3	CLASS 0	CLASS 00

### Note

1. The most common bearings produced in China are basically Normal Class, in accordance to JIS standard at class zero. (please refer to ISO 492/199/582/ABEC1/GB/T307.1 P0 for detailed requirements of bearings tolerance) You may also obtain detailed bearings tolerance statistics from manufacturers' catalog.
2. Bearings may be produced at Class 6 upon requested by customers for relatively rigid applications. Please contact our sales personnel for detailed information before placing an order.



## BEARING TOLERANCES

### Symbols of Boundary Dimension and Running Accuracy

$d$	<i>Nominal bearing bore diameter</i>
$\Delta_{ds}$	<i>Deviation of single bore diameter</i>
$\Delta_{dmp}$	<i>Deviation of mean bore diameter in a single plane</i>
$V_{dp}$	<i>Variation of mean bore diameter in a single plane</i>
$V_{dmp}$	<i>Variation of mean bore diameter</i>
$B$	<i>Nominal inner ring width</i>
$\Delta_{Bs}$	<i>Deviation of single ring width</i>
$V_{Bs}$	<i>Variation of single ring width</i>
$K_{ia}$	<i>Radial runout of inner ring of assembled bearing</i>
$S_d$	<i>Runout of inner ring face to the bore</i>
$S_{ia}$	<i>Axial runout of end face to inner ring raceway of assembled bearing</i>
$S_i / S_e$	<i>Variation of washer thickness of (shaft / housing) locating washers</i>
$T$	<i>Nominal bearing height of a single direction axial bearing</i>
$D$	<i>Nominal bearing outer diameter</i>
$\Delta_{Ds}$	<i>Deviation of single outer diameter</i>
$\Delta_{Dmp}$	<i>Deviation of mean outer diameter in a single plane</i>
$V_{Dp}$	<i>Variation of single outer diameter in a single plane</i>
$V_{Dmp}$	<i>Variation of mean outer diameter</i>
$C$	<i>Nominal outer ring width</i>
$\Delta_{Cs}$	<i>Deviation of single outer ring width</i>
$V_{Cs}$	<i>Variation of outer ring width</i>
$K_{ea}$	<i>Radial runout of outer ring of assembled bearing</i>
$S_D$	<i>Runout of outer ring outside surface generatrix to the face</i>
$S_{ea}$	<i>Axial runout of end face to outer ring raceway of assembled bearing</i>

Tolerance Tables (Part 1)

<i>d</i> (mm)		$\Delta_{dmp}$ Deviation of Mean Bore Diameter										<i>units</i> : $\mu\text{m}$	
		Normal		Class 6		Class 5		Class 4		Class 2			
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low		
0.6	2.5	0	-8	0	-7	0	-5	0	-4	0	-2.5		
2.5	10	0	-8	0	-7	0	-5	0	-4	0	-2.5		
10	18	0	-8	0	-7	0	-5	0	-4	0	-2.5		
18	30	0	-10	0	-8	0	-6	0	-5	0	-2.5		
30	50	0	-12	0	-10	0	-8	0	-6	0	-2.5		
50	80	0	-15	0	-12	0	-9	0	-7	0	-4		
80	120	0	-20	0	-15	0	-10	0	-8	0	-5		
120	150	0	-25	0	-18	0	-13	0	-10	0	-7		
150	180	0	-25	0	-18	0	-13	0	-10	0	-7		
180	250	0	-30	0	-22	0	-15	0	-12	0	-8		
250	315	0	-35	0	-25	0	-18	-	-	-	-		
315	400	0	-40	0	-30	0	-23	-	-	-	-		
400	500	0	-45	0	-35	-	-	-	-	-	-		
500	630	0	-50	0	-40	-	-	-	-	-	-		
630	800	0	-75	-	-	-	-	-	-	-	-		
800	1,000	0	-100	-	-	-	-	-	-	-	-		
1,000	1,250	0	-125	-	-	-	-	-	-	-	-		
1,250	1,600	0	-160	-	-	-	-	-	-	-	-		
1,600	2,000	0	-200	-	-	-	-	-	-	-	-		

<i>d</i> (mm)		$V_{dmp}$ Variation of Mean Bore Diameter					$\Delta_{Bs}$ ( or $\Delta_{Cs}$ ) Deviation of Single (Outer) Ring Width												<i>units</i> : $\mu\text{m}$	
		Normal	Class 6	Class 5	Class 4	Class 2	Single Bearing						Combined Bearings							
							Normal Class 6		Class 5 Class 4		Class 2		Normal Class 6		Class 5 Class 4		Class 2			
Over	Incl.	Max	Max	Max	Max	Max	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low		
0.6	2.5	6	5	3	2	1.5	0	-40	0	-40	0	-40	-	-	0	-250	0	-250	0	-250
2.5	10	6	5	3	2	1.5	0	-120	0	-40	0	-40	0	-250	0	-250	0	-250	0	-250
10	18	6	5	3	2	1.5	0	-120	0	-80	0	-80	0	-250	0	-250	0	-250	0	-250
18	30	8	6	3	2.5	1.5	0	-120	0	-120	0	-120	0	-250	0	-250	0	-250	0	-250
30	50	9	8	4	3	1.5	0	-120	0	-120	0	-120	0	-250	0	-250	0	-250	0	-250
50	80	11	9	5	3.5	2	0	-150	0	-150	0	-150	0	-380	0	-250	0	-250	0	-250
80	120	15	11	5	4	2.5	0	-200	0	-200	0	-380	0	-380	0	-380	0	-380	0	-380
120	150	19	14	7	5	3.5	0	-250	0	-250	0	-250	0	-500	0	-380	0	-380	0	-380
150	180	19	14	7	5	3.5	0	-250	0	-250	0	-250	0	-500	0	-380	0	-380	0	-380
180	250	23	17	8	6	4	0	-300	0	-300	0	-300	0	-500	0	-500	0	-500	0	-500
250	315	26	19	9	-	-	0	-350	0	-350	-	-	0	-500	0	-500	-	-	-	-
315	400	30	23	12	-	-	0	-400	0	-400	-	-	0	-630	0	-630	-	-	-	-
400	500	34	26	-	-	-	0	-450	-	-	-	-	-	-	-	-	-	-	-	-
500	630	38	30	-	-	-	0	-500	-	-	-	-	-	-	-	-	-	-	-	-
630	800	-	-	-	-	-	0	-750	-	-	-	-	-	-	-	-	-	-	-	-
800	1,000	-	-	-	-	-	0	-1,000	-	-	-	-	-	-	-	-	-	-	-	-
1,000	1,250	-	-	-	-	-	0	-1,250	-	-	-	-	-	-	-	-	-	-	-	-
1,250	1,600	-	-	-	-	-	0	-1,600	-	-	-	-	-	-	-	-	-	-	-	-
1,600	2,000	-	-	-	-	-	0	-2,000	-	-	-	-	-	-	-	-	-	-	-	-

## Tolerance Tables (Part 2)

<i>units : μm</i>		$K_{ia}$ Radial runout of inner ring of assembled bearing					$S_d$ Runout of inner ring face to the bore			$S_{ia}$ Axial runout of end face to inner ring raceway of assembled bearing		
		Class 0	Class 6	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2	Class 5	Class 4	Class 2
Over	Incl	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
0.6	2.5	10	5	4	2.5	1.5	7	3	1.5	7	3	1.5
2.5	10	10	6	4	2.5	1.5	7	3	1.5	7	3	1.5
10	18	10	7	4	2.5	1.5	7	3	1.5	7	3	1.5
18	30	13	8	4	3	2.5	8	4	1.5	8	4	2.5
30	50	15	10	5	4	2.5	8	4	1.5	8	4	2.5
50	80	20	10	5	4	2.5	8	5	1.5	8	5	2.5
80	120	25	13	6	5	2.5	9	5	2.5	9	5	2.5
120	150	30	18	8	6	2.5	10	6	2.5	10	7	2.5
150	180	30	18	8	6	5	10	6	4	10	7	5
180	250	40	20	10	8	5	11	7	5	13	8	5
250	315	50	25	13	-	-	13	-	-	15	-	-
315	400	60	30	15	-	-	15	-	-	20	-	-
400	500	65	35	-	-	-	-	-	-	-	-	-
500	630	70	40	-	-	-	-	-	-	-	-	-
630	800	80	-	-	-	-	-	-	-	-	-	-
800	1,000	90	-	-	-	-	-	-	-	-	-	-
1,000	1,250	100	-	-	-	-	-	-	-	-	-	-
1,250	1,600	120	-	-	-	-	-	-	-	-	-	-
1,600	2,000	140	-	-	-	-	-	-	-	-	-	-

<i>D (mm)</i>		$\Delta_{Dmp}$ Deviation of mean outer diameter in a single plane										<i>units : μm</i>	
		Normal		Class 6		Class 5		Class 4		Class 2			
		High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
2.5	Incl. 6	0	-8	0	-7	0	-5	0	-4	0	-2.5	-2.5	
6	18	0	-8	0	-7	0	-5	0	-4	0	-2.5	-2.5	
18	30	0	-9	0	-8	0	-6	0	-5	0	-4	-4	
30	50	0	-11	0	-9	0	-7	0	-6	0	-4	-4	
50	80	0	-13	0	-11	0	-9	0	-7	0	-4	-4	
80	120	0	-15	0	-13	0	-10	0	-8	0	-5	-5	
120	150	0	-18	0	-15	0	-11	0	-9	0	-5	-5	
150	180	0	-25	0	-18	0	-13	0	-10	0	-7	-7	
180	250	0	-30	0	-20	0	-15	0	-11	0	-8	-8	
250	315	0	-35	0	-25	0	-18	0	-13	0	-8	-8	
315	400	0	-40	0	-28	0	-20	0	-15	0	-10	-10	
400	500	0	-45	0	-33	0	-23	-	-	-	-	-	
500	630	0	-50	0	-38	0	-28	-	-	-	-	-	
630	800	0	-75	0	-45	0	-35	-	-	-	-	-	
800	1,000	0	-100	0	-60	-	-	-	-	-	-	-	
1,000	1,250	0	-125	-	-	-	-	-	-	-	-	-	
1,250	1,600	0	-160	-	-	-	-	-	-	-	-	-	
1,600	2,000	0	-200	-	-	-	-	-	-	-	-	-	
2,000	2,500	0	-250	-	-	-	-	-	-	-	-	-	

Tolerance Tables (Part 3)

<i>units : <math>\mu\text{m}</math></i>		$\Delta_{Dmp}$					$K_{ea}$					$S_D$		
		Deviation of mean outer diameter in a single plane					Radial runout of outer ring of assembled bearing					Runout of outer ring outside surface generatrix to the face		
		Normal Max	Class 6 Max	Class 5 Max	Class 4 Max	Class 2 Max	Normal Max	Class 6 Max	Class 5 Max	Class 4 Max	Class 2 Max	Class 5 Max	Class 4 Max	Class 2 Max
Over	Incl.													
2.5	6	6	5	3	2	1.5	15	8	5	3	1.5	8	4	1.5
6	18	6	5	3	2	1.5	15	8	5	3	1.5	8	4	1.5
18	30	7	6	3	2.5	2	15	9	6	4	2.5	8	4	1.5
30	50	8	7	4	3	2	20	10	7	5	2.5	8	4	1.5
50	80	10	8	5	3.5	2	25	13	8	5	4	8	4	1.5
80	120	11	10	5	4	2.5	35	18	10	6	5	9	5	2.5
120	150	14	11	6	5	2.5	40	20	11	7	5	10	5	2.5
150	180	19	14	7	5	3.5	45	23	13	8	5	10	5	2.5
180	250	23	15	8	6	4	50	25	15	10	7	11	7	4
250	315	26	19	9	7	4	60	30	18	11	7	13	8	5
315	400	30	21	10	8	5	70	35	20	13	8	13	10	7
400	500	34	25	12	-	-	80	40	23	-	-	15	-	-
500	630	38	29	14	-	-	100	50	25	-	-	18	-	-
630	800	55	34	18	-	-	120	60	30	-	-	20	-	-
800	1,000	75	45	-	-	-	140	75	-	-	-	-	-	-
1,000	1,250	-	-	-	-	-	160	-	-	-	-	-	-	-
1,250	1,600	-	-	-	-	-	190	-	-	-	-	-	-	-
1,600	2,000	-	-	-	-	-	220	-	-	-	-	-	-	-
2,000	2,500	-	-	-	-	-	250	-	-	-	-	-	-	-

<i>units : <math>\mu\text{m}</math></i>		$D$ (mm)	$S_{ea}$			$V_{Cs}$		
			Axial runout of end face to outer ring raceway of assembled bearing			Variation of outer ring width		
			Class 5 Max	Class 4 Max	Class 2 Max	Class 5 Max	Class 4 Max	Class 2 Max
Over	Incl.							
2.5	6	8	5	1.5	5	2.5	1.5	
6	18	8	5	1.5	5	2.5	1.5	
18	30	8	5	2.5	5	2.5	1.5	
30	50	8	5	2.5	5	2.5	1.5	
50	80	10	5	4	6	3	1.5	
80	120	11	6	5	8	4	2.5	
120	150	13	7	5	8	5	2.5	
150	180	14	8	5	8	5	2.5	
180	250	15	10	7	10	7	4	
250	315	18	10	7	11	7	5	
315	400	20	13	8	13	8	7	
400	500	23	-	-	15	-	-	
500	630	25	-	-	18	-	-	
630	800	30	-	-	20	-	-	
800	1,000	-	-	-	-	-	-	
1,000	1,250	-	-	-	-	-	-	
1,250	1,600	-	-	-	-	-	-	
1,600	2,000	-	-	-	-	-	-	
2,000	2,500	-	-	-	-	-	-	

## BEARINGS SERIES SYMBOLS

Types of Bearings	Bearing Series Symbols	Symbols Type	Dimension Symbols		Types of Bearings	Bearing Series Symbols	Symbols Type	Dimension Symbols	
			Width or Height Symbols	Symbols				Width or Height Symbols	Symbols
Single-Row Deep Groove Ball Bearings	68	6	(1)	8	Single-Row Cylindrical Roller Bearings	NU10	NU	1	0
	69	6	(1)	9		NU2	NU	(0)	2
	60	6	(1)	0		NU22	NU	2	2
	62	6	(0)	2		NU3	NU	(0)	3
	63	6	(0)	3		NU23	NU	2	3
Single Row Angular Contact Ball Bearings	79	7	(1)	9		NU4	NU	(0)	4
	70	7	(1)	0		NJ2	NJ	(0)	2
	72	7	(0)	2		NJ22	NJ	2	2
	73	7	(0)	3		NJ3	NJ	(0)	3
Self-Aligning Ball Bearings	12	1	(0)	2		NJ23	NJ	2	3
	13	1	(0)	3		NJ4	NJ	(0)	4
	22	(1)	2	2		NUP2	NUP	(0)	2
	23	(1)	2	3		NUP22	NUP	2	2
Spherical Roller Bearings	230	2	3	0		NUP3	NUP	(0)	3
	231	2	3	1		NUP23	NUP	2	3
	222	2	2	2		NUP4	NUP	(0)	4
	232	2	3	2		N10	N	1	0
	213(1)	2	0	3		N2	N	(0)	2
	223	2	2	3		N3	N	(0)	3
Thrust Ball Bearings	511	5	1	1		N4	N	(0)	4
	512	5	1	2	NF2	NF	(0)	2	
	513	5	1	3	NF3	NF	(0)	3	
	514	5	1	4	NF4	NF	(0)	4	
	522	5	2	2	Double Row Cylindrical Roller Bearing	NNU49	NNU	4	9
	523	5	2	3		NN30	NNU	3	0
	524	5	2	4	Thrust Spherical Roller Bearings	292	2	9	2
Taper Roller Bearings	329	3	2	9		293	2	9	3
	320	3	2	0		294	2	9	4
	330	3	3	0	Needle Roller Bearings	NA48	N/A	4	8
	331	3	3	1		NA49	N/A	4	9
	302	3	0	2		NA59	N/A	5	9
	322	3	2	2		NA69	N/A	6	9
	332	3	3	2	Note Numbers in "( )" are normally omitted from the bearing numbers.				
	303	3	0	3					
	323	3	2	3					

## BEARINGS SUPPLEMENTARY DESIGNATIONS

### Frequently Used Suffixes of Bearing Numbers

Attribute	Supplementary Designation			
	Local	SKF	FAG	NSK
<b>Contact Angle Symbol</b>				
Standard contact angle of 30°	A			A
Standard contact angle of 25°	A5	ACD	E	A5
Standard contact angle of 40°	B	B	B	B
Standard contact angle of 15°	C	CD	C	C
Contact angle about 20° (only applied to Tapered Roller Bearings)	C			C
Contact angle about 28° (only applied to Tapered Roller Bearings)	D			D
<b>Internal Design Symbol</b>				
Internal design differs from standard	A	A	A	A
Smaller diameter of outer ring raceway, contact angle, and outer ring width of tapered roller bearings conform to ISO 355	J	X/Q	X	J
<b>Material Symbol</b>				
Case-hardened steel used in rings, rolling elements	G			G
Stainless steel used in rings, rolling elements	H		Z	H
<b>Cage Symbol</b>				
Machined brass cage	M	M	M	M
Synthetic resin cage	T	TN9	TV	T
Pressed steel cage	W	F	F	W
Without cage	V	V	V	V
<b>External Features – Seals, Shields Symbol</b>				
Shield on one side only	Z / ZS	Z	ZR	Z / ZS
Shield on both sides	ZZ / ZZS	2Z	2ZR	ZZ / ZZS
Contact rubber seal on one side only	D / DU	RS	RSR	D / DU
Contact rubber shield on both sides	DD / DDU	2RS	2RSR	DD / DDU
Non-contact rubber seal on one side only	V	RZ		V
Non-contact rubber seal on both sides	VV	2RZ		VV
<b>Rings Design Symbol</b>				
Tapered bore of inner ring (Taper 1:12)	K	K	K	K
Tapered bore of inner ring (Taper 1:30)	K30	K30	K30	K30
Notch or lubricating groove ring	E	E	E	E
Lubricating groove in outside surface and holes in outer ring	E4	E	S	E4
Snap ring groove in outer ring	N	N	N	N
Snap ring groove with snap ring in outer ring	NR	NR	NR	NR
<b>Bearing Arrangement Symbol</b>				
Back to back arrangement	DB	DB	UA	DB
Face to face arrangement	DF	DF	UO	DF
Tandem arrangement	DT	DT	UL	DT
<b>Internal Clearance Symbol</b>				
Clearance less than C2	C1	C1	C1	C1
Clearance less than CN	C2	C2	C2	C2
CN Clearance	CN	C0	C0	CN
Clearance greater than CN	C3	C3	C3	C3
Clearance greater than C3	C4	C4	C4	C4
Clearance greater than C4	C5	C5	C5	C5
<b>Tolerance Class Symbol</b>				
ISO normal (P0 is usually omitted from the bearing numbers)	P0	P0	P0	P0
ISO Class 6	P6	P6	P6	P6
ISO Class 5	P5	P5	P5	P5
ISO Class 4	P4	P4	P4	P4
ISO Class 2	P2			P2
<b>Special Specification Symbol</b>				
Working temperature lower than 150°C	X26	S0	S0	X26
Working temperature lower than 200°C	X28	S1	S1	X28
Working temperature lower than 250°C	X29	S2	S2	X29
Dimensional stabilizing treatment working temperature lower than 200°C	S11	S1	S1	S11

# COMPETITIVE PRODUCTS & PRODUCTS GALLERY

## COMPETITIVE PRODUCTS LIST

Below listed products are technically established, available in stock or within the shortest possible delivery lead-time, and lowest requirement of minimum order. Please contact us if you are looking for something out of the list.

### Deep Groove Ball Bearings

- Single Row Deep Groove Ball Bearings
- Double Row Deep Groove Ball Bearings

### Angular Contact Ball Bearings

- Single Row Angular Contact Ball Bearings
- Double Row Angular Contact Ball Bearings
- Four Point Contact Ball Bearings

### Self-Aligning Ball Bearings

### Spherical Roller Bearings

### Thrust Ball Bearings

- Single Direction Thrust Ball Bearings
- Double Direction Thrust Ball Bearings

### Thrust Spherical Roller Bearings

### Cylindrical Roller Bearings

- Single Row Cylindrical Roller Bearings
- Double Row Cylindrical Roller Bearings
- Full Complement Type Cylindrical Roller Bearings
  - Full Complement Type Single Row Cylindrical Roller Bearings
  - Full Complement Type Double Row Cylindrical Roller Bearings

### Tapered Roller Bearings

- Single Row Tapered Roller Bearings
- Double Row Tapered Roller Bearings

### Needle Roller Bearings

- Needle Rollers & Cage Assemblies
- Drawn Cup Needle Roller Bearings
- Solid Needle Roller Bearings
- Cam Rollers
- Cam Followers

### High Precision Bearings

- High Precision Angular Contact Ball Bearings
- Single Row High Precision Cylindrical Roller Bearings
- Double Row High Precision Cylindrical Roller Bearings

### Bearing Units

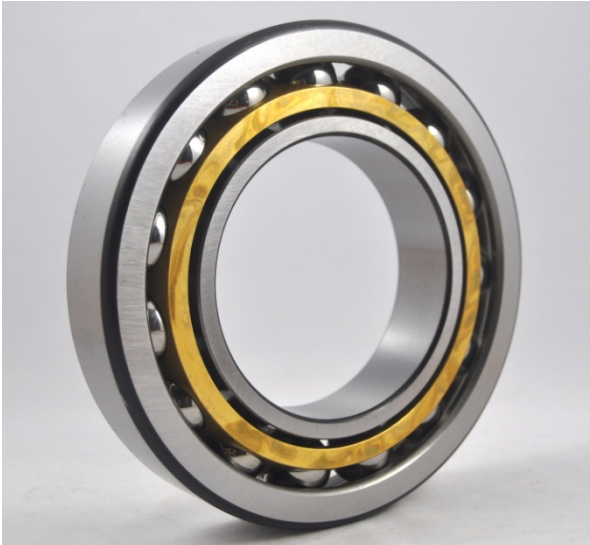
- Pillow Type Units
  - UCP Series
  - UKT Series
- Square Four Bolt Flange Type Units
  - UCF Series
  - UKF Series
- Oval Flange Type Units
  - UCFL Series
  - UKFL Series
- Round Flange Cartridge Type Units
  - UCFC Series
  - UKFC Series
- Take Up Type Units
  - UCT Series
  - UKT Series
- Ball Bearing Inserts
  - UC, SB, SU Series
  - NA Series
  - ER, RB Series



PRODUCTS GALLERY



DEEP GROOVE BALL BEARINGS



ANGULAR CONTACT BALL BEARINGS



SELF-ALIGNING BALL BEARINGS



SPHERICAL ROLLER BEARINGS



THRUST BALL BEARINGS



THRUST SPHERICAL ROLLER BEARINGS



CYLINDRICAL ROLLER BEARINGS



TAPERED ROLLER BEARINGS



NEEDLE ROLLER BEARINGS



HIGH PRECISION BEARINGS

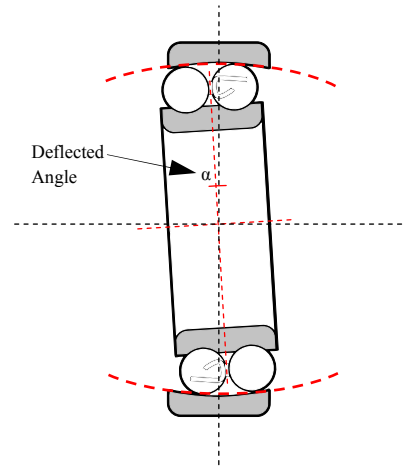
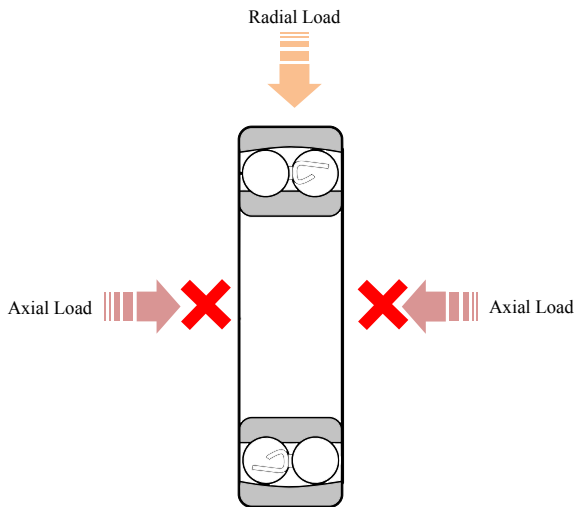
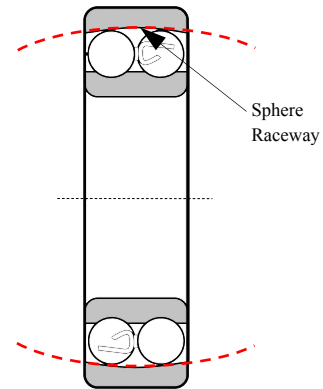


BEARING UNITS

# BEARING TABLES

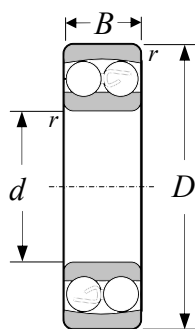
### SELF-ALIGNING BALL BEARINGS

The outer ring of self-aligning ball bearing has s sphere raceways, the balls and the cage are allowed to have certain angle of deflect around the bearing center. This enabled the bearings to have self-aligning capability, and insensitive to misalignment of mounting shaft. Self-aligning ball bearings are mostly suitable for application where there is expected deflection or misalignment of shaft. Among all rolling bearings, self-aligning ball bearing has the lowest friction factor, which enables it to run cooler even at high speeds. However, self-aligning ball bearings do not accommodate any axial loads.

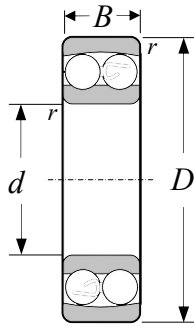


**SELF-ALIGNING BALL BEARINGS**  
Cylindrical & Tapered Bore

Table 39  
Bore Diameter 10mm - 30mm



Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic C	Static C <sub>0</sub>	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm	mm	mm	kN		r/min	r/min	kg				
10	30	9	5.53	1.18	56000	36000	0.034	1200 TN	1200 ETN9	1200 TVH	1200 TN
10	30	14	5.53	1.18	-	17000	0.048	2200 2RSTN	2200 E-2RS1TN9	2200 K.2RS.TVH	2200 2RSTN
10	30	14	8.06	1.73	50000	34000	0.047	2200 TN	2200 ETN9	2200 TVH	2200 TN
12	32	10	6.24	1.43	50000	32000	0.04	1201 TN	1201 ETN9	1201 TVH	1201 TN
12	32	14	6.24	1.43	-	16000	0.053	2201 2RSTN	2201 E-2RS1TN9	2201 K.2RS.TVH	2201 2RSTN
12	32	14	8.52	1.9	45000	30000	0.053	2201 TN	2201 ETN9	2201 TVH	2201 TN
12	37	12	9.36	2.16	40000	28000	0.072	1301 M	1301 EM	1301 M	1301 M
12	37	12	9.36	2.16	40000	28000	0.067	1301 TN	1301 ETN9	1301 TVH	1301 TN
12	37	17	11.7	2.7	38000	28000	0.095	2301	2301	2301	2301
15	35	11	7.41	1.76	45000	28000	0.049	1202 TN	1202 ETN9	1202 TVH	1202 TN
15	35	14	7.41	1.76	-	14000	0.058	2202 2RSTN	2202 E-2RS1TN9	2202 K.2RS.TVH	2202 2RSTN
15	35	14	8.71	2.04	38000	26000	0.06	2202 TN	2202 ETN9	2202 TVH	2202 TN
15	42	13	10.8	2.6	34000	24000	0.094	1302 TN	1302 ETN9	1302 TVH	1302 TN
15	42	17	11.9	2.9	32000	24000	0.12	2302	2302	2302	2302
15	42	17	10.8	2.6	-	12000	0.11	2302 2RSTN	2302 E-2RS1TN9	2302 K.2RS.TVH	2302 2RSTN
17	40	12	8.84	2.2	38000	24000	0.073	1203 TN	1203 ETN9	1203 TVH	1203 TN
17	40	16	8.84	2.2	-	12000	0.089	2203 2RSTN	2203 E-2RS1TN9	2203 K.2RS.TVH	2203 2RSTN
17	40	16	10.6	2.55	34000	24000	0.088	2203 TN	2203 ETN9	2203 TVH	2203 TN
17	47	14	12.7	3.4	28000	20000	0.13	1303 M	1303 EM	1303 M	1303 M
17	47	14	12.7	3.4	28000	20000	0.12	1303 TN	1303 ETN9	1303 TVH	1303 TN
17	47	19	14.6	3.55	30000	22000	0.16	2303	2303	2303	2303
17	47	19	12.7	3.4	-	11000	0.16	2303 2RSTN	2303 E-2RS1TN9	2303 K.2RS.TVH	2303 2RSTN
17	47	19	14.6	3.55	30000	22000	0.18	2303 M	2303 M	2303 M	2303 M
20	47	14	12.7	3.4	32000	20000	0.12	1204 TN	1204 EKTN9	1204 K.TVH	1204 TN
20	47	14	12.7	3.4	32000	20000	0.12	1204 TN	1204 ETN9	1204 TVH	1204 TN
20	47	18	12.7	3.4	-	10000	0.14	2204 2RSTN	2204 E-2RS1TN9	2204 K.2RS.TVH	2204 2RSTN
20	47	18	16.8	4.15	28000	20000	0.14	2204 TN	2204 ETN9	2204 TVH	2204 TN
20	47	40	12.7	3.4	-	9000	0.18	11204 TN	11204 ETN9	11204 TVH	11204 TN
20	52	15	14.3	4	26000	18000	0.16	1304 TN	1304 ETN9	1304 TVH	1304 TN
20	52	21	14.3	4	-	9000	0.21	2304 2RSTN	2304 E-2RS1TN9	2304 K.2RS.TVH	2304 2RSTN
20	52	21	18.2	4.75	26000	19000	0.23	2304 M	2304 M	2304 M	2304 M
20	52	21	18.2	4.75	26000	19000	0.22	2304 TN	2304 TN	2304 TVH	2304 TN
25	52	15	14.3	4	28000	18000	0.14	1205 TN	1205 EKTN9	1205 K.TVH	1205 TN
25	52	15	14.3	4	28000	18000	0.14	1205 TN	1205 ETN9	1205 TVH	1205 TN
25	52	18	14.3	4	-	9000	0.16	2205 2RSTN	2205 E-2RS1KTN9	2205 K.2RS.TVH	2205 2RSTN
25	52	18	14.3	4	-	9000	0.16	2205 2RSTN	2205 E-2RS1TN9	2205 K.2RS.TVH	2205 2RSTN
25	52	18	16.8	4.4	26000	18000	0.16	2205 TN	2205 EKTN9	2205 K.TVH	2205 TN
25	52	18	16.8	4.4	26000	18000	0.16	2205 TN	2205 ETN9	2205 TVH	2205 TN
25	52	44	14.3	4	-	8000	0.22	11205 TN	11205 ETN9	11205 TVH	11205 TN
25	62	17	19	5.4	22000	15000	0.26	1305 TN	1305 EKTN9	1305 K.TVH	1305 TN
25	62	17	19	5.4	22000	15000	0.26	1305 TN	1305 ETN9	1305 TVH	1305 TN
25	62	24	19	5.4	-	7500	0.34	2305 2RSTN	2305 E-2RS1TN9	2305 K.2RS.TVH	2305 2RSTN
25	62	24	27	7.1	22000	16000	0.34	2305 TN	2305 ETN9	2305 TVH	2305 TN
25	62	24	24.2	6.55	22000	16000	0.36	2305 M	2305 M	2305 M	2305 M
30	62	16	15.6	4.65	24000	15000	0.22	1206 TN	1206 EKTN9	1206 K.TVH	1206 TN
30	62	16	15.6	4.65	24000	15000	0.24	1206 M	1206 EM	1206 M	1206 M
30	62	16	15.6	4.65	24000	15000	0.22	1206 TN	1206 ETN9	1206 TVH	1206 TN
30	62	20	15.6	4.65	-	7500	0.26	2206 2RSTN	2206 E-2RS1KTN9	2206 K.2RS.TVH	2206 2RSTN
30	62	20	15.6	4.65	-	7500	0.26	2206 2RSTN	2206 E-2RS1TN9	2206 K.2RS.TVH	2206 2RSTN
30	62	20	23.8	6.7	22000	15000	0.26	2206 TN	2206 EKTN9	2206 K.TVH	2206 TN



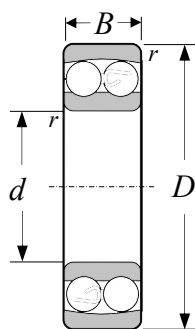
**SELF-ALIGNING BALL BEARINGS**  
Cylindrical & Tapered Bore

Table 40  
Bore Diameter 30mm - 50mm

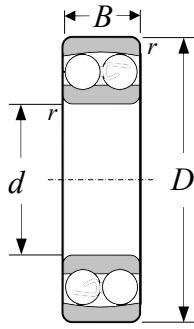
Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic C	Static C <sub>0</sub>	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			kN		r/min		kg				
30	62	20	23.8	6.7	22000	15000	0.26	2206 TN	2206 ETN9	2206 TVH	2206 TN
30	72	19	22.5	6.8	19000	13000	0.39	1306 TN	1306 EKTN9	1306 K.TVH	1306 TN
30	72	19	22.5	6.8	19000	13000	0.39	1306 TN	1306 ETN9	1306 TVH	1306 TN
30	72	27	31.2	8.8	18000	13000	0.5	2306	2306	2306	2306
30	72	27	22.5	6.8	-	6700	0.51	2306 2RSTN	2306 E-2RS1TN9	2306 K.2RS.TVH	2306 2RSTN
30	72	27	31.2	8.8	18000	13000	0.5	2306 K	2306 K	2306 K	2306 K
30	72	27	31.2	8.8	18000	13000	0.55	2306 M	2306 M	2306 M	2306 M
35	72	17	19	6	20000	13000	0.32	1207 TN	1207 EKTN9	1207 K.TVH	1207 TN
35	72	17	19	6	20000	13000	0.32	1207 TN	1207 ETN9	1207 TVH	1207 TN
35	72	23	19	6	-	6300	0.41	2207 2RSTN	2207 E-2RS1KTN9	2207 K.2RS.TVH	2207 2RSTN
35	72	23	19	6	-	6300	0.41	2207 2RSTN	2207 E-2RS1TN9	2207 K.2RS.TVH	2207 2RSTN
35	72	23	30.7	8.8	18000	12000	0.4	2207 TN	2207 EKTN9	2207 K.TVH	2207 TN
35	72	23	30.7	8.8	18000	12000	0.4	2207 TN	2207 ETN9	2207 TVH	2207 TN
35	80	21	26.5	8.5	16000	11000	0.51	1307 TN	1307 EKTN9	1307 K.TVH	1307 TN
35	80	21	26.5	8.5	16000	11000	0.51	1307 TN	1307 ETN9	1307 TVH	1307 TN
35	80	31	26.5	8.5	-	5600	0.7	2307 2RSTN	2307 E-2RS1TN9	2307 K.2RS.TVH	2307 2RSTN
35	80	31	39.7	11.2	16000	12000	0.68	2307 TN	2307 EKTN9	2307 K.TVH	2307 TN
35	80	31	39.7	11.2	16000	12000	0.75	2307 M	2307 EM	2307 M	2307 M
35	80	31	39.7	11.2	16000	12000	0.68	2307 TN	2307 ETN9	2307 TVH	2307 TN
35	80	31	39.7	11.2	16000	12000	0.75	2307 EKTN	2307 KM	2307 K.M	2307 EKTN
40	80	18	19.9	6.95	18000	11000	0.42	1208 TN	1208 EKTN9	1208 K.TVH	1208 TN
40	80	18	19.9	6.95	18000	11000	0.42	1208 TN	1208 ETN9	1208 TVH	1208 TN
40	80	23	19.9	6.95	-	5600	0.5	2208 2RSTN	2208 E-2RS1KTN9	2208 K.2RS.TVH	2208 2RSTN
40	80	23	19.9	6.95	-	5600	0.5	2208 2RSTN	2208 E-2RS1TN9	2208 K.2RS.TVH	2208 2RSTN
40	80	23	31.9	10	16000	11000	0.51	2208 TN	2208 EKTN9	2208 K.TVH	2208 TN
40	80	23	31.9	10	16000	11000	0.51	2208 TN	2208 ETN9	2208 TVH	2208 TN
40	90	23	33.8	11.2	14000	9500	0.68	1308 TN	1308 EKTN9	1308 K.TVH	1308 TN
40	90	23	33.8	11.2	14000	9500	0.72	1308 M	1308 EM	1308 M	1308 M
40	90	23	33.8	11.2	14000	9500	0.68	1308 TN	1308 ETN9	1308 TVH	1308 TN
40	90	33	33.8	11.2	-	5000	0.96	2308 2RSTN	2308 E-2RS1TN9	2308 K.2RS.TVH	2308 2RSTN
40	90	33	54	16	14000	10000	0.9	2308 TN	2308 EKTN9	2308 K.TVH	2308 TN
40	90	33	54	16	14000	10000	0.99	2308 M	2308 EM	2308 M	2308 M
40	90	33	54	16	14000	10000	0.93	2308 TN	2308 ETN9	2308 TVH	2308 TN
45	85	19	22.9	7.8	17000	11000	0.47	1209 TN	1209 EKTN9	1209 K.TVH	1209 TN
45	85	19	22.9	7.8	17000	11000	0.47	1209 TN	1209 ETN9	1209 TVH	1209 TN
45	85	23	22.9	7.8	-	5300	0.53	2209 2RSTN	2209 E-2RS1KTN9	2209 K.2RS.TVH	2209 2RSTN
45	85	23	22.9	7.8	-	5300	0.53	2209 2RSTN	2209 E-2RS1TN9	2209 K.2RS.TVH	2209 2RSTN
45	85	23	32.5	10.6	15000	10000	0.55	2209 TN	2209 EKTN9	2209 K.TVH	2209 TN
45	85	23	32.5	10.6	15000	10000	0.55	2209 TN	2209 ETN9	2209 TVH	2209 TN
45	100	25	39	13.4	12000	8500	0.96	1309 TN	1309 EKTN9	1309 K.TVH	1309 TN
45	100	25	39	13.4	12000	8500	0.96	1309 TN	1309 ETN9	1309 TVH	1309 TN
45	100	36	39	13.4	-	4500	1.3	2309 2RSTN	2309 E-2RS1TN9	2309 K.2RS.TVH	2309 2RSTN
45	100	36	63.7	19.3	13000	9000	1.15	2309 TN	2309 EKTN9	2309 K.TVH	2309 TN
45	100	36	63.7	19.3	13000	9000	1.3	2309 M	2309 EM	2309 M	2309 M
45	100	36	63.7	19.3	13000	9000	1.25	2309 TN	2309 ETN9	2309 TVH	2309 TN
50	90	20	26.5	9.15	16000	10000	0.53	1210 TN	1210 EKTN9	1210 K.TVH	1210 TN
50	90	20	26.5	9.15	16000	10000	0.53	1210 TN	1210 ETN9	1210 TVH	1210 TN
50	90	23	22.9	8.15	-	4800	0.57	2210 2RSTN	2210 E-2RS1KTN9	2210 K.2RS.TVH	2210 2RSTN
50	90	23	22.9	8.15	-	4800	0.57	2210 2RSTN	2210 E-2RS1TN9	2210 K.2RS.TVH	2210 2RSTN
50	90	23	33.8	11.2	14000	9500	0.6	2210 TN	2210 EKTN9	2210 K.TVH	2210 TN

**SELF-ALIGNING BALL BEARINGS**  
Cylindrical & Tapered Bore

Table 41  
Bore Diameter 50mm - 75mm



Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic C	Static C <sub>0</sub>	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			kN		r/min		kg				
50	90	23	33.8	11.2	14000	9500	0.6	2210 TN	2210 ETN9	2210 TVH	2210 TN
50	110	27	43.6	14	12000	8000	1.2	1310 TN	1310 EKTN9	1310 K.TVH	1310 TN
50	110	27	43.6	14	12000	8000	1.2	1310 TN	1310 ETN9	1310 TVH	1310 TN
50	110	40	63.7	20	14000	9500	1.65	2310	2310	2310	2310
50	110	40	43.6	14	-	4000	1.65	2310 2RSTN	2310 E-2RS1TN9	2310 K.2RS.TVH	2310 2RSTN
50	110	40	63.7	20	14000	9500	1.55	2310 K	2310 K	2310 K	2310 K
50	110	40	63.7	20	14000	9500	1.8	2310 M	2310 M	2310 M	2310 M
55	100	21	27.6	10.6	14000	9000	0.71	1211 TN	1211 EKTN9	1211 K.TVH	1211 TN
55	100	21	27.6	10.6	14000	9000	0.71	1211 TN	1211 ETN9	1211 TVH	1211 TN
55	100	25	27.6	10.6	-	4300	0.79	2211 2RSTN	2211 E-2RS1KTN9	2211 K.2RS.TVH	2211 2RSTN
55	100	25	27.6	10.6	-	4300	0.79	2211 2RSTN	2211 E-2RS1TN9	2211 K.2RS.TVH	2211 2RSTN
55	100	25	39	13.4	12000	8500	0.81	2211 TN	2211 EKTN9	2211 K.TVH	2211 TN
55	100	25	39	13.4	12000	8500	0.81	2211 TN	2211 ETN9	2211 TVH	2211 TN
55	120	29	50.7	18	11000	7500	1.6	1311 TN	1311 EKTN9	1311 K.TVH	1311 TN
55	120	29	50.7	18	11000	7500	1.6	1311 TN	1311 ETN9	1311 TVH	1311 TN
55	120	43	76.1	24	11000	7500	2.1	2311	2311	2311	2311
55	120	43	76.1	24	11000	7500	2	2311 K	2311 K	2311 K	2311 K
55	120	43	76.1	24	11000	7500	2.3	2311 M	2311 M	2311 M	2311 M
60	110	22	31.2	12.2	12000	8500	0.9	1212 TN	1212 EKTN9	1212 K.TVH	1212 TN
60	110	22	31.2	12.2	12000	8500	0.9	1212 TN	1212 ETN9	1212 TVH	1212 TN
60	110	28	31.2	12.2	-	3800	1.05	2212 2RSTN	2212 E-2RS1KTN9	2212 K.2RS.TVH	2212 2RSTN
60	110	28	31.2	12.2	-	3800	1.05	2212 2RSTN	2212 E-2RS1TN9	2212 K.2RS.TVH	2212 2RSTN
60	110	28	48.8	17	11000	8000	1.05	2212 TN	2212 EKTN9	2212 K.TVH	2212 TN
60	110	28	48.8	17	11000	8000	1.1	2212 TN	2212 ETN9	2212 TVH	2212 TN
60	130	31	58.5	22	9000	6300	1.9	1312 TN	1312 EKTN9	1312 K.TVH	1312 TN
60	130	31	58.5	22	9000	6300	1.95	1312 TN	1312 ETN9	1312 TVH	1312 TN
60	130	46	87.1	28.5	9500	7000	2.6	2312	2312	2312	2312
60	130	46	87.1	28.5	9500	7000	2.5	2312 K	2312 K	2312 K	2312 K
60	130	46	87.1	28.5	9500	7000	2.9	2312 M	2312 M	2312 M	2312 M
60	150	42	125	41.5	9000	6300	3.95	1412 M	1412 M	1412 M	1412 M
65	120	23	35.1	14	10000	7000	1.1	1213 TN	1213 EKTN9	1213 K.TVH	1213 TN
65	120	23	35.1	14	11000	7000	1.15	1213 TN	1213 ETN9	1213 TVH	1213 TN
65	120	31	35.1	14	-	3600	1.35	2213 2RSTN	2213 E-2RS1KTN9	2213 K.2RS.TVH	2213 2RSTN
65	120	31	35.1	14	-	3600	1.4	2213 2RSTN	2213 E-2RS1TN9	2213 K.2RS.TVH	2213 2RSTN
65	120	31	57.2	20	10000	7000	1.4	2213 TN	2213 EKTN9	2213 K.TVH	2213 TN
65	120	31	57.2	20	10000	7000	1.45	2213 TN	2213 ETN9	2213 TVH	2213 TN
65	140	33	65	25.5	8500	6000	2.35	1313 TN	1313 EKTN9	1313 K.TVH	1313 TN
65	140	33	65	25.5	8500	6000	2.45	1313 TN	1313 ETN9	1313 TVH	1313 TN
65	140	48	95.6	32.5	9000	6300	3.25	2313	2313	2313	2313
65	140	48	95.6	32.5	9000	6300	3.1	2313 K	2313 K	2313 K	2313 K
65	140	48	95.6	32.5	9000	6300	3.6	2313 M	2313 M	2313 M	2313 M
70	125	24	35.8	14.6	11000	7000	1.25	1214 TN	1214 ETN9	1214 TVH	1214 TN
70	125	31	44.2	17	10000	6700	1.5	2214	2214	2214	2214
70	125	31	35.8	14.6	-	3400	1.45	2214 2RSTN	2214 E-2RS1TN9	2214 K.2RS.TVH	2214 2RSTN
70	150	35	74.1	27.5	8500	6000	3	1314	1314	1314	1314
70	150	51	111	37.5	8000	6000	3.9	2314	2314	2314	2314
70	150	51	111	37.5	8000	6000	4.25	2314 M	2314 M	2314 M	2314 M
75	130	25	39	15.6	10000	6700	1.35	1215	1215	1215	1215
75	130	25	39	15.6	10000	6700	1.3	1215 K	1215 K	1215 K	1215 K
75	130	31	58.5	22	9000	6300	1.5	2215 TN	2215 EKTN9	2215 K.TVH	2215 TN



**SELF-ALIGNING BALL BEARINGS**  
Cylindrical & Tapered Bore

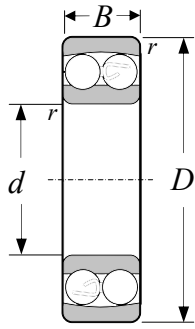
Table 42  
Bore Diameter 75mm - 100mm

Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic C	Static C <sub>0</sub>	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			kN		r/min		kg				
75	130	31	58.5	22	9000	6300	1.6	2215 TN	2215 ETN9	2215 TVH	2215 TN
75	160	37	79.3	30	8000	5600	3.55	1315	1315	1315	1315
75	160	37	79.3	30	8000	5600	3.4	1315 K	1315 K	1315 K	1315 K
75	160	37	79.3	30	8000	5600	3.95	1315 M	1315 M	1315 M	1315 M
75	160	55	124	43	7500	5600	4.7	2315	2315	2315	2315
75	160	55	124	43	7500	5600	4.45	2315 K	2315 K	2315 K	2315 K
75	160	55	124	43	7500	5600	5.05	2315 EKTN	2315 KM	2315 K.M	2315 EKTN
75	160	55	124	43	7500	5600	5.3	2315 M	2315 M	2315 M	2315 M
80	140	26	39.7	17	9500	6000	1.65	1216	1216	1216	1216
80	140	26	39.7	17	9500	6000	1.6	1216 K	1216 K	1216 K	1216 K
80	140	33	65	25.5	8500	6000	1.9	2216 TN	2216 EKTN9	2216 K.TVH	2216 TN
80	140	33	65	25.5	8500	6000	2	2216 TN	2216 ETN9	2216 TVH	2216 TN
80	170	39	88.4	33.5	7500	5300	4.2	1316	1316	1316	1316
80	170	39	88.4	33.5	7500	5300	4.05	1316 K	1316 K	1316 K	1316 K
80	170	58	135	49	7000	5300	6.1	2316	2316	2316	2316
80	170	58	135	49	7000	5300	5.9	2316 K	2316 K	2316 K	2316 K
80	170	58	135	49	7000	5300	6.05	2316 EKTN	2316 KM	2316 K.M	2316 EKTN
80	170	58	135	49	7000	5300	6.25	2316 M	2316 M	2316 M	2316 M
85	150	28	48.8	20.8	9000	5600	2.05	1217	1217	1217	1217
85	150	28	48.8	20.8	9000	5600	2	1217 K	1217 K	1217 K	1217 K
85	150	36	58.5	23.6	8000	5600	2.5	2217	2217	2217	2217
85	150	36	58.5	23.6	8000	5600	2.4	2217 K	2217 K	2217 K	2217 K
85	180	41	97.5	38	7000	4800	5	1317	1317	1317	1317
85	180	41	97.5	38	7000	4800	4.9	1317 K	1317 K	1317 K	1317 K
85	180	60	140	51	6700	4800	6.8	2317 EKTN	2317 KM	2317 K.M	2317 EKTN
85	180	60	140	51	6700	4800	7.05	2317 M	2317 M	2317 M	2317 M
90	160	30	57.2	23.6	8500	5300	2.5	1218	1218	1218	1218
90	160	30	57.2	23.6	8500	5300	2.4	1218 K	1218 K	1218 K	1218 K
90	160	40	70.2	28.5	7500	5300	3.4	2218	2218	2218	2218
90	160	40	70.2	28.5	7500	5300	3.2	2218 K	2218 K	2218 K	2218 K
90	190	43	117	44	6700	4500	5.8	1318	1318	1318	1318
90	190	43	117	44	6700	4500	5.6	1318 K	1318 K	1318 K	1318 K
90	190	64	153	57	6300	4500	8.2	2318 EKTN	2318 KM	2318 K.M	2318 EKTN
90	190	64	153	57	6300	4500	8.45	2318 M	2318 M	2318 M	2318 M
95	170	32	63.7	27	8000	5000	3.1	1219	1219	1219	1219
95	170	32	63.7	27	8000	5000	3	1219 K	1219 K	1219 K	1219 K
95	170	43	83.2	34.5	7000	5000	3.9	2219 EKTN	2219 KM	2219 K.M	2219 EKTN
95	170	43	83.2	34.5	7000	5000	4.1	2219 M	2219 M	2219 M	2219 M
95	200	45	133	51	6300	4300	6.7	1319	1319	1319	1319
95	200	45	133	51	6300	4300	6.5	1319 K	1319 K	1319 K	1319 K
95	200	67	165	64	6000	4500	9.8	2319 M	2319 M	2319 M	2319 M
100	180	34	68.9	30	7500	4800	3.7	1220	1220	1220	1220
100	180	34	68.9	30	7500	4800	3.6	1220 K	1220 K	1220 K	1220 K
100	180	46	97.5	40.5	6700	4800	5.5	2220	2220	2220	2220
100	180	46	97.5	40.5	6700	4800	4.8	2220 EKTN	2220 KM	2220 K.M	2220 EKTN
100	180	46	97.5	40.5	6700	4800	5	2220 M	2220 M	2220 M	2220 M
100	215	47	143	57	6000	4000	8.3	1320	1320	1320	1320
100	215	47	143	57	6000	4000	8.05	1320 K	1320 K	1320 K	1320 K
100	215	73	190	80	5600	4000	12	2320 EKTN	2320 KM	2320 K.M	2320 EKTN
100	215	73	190	80	5600	4000	12.5	2320 M	2320 M	2320 M	2320 M



**SELF-ALIGNING BALL BEARINGS**  
Cylindrical & Tapered Bore

Table 43  
Bore Diameter 110mm - 240mm



Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic C	Static C <sub>0</sub>	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			kN		r/min		kg				
110	200	38	88.4	39	6700	4300	5.15	1222	1222	1222	1222
110	200	38	88.4	39	6700	4300	5	1222 K	1222 K	1222 K	1222 K
110	200	53	124	52	6000	4300	6.5	2222	2222	2222	2222
110	200	53	124	52	6000	4300	6.8	2222 EKTN	2222 KM	2222 K.M	2222 EKTN
110	200	53	124	52	6000	4300	7.1	2222 M	2222 M	2222 M	2222 M
110	240	50	163	72	5300	3600	11.5	1322 EKTN	1322 KM	1322 K.M	1322 EKTN
110	240	50	163	72	5300	3600	12	1322 M	1322 M	1322 M	1322 M
120	215	42	119	53	6300	4000	6.5	1224 EKTN	1224 KM	1224 K.M	1224 EKTN
120	215	42	119	53	6300	4000	6.75	1224 M	1224 M	1224 M	1224 M
130	230	46	127	58.5	5600	3600	8.3	1226 M	1226 M	1226 M	1226 M
150	225	56	57.2	23.6	5600	3400	7.5	13030	13030	13030	13030
180	280	74	95.6	40	4500	2800	16	13036	13036	13036	13036
200	280	60	60.5	29	4300	2600	10.7	13940	13940	13940	13940
220	300	60	60.5	30.5	3800	2400	11	13944	13944	13944	13944
240	320	60	60.5	32	3800	2200	11.3	13948	13948	13948	13948

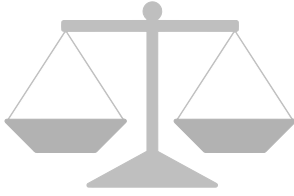


# APPENDICES CONTENTS

Conversion Tables, [N - kgf] [kg - lb] [inch - mm]

Tolerance Tables for Shaft Diameters

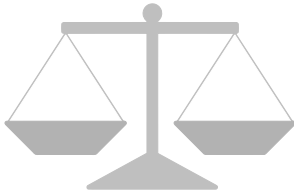
Tolerance Tables for Housing Bore Diameters



CONVERSION TABLE [N-kgf] [kg-lb]

<i>N</i>	-	<i>kgf</i>	<i>N</i>	-	<i>kgf</i>
9.8066	1	0.1020	500.14	51	5.2006
19.613	2	0.2039	509.95	52	5.3025
29.420	3	0.3059	519.75	53	5.4045
39.227	4	0.4079	529.56	54	5.5065
49.033	5	0.5099	539.37	55	5.6084
58.840	6	0.6118	549.17	56	5.7104
68.647	7	0.7138	558.98	57	5.8124
78.453	8	0.8158	568.79	58	5.9144
88.260	9	0.9177	578.59	59	6.0163
98.066	10	1.0197	588.40	60	6.1183
107.87	11	1.1217	598.21	61	6.2203
117.68	12	1.2237	608.01	62	6.3222
127.49	13	1.3256	617.82	63	6.4242
137.29	14	1.4276	627.63	64	6.5262
147.10	15	1.5296	637.43	65	6.6282
156.91	16	1.6315	647.24	66	6.7301
166.71	17	1.7335	657.05	67	6.8321
176.52	18	1.8355	666.85	68	6.9341
186.33	19	1.9375	676.66	69	7.0360
196.13	20	2.0394	686.47	70	7.1380
205.94	21	2.1414	696.27	71	7.2400
215.75	22	2.2434	706.08	72	7.3420
225.55	23	2.3453	715.89	73	7.4439
235.36	24	2.4473	725.69	74	7.5459
245.17	25	2.5493	735.50	75	7.6479
254.97	26	2.6513	745.31	76	7.7498
264.78	27	2.7532	755.11	77	7.8518
274.59	28	2.8552	764.92	78	7.9538
284.39	29	2.9572	774.73	79	8.0558
294.20	30	3.0591	784.53	80	8.1577
304.01	31	3.1611	794.34	81	8.2597
313.81	32	3.2631	804.15	82	8.3617
323.62	33	3.3651	813.95	83	8.4636
333.43	34	3.4670	823.76	84	8.5656
343.23	35	3.5690	833.57	85	8.6676
353.04	36	3.6710	843.37	86	8.7696
362.85	37	3.7729	853.18	87	8.8715
372.65	38	3.8749	862.99	88	8.9735
382.46	39	3.9769	872.79	89	9.0755
392.27	40	4.0789	882.60	90	9.1774
402.07	41	4.1808	892.41	91	9.2794
411.88	42	4.2828	902.21	92	9.3814
421.69	43	4.3848	912.02	93	9.4834
431.49	44	4.4868	921.83	94	9.5853
441.30	45	4.5887	931.63	95	9.6873
451.11	46	4.6907	941.44	96	9.7893
460.91	47	4.7927	951.25	97	9.8912
470.72	48	4.8946	961.05	98	9.9932
480.53	49	4.9966	970.86	99	10.095
490.33	50	5.0986	980.07	100	10.197

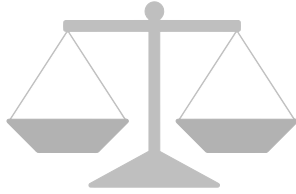
<i>kg</i>	-	<i>lb</i>	<i>kg</i>	-	<i>lb</i>
0.454	1	2.205	23.133	51	112.44
0.907	2	4.409	23.587	52	114.64
1.361	3	6.614	24.040	53	116.84
1.814	4	8.818	24.494	54	119.05
2.268	5	11.023	24.948	55	121.25
2.722	6	13.228	25.401	56	123.46
3.175	7	15.432	25.855	57	125.66
3.629	8	17.637	26.308	58	127.87
4.082	9	19.842	26.762	59	130.07
4.536	10	22.046	27.216	60	132.28
4.990	11	24.251	27.669	61	134.48
5.443	12	26.455	28.123	62	136.69
5.897	13	28.660	28.576	63	138.89
6.350	14	30.865	29.030	64	141.10
6.804	15	33.069	29.484	65	143.30
7.257	16	35.274	29.937	66	145.51
7.711	17	37.479	30.391	67	147.71
8.165	18	39.683	30.844	68	149.91
8.618	19	41.888	31.298	69	152.12
9.072	20	44.092	31.751	70	154.32
9.525	21	46.297	32.205	71	156.53
9.979	22	48.502	32.659	72	158.73
10.433	23	50.706	33.112	73	160.94
10.886	24	52.911	33.566	74	163.14
11.340	25	55.116	34.019	75	165.35
11.793	26	57.320	34.473	76	167.55
12.247	27	59.525	34.927	77	169.76
12.701	28	61.729	35.380	78	171.96
13.154	29	63.934	35.834	79	174.17
13.608	30	66.139	36.287	80	176.37
14.061	31	68.343	36.741	81	178.57
14.515	32	70.548	37.195	82	180.78
14.969	33	72.753	37.648	83	182.98
15.422	34	74.957	38.102	84	185.19
15.876	35	77.162	38.555	85	187.39
16.329	36	79.366	39.009	86	189.60
16.783	37	81.571	39.463	87	191.80
17.237	38	83.776	39.916	88	194.01
17.690	39	85.980	40.370	89	196.21
18.144	40	88.185	40.823	90	198.42
18.597	41	90.390	41.277	91	200.62
19.051	42	92.594	41.730	92	202.83
19.504	43	94.799	42.184	93	205.03
19.958	44	97.003	42.638	94	207.23
20.412	45	99.208	43.091	95	209.44
20.865	46	101.41	43.545	96	211.64
21.319	47	103.62	43.998	97	213.85
21.772	48	105.82	44.452	98	216.05
22.226	49	108.03	44.906	99	218.26
22.680	50	110.23	45.360	100	220.46



CONVERSION TABLE [Inch-mm]

*Inch – mm*  
*1” – 10”*

Inch	Inches												
	Fraction	Decimal	0	1	2	3	4	5	6	7	8	9	10
0	0	0	25.4000	50.8000	76.2000	101.6000	127.0000	152.4000	177.8000	203.2000	228.6000	254.0000	
1/64	0.015625	0.3969	25.7969	51.1969	76.5969	101.9969	127.3969	152.7969	178.1969	203.5969	228.9969	254.3969	
1/32	0.03125	0.7938	26.1938	51.5938	76.9938	102.3938	127.7938	153.1938	178.5938	203.9938	229.3938	254.7938	
3/64	0.046875	1.1906	26.5906	51.9906	77.3906	102.7906	128.1906	153.5906	178.9906	204.3906	229.7906	255.1906	
<b>1/16</b>	<b>0.0625</b>	<b>1.5875</b>	<b>26.9875</b>	<b>52.3875</b>	<b>77.7875</b>	<b>103.1875</b>	<b>128.5875</b>	<b>153.9875</b>	<b>179.3875</b>	<b>204.7875</b>	<b>230.1875</b>	<b>255.5875</b>	
5/64	0.078125	1.9844	27.3844	52.7844	78.1844	103.5844	128.9844	154.3844	179.7844	205.1844	230.5844	255.9844	
3/32	0.09375	2.3812	27.7812	53.1812	78.5812	103.9812	129.3812	154.7812	180.1812	205.5812	230.9812	256.3812	
7/64	0.109375	2.7781	28.1781	53.5781	78.9781	104.3781	129.7781	155.1781	180.5781	205.9781	231.3781	256.7781	
<b>1/8</b>	<b>0.125</b>	<b>3.1750</b>	<b>28.5750</b>	<b>53.9750</b>	<b>79.3750</b>	<b>104.7750</b>	<b>130.1750</b>	<b>155.5750</b>	<b>180.9750</b>	<b>206.3750</b>	<b>231.7750</b>	<b>257.1750</b>	
9/64	0.140625	3.5719	28.9719	54.3719	79.7719	105.1719	130.5719	155.9719	181.3719	206.7719	232.1719	257.5719	
5/32	0.15625	3.9688	29.3688	54.7688	80.1688	105.5688	130.9688	156.3688	181.7688	207.1688	232.5688	257.9688	
11/64	0.171875	4.3656	29.7656	55.1656	80.5656	105.9656	131.3656	156.7656	182.1656	207.5656	232.9656	258.3656	
<b>3/16</b>	<b>0.1875</b>	<b>4.7625</b>	<b>30.1625</b>	<b>55.5625</b>	<b>80.9625</b>	<b>106.3625</b>	<b>131.7625</b>	<b>157.1625</b>	<b>182.5625</b>	<b>207.9625</b>	<b>233.3625</b>	<b>258.7625</b>	
13/64	0.203125	5.1594	30.5594	55.9594	81.3594	106.7594	132.1594	157.5594	182.9594	208.3594	233.7594	259.1594	
7/32	0.21875	5.5562	30.9562	56.3562	81.7562	107.1562	132.5562	157.9562	183.3562	208.7562	234.1562	259.5562	
15/64	0.234375	5.9531	31.3531	56.7531	82.1531	107.5531	132.9531	158.3531	183.7531	209.1531	234.5531	259.9531	
<b>1/4</b>	<b>0.25</b>	<b>6.3500</b>	<b>31.7500</b>	<b>57.1500</b>	<b>82.5500</b>	<b>107.9500</b>	<b>133.3500</b>	<b>158.7500</b>	<b>184.1500</b>	<b>209.5500</b>	<b>234.9500</b>	<b>260.3500</b>	
17/64	0.265625	6.7469	32.1469	57.5469	82.9469	108.3469	133.7469	159.1469	184.5469	209.9469	235.3469	260.7469	
9/32	0.28125	7.1438	32.5438	57.9438	83.3438	108.7438	134.1438	159.5438	184.9438	210.3438	235.7438	261.1438	
19/64	0.296875	7.5406	32.9406	58.3406	83.7406	109.1406	134.5406	159.9406	185.3406	210.7406	236.1406	261.5406	
<b>5/16</b>	<b>0.3125</b>	<b>7.9375</b>	<b>33.3375</b>	<b>58.7375</b>	<b>84.1375</b>	<b>109.5375</b>	<b>134.9375</b>	<b>160.3375</b>	<b>185.7375</b>	<b>211.1375</b>	<b>236.5375</b>	<b>261.9375</b>	
21/64	0.328125	8.3344	33.7344	59.1344	84.5344	109.9344	135.3344	160.7344	186.1344	211.5344	236.9344	262.3344	
11/32	0.34375	8.7312	34.1312	59.5312	84.9312	110.3312	135.7312	161.1312	186.5312	211.9312	237.3312	262.7312	
23/64	0.359375	9.1281	34.5281	59.9281	85.3281	110.7281	136.1281	161.5281	186.9281	212.3281	237.7281	263.1281	
<b>3/8</b>	<b>0.375</b>	<b>9.5250</b>	<b>34.9250</b>	<b>60.3250</b>	<b>85.7250</b>	<b>111.1250</b>	<b>136.5250</b>	<b>161.9250</b>	<b>187.3250</b>	<b>212.7250</b>	<b>238.1250</b>	<b>263.5250</b>	
25/64	0.390625	9.9219	35.3219	60.7219	86.1219	111.5219	136.9219	162.3219	187.7219	213.1219	238.5219	263.9219	
13/32	0.40625	10.3188	35.7188	61.1188	86.5188	111.9188	137.3188	162.7188	188.1188	213.5188	238.9188	264.3188	
27/64	0.421875	10.7156	36.1156	61.5156	86.9156	112.3156	137.7156	163.1156	188.5156	213.9156	239.3156	264.7156	
<b>7/16</b>	<b>0.4375</b>	<b>11.1125</b>	<b>36.5125</b>	<b>61.9125</b>	<b>87.3125</b>	<b>112.7125</b>	<b>138.1125</b>	<b>163.5125</b>	<b>188.9125</b>	<b>214.3125</b>	<b>239.7125</b>	<b>265.1125</b>	
29/64	0.453125	11.5094	36.9094	62.3094	87.7094	113.1094	138.5094	163.9094	189.3094	214.7094	240.1094	265.5094	
15/32	0.46875	11.9062	37.3062	62.7062	88.1062	113.5062	138.9062	164.3062	189.7062	215.1062	240.5062	265.9062	
31/64	0.484375	12.3031	37.7031	63.1031	88.5031	113.9031	139.3031	164.7031	190.1031	215.5031	240.9031	266.3031	
<b>1/2</b>	<b>0.5</b>	<b>12.7000</b>	<b>38.1000</b>	<b>63.5000</b>	<b>88.9000</b>	<b>114.3000</b>	<b>139.7000</b>	<b>165.1000</b>	<b>190.5000</b>	<b>215.9000</b>	<b>241.3000</b>	<b>266.7000</b>	
33/64	0.515625	13.0969	38.4969	63.8969	89.2969	114.6969	140.0969	165.4969	190.8969	216.2969	241.6969	267.0969	
17/32	0.53125	13.4938	38.8938	64.2938	89.6938	115.0938	140.4938	165.8938	191.2938	216.6938	242.0938	267.4938	
35/64	0.546875	13.8906	39.2906	64.6906	90.0906	115.4906	140.8906	166.2906	191.6906	217.0906	242.4906	267.8906	
<b>9/16</b>	<b>0.5625</b>	<b>14.2875</b>	<b>39.6875</b>	<b>65.0875</b>	<b>90.4875</b>	<b>115.8875</b>	<b>141.2875</b>	<b>166.6875</b>	<b>192.0875</b>	<b>217.4875</b>	<b>242.8875</b>	<b>268.2875</b>	
37/64	0.578125	14.6844	40.0844	65.4844	90.8844	116.2844	141.6844	167.0844	192.4844	217.8844	243.2844	268.6844	
19/32	0.59375	15.0812	40.4812	65.8812	91.2812	116.6812	142.0812	167.4812	192.8812	218.2812	243.6812	269.0812	
39/64	0.609375	15.4781	40.8781	66.2781	91.6781	117.0781	142.4781	167.8781	193.2781	218.6781	244.0781	269.4781	
<b>5/8</b>	<b>0.625</b>	<b>15.8750</b>	<b>41.2750</b>	<b>66.6750</b>	<b>92.0750</b>	<b>117.4750</b>	<b>142.8750</b>	<b>168.2750</b>	<b>193.6750</b>	<b>219.0750</b>	<b>244.4750</b>	<b>269.8750</b>	
41/64	0.640625	16.2719	41.6719	67.0719	92.4719	117.8719	143.2719	168.6719	194.0719	219.4719	244.8719	270.2719	
21/32	0.65625	16.6688	42.0688	67.4688	92.8688	118.2688	143.6688	169.0688	194.4688	219.8688	245.2688	270.6688	
43/64	0.671875	17.0656	42.4656	67.8656	93.2656	118.6656	144.0656	169.4656	194.8656	220.2656	245.6656	271.0656	
<b>11/16</b>	<b>0.6875</b>	<b>17.4625</b>	<b>42.8625</b>	<b>68.2625</b>	<b>93.6625</b>	<b>119.0625</b>	<b>144.4625</b>	<b>169.8625</b>	<b>195.2625</b>	<b>220.6625</b>	<b>246.0625</b>	<b>271.4625</b>	
45/64	0.703125	17.8594	43.2594	68.6594	94.0594	119.4594	144.8594	170.2594	195.6594	221.0594	246.4594	271.8594	
23/32	0.71875	18.2562	43.6562	69.0562	94.4562	119.8562	145.2562	170.6562	196.0562	221.4562	246.8562	272.2562	
47/64	0.734375	18.6531	44.0531	69.4531	94.8531	120.2531	145.6531	171.0531	196.4531	221.8531	247.2531	272.6531	
<b>3/4</b>	<b>0.75</b>	<b>19.0500</b>	<b>44.4500</b>	<b>69.8500</b>	<b>95.2500</b>	<b>120.6500</b>	<b>146.0500</b>	<b>171.4500</b>	<b>196.8500</b>	<b>222.2500</b>	<b>247.6500</b>	<b>273.0500</b>	
49/64	0.765625	19.4469	44.8469	70.2469	95.6469	121.0469	146.4469	171.8469	197.2469	222.6469	248.0469	273.4469	
25/32	0.78125	19.8438	45.2438	70.6438	96.0438	121.4438	146.8438	172.2438	197.6438	223.0438	248.4438	273.8438	
51/64	0.796875	20.2406	45.6406	71.0406	96.4406	121.8406	147.2406	172.6406	198.0406	223.4406	248.8406	274.2406	
<b>13/16</b>	<b>0.8125</b>	<b>20.6375</b>	<b>46.0375</b>	<b>71.4375</b>	<b>96.8375</b>	<b>122.2375</b>	<b>147.6375</b>	<b>173.0375</b>	<b>198.4375</b>	<b>223.8375</b>	<b>249.2375</b>	<b>274.6375</b>	
53/64	0.828125	21.0344	46.4344	71.8344	97.2344	122.6344	148.0344	173.4344	198.8344	224.2344	249.6344	275.0344	
27/32	0.84375	21.4312	46.8312	72.2312	97.6312	123.0312	148.4312	173.8312	199.2312	224.6312	250.0312	275.4312	
55/64	0.859375	21.8281	47.2281	72.6281	98.0281	123.4281	148.8281	174.2281	199.6281	225.0281	250.4281	275.8281	
<b>7/8</b>	<b>0.875</b>	<b>22.2250</b>	<b>47.6250</b>	<b>73.0250</b>	<b>98.4250</b>	<b>123.8250</b>	<b>149.2250</b>	<b>174.6250</b>	<b>200.0250</b>	<b>225.4250</b>	<b>250.8250</b>	<b>276.2250</b>	
57/64	0.890625	22.6219	48.0219	73.4219	98.8219	124.2219	149.6219	175.0219	200.4219	225.8219	251.2219	276.6219	
29/32	0.90625	23.0188	48.4188	73.8188	99.2188	124.6188	150.0188	175.4188	200.8188	226.2188	251.6188	277.0188	
59/64	0.921875	23.4156	48.8156	74.2156	99.6156	125.0156	150.4156	175.8156	201.2156	226.6156	252.0156	277.4156	
<b>15/16</b>	<b>0.9375</b>	<b>23.8125</b>	<b>49.2125</b>	<b>74.6125</b>	<b>100.0125</b>	<b>125.4125</b>	<b>150.8125</b>	<b>176.2125</b>	<b>201.6125</b>	<b>227.012</b>			



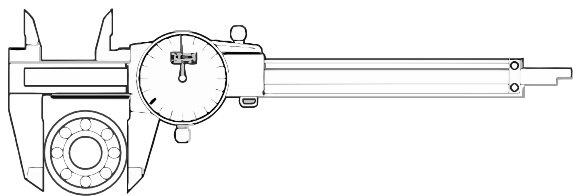
CONVERSION TABLE

*Inch – mm*  
*1” – 40”*

		<i>Inches</i>									
<i>Inch</i>		<i>11</i>	<i>12</i>	<i>13</i>	<i>14</i>	<i>15</i>	<i>16</i>	<i>17</i>	<i>18</i>	<i>19</i>	<i>20</i>
<i>Fraction</i>	<i>Decimal</i>	<i>mm</i>									
<b>0</b>	<b>0.0000</b>	<b>279.400</b>	<b>304.800</b>	<b>330.200</b>	<b>355.600</b>	<b>381.000</b>	<b>406.400</b>	<b>431.800</b>	<b>457.200</b>	<b>482.600</b>	<b>508.000</b>
1 / 16	0.0625	280.988	306.388	331.788	357.188	382.588	407.988	433.388	458.788	484.188	509.588
1 / 8	0.1250	282.575	307.975	333.375	358.775	384.175	409.575	434.975	460.375	485.775	511.175
3 / 16	0.1875	284.162	309.562	334.962	360.362	385.762	411.162	436.562	461.962	487.362	512.762
<b>1 / 4</b>	<b>0.2500</b>	<b>285.750</b>	<b>311.150</b>	<b>336.550</b>	<b>361.950</b>	<b>387.350</b>	<b>412.750</b>	<b>438.150</b>	<b>463.550</b>	<b>488.950</b>	<b>514.350</b>
5 / 16	0.3125	287.338	312.738	338.138	363.538	388.938	414.338	439.738	465.138	490.538	515.938
3 / 8	0.3750	288.925	314.325	339.725	365.125	390.525	415.925	441.325	466.725	492.125	517.525
7 / 16	0.4375	290.512	315.912	341.312	366.712	392.112	417.512	442.912	468.312	493.712	519.112
<b>1 / 2</b>	<b>0.5000</b>	<b>292.100</b>	<b>317.500</b>	<b>342.900</b>	<b>368.300</b>	<b>393.700</b>	<b>419.100</b>	<b>444.500</b>	<b>469.900</b>	<b>495.300</b>	<b>520.700</b>
9 / 16	0.5625	293.688	319.088	344.488	369.888	395.288	420.688	446.088	471.488	496.888	522.288
5 / 8	0.6250	295.275	320.675	346.075	371.475	396.875	422.275	447.675	473.075	498.475	523.875
11 / 16	0.6875	296.862	322.262	347.662	373.062	398.462	423.862	449.262	474.662	500.062	525.462
<b>3 / 4</b>	<b>0.7500</b>	<b>298.450</b>	<b>323.850</b>	<b>349.250</b>	<b>374.650</b>	<b>400.050</b>	<b>425.450</b>	<b>450.850</b>	<b>476.250</b>	<b>501.650</b>	<b>527.050</b>
13 / 16	0.8125	300.038	325.438	350.838	376.238	401.638	427.038	452.438	477.838	503.238	528.638
7 / 8	0.8750	301.625	327.025	352.425	377.825	403.225	428.625	454.025	479.425	504.825	530.225
15 / 16	0.9375	303.212	328.612	354.012	379.412	404.812	430.212	455.612	481.012	506.412	531.812

		<i>Inches</i>									
<i>Inch</i>		<i>21</i>	<i>22</i>	<i>23</i>	<i>24</i>	<i>25</i>	<i>26</i>	<i>27</i>	<i>28</i>	<i>29</i>	<i>30</i>
<i>Fraction</i>	<i>Decimal</i>	<i>mm</i>									
<b>0</b>	<b>0.0000</b>	<b>533.400</b>	<b>558.800</b>	<b>584.200</b>	<b>609.600</b>	<b>635.000</b>	<b>660.400</b>	<b>685.800</b>	<b>711.200</b>	<b>736.600</b>	<b>762.000</b>
1 / 16	0.0625	534.988	560.388	585.788	611.188	636.588	661.988	687.388	712.788	738.188	763.588
1 / 8	0.1250	536.575	561.975	587.375	612.775	638.175	663.575	688.975	714.375	739.775	765.175
3 / 16	0.1875	538.162	563.562	588.962	614.362	639.762	665.162	690.562	715.962	741.362	766.762
<b>1 / 4</b>	<b>0.2500</b>	<b>539.750</b>	<b>565.150</b>	<b>590.550</b>	<b>615.950</b>	<b>641.350</b>	<b>666.750</b>	<b>692.150</b>	<b>717.550</b>	<b>742.950</b>	<b>768.350</b>
5 / 16	0.3125	541.338	566.738	592.138	617.538	642.938	668.338	693.738	719.138	744.538	769.938
3 / 8	0.3750	542.925	568.325	593.725	619.125	644.525	669.925	695.325	720.725	746.125	771.525
7 / 16	0.4375	544.512	569.912	595.312	620.712	646.112	671.512	696.912	722.312	747.712	773.112
<b>1 / 2</b>	<b>0.5000</b>	<b>546.100</b>	<b>571.500</b>	<b>596.900</b>	<b>622.300</b>	<b>647.700</b>	<b>673.100</b>	<b>698.500</b>	<b>723.900</b>	<b>749.300</b>	<b>774.700</b>
9 / 16	0.5625	547.688	573.088	598.488	623.888	649.288	674.688	700.088	725.488	750.888	776.288
5 / 8	0.6250	549.275	574.675	600.075	625.475	650.875	676.275	701.675	727.075	752.475	777.875
11 / 16	0.6875	550.862	576.262	601.662	627.062	652.462	677.862	703.262	728.662	754.062	779.462
<b>3 / 4</b>	<b>0.7500</b>	<b>552.450</b>	<b>577.850</b>	<b>603.250</b>	<b>628.650</b>	<b>654.050</b>	<b>679.450</b>	<b>704.850</b>	<b>730.250</b>	<b>755.650</b>	<b>781.050</b>
13 / 16	0.8125	554.038	579.438	604.838	630.238	655.638	681.038	706.438	731.838	757.238	782.638
7 / 8	0.8750	555.625	581.025	606.425	631.825	657.225	682.625	708.025	733.425	758.825	784.225
15 / 16	0.9375	557.212	582.612	608.012	633.412	658.812	684.212	709.612	735.012	760.412	785.812

		<i>Inches</i>									
<i>Inch</i>		<i>31</i>	<i>32</i>	<i>33</i>	<i>34</i>	<i>35</i>	<i>36</i>	<i>37</i>	<i>38</i>	<i>39</i>	<i>40</i>
<i>Fraction</i>	<i>Decimal</i>	<i>mm</i>									
<b>0</b>	<b>0.0000</b>	<b>787.400</b>	<b>812.800</b>	<b>838.200</b>	<b>863.600</b>	<b>889.000</b>	<b>914.400</b>	<b>939.800</b>	<b>965.200</b>	<b>990.600</b>	<b>1016.000</b>
1 / 16	0.0625	788.988	814.388	839.788	865.188	890.588	915.988	941.388	966.788	992.188	1017.588
1 / 8	0.1250	790.575	815.975	841.375	866.775	892.175	917.575	942.975	968.375	993.775	1019.175
3 / 16	0.1875	792.162	817.562	842.962	868.362	893.762	919.162	944.562	969.962	995.362	1020.762
<b>1 / 4</b>	<b>0.2500</b>	<b>793.750</b>	<b>819.150</b>	<b>844.550</b>	<b>869.950</b>	<b>895.350</b>	<b>920.750</b>	<b>946.150</b>	<b>971.550</b>	<b>996.950</b>	<b>1022.350</b>
5 / 16	0.3125	795.338	820.738	846.138	871.538	896.938	922.338	947.738	973.138	998.538	1023.938
3 / 8	0.3750	796.925	822.325	847.725	873.125	898.525	923.925	949.325	974.725	1000.125	1025.525
7 / 16	0.4375	798.512	823.912	849.312	874.712	900.112	925.512	950.912	976.312	1001.712	1027.112
<b>1 / 2</b>	<b>0.5000</b>	<b>800.100</b>	<b>825.500</b>	<b>850.900</b>	<b>876.300</b>	<b>901.700</b>	<b>927.100</b>	<b>952.500</b>	<b>977.900</b>	<b>1003.300</b>	<b>1028.700</b>
9 / 16	0.5625	801.688	827.088	852.488	877.888	903.288	928.688	954.088	979.488	1004.888	1030.288
5 / 8	0.6250	803.275	828.675	854.075	879.475	904.875	930.275	955.675	981.075	1006.475	1031.875
11 / 16	0.6875	804.862	830.262	855.662	881.062	906.462	931.862	957.262	982.662	1008.062	1033.462
<b>3 / 4</b>	<b>0.7500</b>	<b>806.450</b>	<b>831.850</b>	<b>857.250</b>	<b>882.650</b>	<b>908.050</b>	<b>933.450</b>	<b>958.850</b>	<b>984.250</b>	<b>1009.650</b>	<b>1035.050</b>
13 / 16	0.8125	808.038	833.438	858.838	884.238	909.638	935.038	960.438	985.838	1011.238	1036.638
7 / 8	0.8750	809.625	835.025	860.425	885.825	911.225	936.625	962.025	987.425	1012.825	1038.225
15 / 16	0.9375	811.212	836.612	862.012	887.412	912.812	938.212	963.621	989.012	1014.412	1039.812

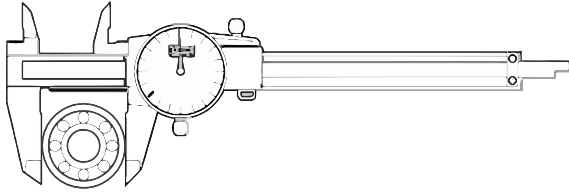


## TOLERANCE TABLES

Tolerances for Shaft Diameters

units :  $\mu\text{m}$

Diameter (mm)		$\Delta_{dmp}$	d6	e6	f6	g5	g6	h5	h6	h7	h8	h9	h10	js5	js6	j5	j6	j7	k5	k6	k7	m5	m6	n6	p6
over	incl																								
3	6	0	-30	-20	-10	-4	-4	0	0	0	0	0	0	$\pm 2.5$	$\pm 4.0$	+3	+6	+8	+6	+9	+13	+9	+12	+16	+20
		-8	-38	-28	-18	-9	-12	-5	-8	-12	-18	-30	-48			-2	-2	-4	+1	+1	+1	+4	+4	+8	+12
6	10	0	-40	-25	-13	-5	-5	0	0	0	0	0	0	$\pm 3.0$	$\pm 4.5$	+4	+7	+10	+7	+10	+16	+12	+15	+19	+24
		-8	-49	-34	-22	-11	-14	-6	-9	-15	-22	-36	-58			-2	-2	-5	+1	+1	+1	+6	+6	+10	+15
10	18	0	-50	-32	-16	-6	-6	0	0	0	0	0	0	$\pm 4.0$	$\pm 5.5$	+5	+8	+12	+9	+12	+19	+15	+18	+23	+29
		-8	-61	-43	-27	-14	-17	-8	-11	-18	-27	-43	-70			-3	-3	-6	+1	+1	+1	+7	+7	+12	+18
18	30	0	-65	-40	-20	-7	-7	0	0	0	0	0	0	$\pm 4.5$	$\pm 6.5$	+5	+9	+13	+11	+15	+23	+17	+21	+28	+35
		-10	-78	-53	-33	-16	-20	-9	-13	-21	-33	-52	-84			-4	-4	-8	+2	+2	+2	+8	+8	+15	+22
30	50	0	-80	-50	-25	-9	-9	0	0	0	0	0	0	$\pm 5.5$	$\pm 8.0$	+6	+11	+15	+13	+18	+27	+20	+25	+33	+42
		-12	-96	-66	-41	-20	-25	-11	-16	-25	-39	-62	-100			-5	-5	-10	+2	+2	+2	+9	+9	+17	+26
50	80	0	-100	-60	-30	-10	-10	0	0	0	0	0	0	$\pm 6.5$	$\pm 9.5$	+6	+12	+18	+15	+21	+32	+24	+30	+39	+51
		-15	-119	-79	-49	-23	-29	-13	-19	-30	-46	-74	-120			-7	-7	-12	+2	+2	+2	+11	+11	+20	+32
80	120	0	-120	-72	-36	-12	-12	0	0	0	0	0	0	$\pm 7.5$	$\pm 11.0$	+6	+13	+20	+18	+25	+38	+28	+35	+45	+59
		-20	-142	-94	-58	-27	-34	-15	-22	-35	-54	-87	-140			-9	-9	-15	+3	+3	+3	+13	+13	+23	+37
120	180	0	-145	-85	-43	-14	-14	0	0	0	0	0	0	$\pm 9.0$	$\pm 12.5$	+7	+14	+22	+21	+28	+43	+33	+40	+52	+68
		-25	-170	-110	-68	-32	-39	-18	-25	-40	-63	-100	-160			-11	-11	-18	+3	+3	+3	+15	+15	+27	+43
180	250	0	-170	-100	-50	-15	-15	0	0	0	0	0	0	$\pm 10.0$	$\pm 14.5$	+7	+16	+25	+24	+33	+50	+37	+46	+60	+79
		-30	-199	-129	-79	-35	-44	-20	-29	-46	-72	-115	-185			-13	-13	-21	+4	+4	+4	+17	+17	+31	+50
250	315	0	-190	-110	-56	-17	-17	0	0	0	0	0	0	$\pm 11.5$	$\pm 16.0$	+7	$\pm 16$	$\pm 26$	+27	+36	+56	+43	+52	+66	+88
		-35	-222	-142	-88	-40	-49	-23	-32	-52	-81	-130	-210			-16			+4	+4	+4	+20	+20	+34	+56
315	400	0	-210	-125	-62	-18	-18	0	0	0	0	0	0	$\pm 12.5$	$\pm 18.0$	+7	$\pm 18$	+29	+29	+40	+61	+46	+57	+73	+98
		-40	-246	-161	-98	-43	-54	-25	-36	-57	-89	-140	-230			-18		-28	+4	+4	+4	+21	+21	+37	+62
400	500	0	-230	-135	-68	-20	-20	0	0	0	0	0	0	$\pm 13.5$	$\pm 20.0$	+7	$\pm 20$	+31	+32	+45	+68	+50	+63	+80	+108
		-45	-270	-175	-108	-47	-60	-27	-40	-63	-97	-155	-250			-20		-32	+5	+5	+5	+23	+23	+40	+68
500	630	0	-260	-145	-76	-	-22	-	0	0	0	0	0	-	$\pm 22.0$	-	-	-	-	+44	+70	-	+70	+88	+122
		-50	-304	-189	-120	-	-66	-	-44	-70	-110	-175	-280							0	0	-	+26	+44	+78
630	800	0	-290	-160	-80	-	-24	-	0	0	0	0	0	-	$\pm 25.0$	-	-	-	-	+50	+80	-	+80	+100	+138
		-75	-340	-210	-130	-	-74	-	-50	-80	-125	-200	-320							0	0	-	+30	+50	+88
800	1000	0	-320	-170	-86	-	-26	-	0	0	0	0	0	-	$\pm 28.0$	-	-	-	-	+56	+90	-	+90	+112	+156
		-100	-376	-226	-142	-	-82	-	-56	-90	-140	-230	-360							0	0	-	+34	+56	+100
1000	1250	0	-350	-195	-98	-	-28	-	0	0	0	0	0	-	$\pm 33.0$	-	-	-	-	+66	+105	-	+106	+132	+186
		-125	-416	-261	-164	-	-94	-	-66	-105	-165	-260	-420							0	0	-	+40	+66	+120
1250	1600	0	-390	-220	-110	-	-30	-	0	0	0	0	0	-	$\pm 39.0$	-	-	-	-	+78	+125	-	+126	+156	+218
		-160	-468	-298	-188	-	-108	-	-78	-125	-195	-310	-500							0	0	-	+48	+78	+140
1600	2000	0	-430	-240	-120	-	-32	-	0	0	0	0	0	-	$\pm 46.0$	-	-	-	-	+92	+150	-	+150	+184	+262
		-200	-522	-332	-212	-	-124	-	-92	-150	-230	-370	-600							0	0	-	+58	+92	+170



**TOLERANCE TABLES**  
Tolerances for  
Housing Bore Diameters

units :  $\mu\text{m}$

Diameters (mm)		$\Delta_{Dmp}$	E6	F6	F7	G6	G7	H6	H7	H8	J6	J7	JS6	JS7	K5	K6	K7	M5	M6	M7	N5	N6	N7	P6	P7
over	incl																								
10	18	0	+43	+27	+34	+17	+24	+11	+18	+27	+6	+10	$\pm 5.5$	$\pm 9$	+2	+2	+6	-4	-4	0	-9	-9	-5	-15	-11
		-8	+32	+16	+16	+6	+6	0	0	0	-5	-8			-6	-9	-12	-12	-15	-18	-17	-20	-23	-26	-29
18	30	0	+53	+33	+41	+20	+28	+13	+21	+33	+8	+12	$\pm 6.5$	$\pm 10.5$	+1	+2	+6	-5	-4	0	-12	-11	-7	-18	-14
		-9	+40	+20	+20	+7	+7	0	0	0	-5	-9			-8	-11	-15	-14	-17	-21	-21	-24	-28	-31	-35
30	50	0	+66	+41	+50	+25	+34	+16	+25	+39	+10	+14	$\pm 8$	$\pm 12.5$	+2	+3	+7	-5	-4	0	-13	-12	-8	-21	-17
		-11	+50	+25	+25	+9	+9	0	0	0	-6	-11			-9	-13	-18	-16	-20	-25	-24	-28	-33	-37	-42
50	80	0	+79	+49	+60	+29	+40	+19	+30	+46	+13	+18	$\pm 9.5$	$\pm 15$	+3	+4	+9	-6	-5	0	-15	-14	-9	-26	-21
		-13	+60	+30	+30	+10	+10	0	0	0	-6	-12			-10	-15	-21	-19	-24	-30	-28	-33	-39	-45	-51
80	120	0	+94	+58	+71	+34	+47	+22	+35	+54	+16	+22	$\pm 11$	$\pm 17.5$	+2	+4	+10	-8	-6	0	-18	-16	-10	-30	-24
		-15	+72	+36	+36	+12	+12	0	0	0	-6	-13			-13	-18	-25	-23	-28	-35	-33	-38	-45	-52	-59
120	150	0	+110	+68	+83	+39	+54	+25	+40	+63	+18	+26	$\pm 12.5$	$\pm 20$	+3	+4	+12	-9	-8	0	-21	-20	-12	-36	-28
		-18	+85	+43	+43	+14	+14	0	0	0	-7	-14			-15	-21	-28	-27	-33	-40	-39	-45	-52	-61	-68
150	180	0	+110	+68	+83	+39	+54	+25	+40	+63	+18	+26	$\pm 12.5$	$\pm 20$	+3	+4	+12	-9	-8	0	-21	-20	-12	-36	-28
		-25	+85	+43	+43	+14	+14	0	0	0	-7	-14			-15	-21	-28	-27	-33	-40	-39	-45	-52	-61	-68
180	250	0	+129	+79	+96	+44	+61	+29	+46	+72	+22	+30	$\pm 14.5$	$\pm 23$	+2	+5	+13	-11	-8	0	-25	-22	-14	-41	-33
		-30	+100	+50	+50	+15	+15	0	0	0	-7	-16			-18	-24	-33	-31	-37	-46	-45	-51	-60	-70	-79
250	315	0	+142	+88	+108	+49	+69	+32	+52	+81	+25	+36	$\pm 16$	$\pm 26$	+3	+5	+16	-13	-9	0	-27	-25	-14	-47	-36
		-35	+110	+56	+56	+17	+17	0	0	0	-7	-16			-20	-27	-36	-36	-41	-52	-50	-57	-66	-79	-88
315	400	0	+161	+98	+119	+54	+75	+36	+57	+89	+29	+39	$\pm 18$	$\pm 28.5$	+3	+7	+17	-14	-10	0	-30	-26	-16	-51	-41
		-40	+125	+62	+62	+18	+18	0	0	0	-7	-18			-22	-29	-40	-39	-46	-57	-55	-62	-73	-87	-98
400	500	0	+175	+108	+131	+60	+83	+40	+63	+97	+33	+43	$\pm 20$	$\pm 31.5$	+2	+8	+18	-16	-10	0	-33	-27	-17	-55	-45
		-45	+135	+68	+68	+20	+20	0	0	0	-7	-20			-25	-32	-45	-43	-50	-63	-60	-67	-80	-95	-108
500	630	0	+189	+120	+146	+66	+92	+44	+70	+110	-	-	$\pm 22$	$\pm 35$	-	0	0	-	-26	-26	-	-44	-44	-78	-78
		-50	+145	+76	+76	+22	+22	0	0	0	-	-			-	-44	-70	-	-70	-96	-	-88	-114	-122	-148
630	800	0	+210	+130	+160	+74	+104	+50	+80	+125	-	-	$\pm 25$	$\pm 40$	-	0	0	-	-30	-30	-	-50	-50	-88	-88
		-75	+160	+80	+80	+24	+24	0	0	0	-	-			-	-50	-80	-	-80	-110	-	-100	-130	-138	-168
800	1000	0	+226	+142	+176	+82	+116	+56	+90	+140	-	-	$\pm 28$	$\pm 45$	-	0	0	-	-34	-34	-	-56	-56	-100	-100
		-100	+170	+86	+86	+26	+26	0	0	0	-	-			-	-56	-90	-	-90	-124	-	-112	-146	-156	-190
1000	1250	0	+261	+164	+203	+94	+133	+66	+105	+165	-	-	$\pm 33$	$\pm 52.5$	-	0	0	-	-40	-40	-	-66	-66	-120	-120
		-125	+195	+98	+98	+28	+28	0	0	0	-	-			-	-66	-105	-	-106	-145	-	-132	-171	-186	-225
1250	1600	0	+298	+188	+235	+108	+155	+78	+125	+195	-	-	$\pm 39$	$\pm 62.5$	-	0	0	-	-48	-48	-	-78	-78	-140	-140
		-160	+220	+110	+110	+30	+30	0	0	0	-	-			-	-78	-125	-	-126	-173	-	-156	-203	-218	-265
1600	2000	0	+332	+212	+270	+124	+182	+92	+150	+230	-	-	$\pm 46$	$\pm 75$	-	0	0	-	-58	-58	-	-92	-92	-170	-170
		-200	+240	+120	+120	+32	+32	0	0	0	-	-			-	-92	-150	-	-150	-208	-	-184	-242	-262	-320
2000	2500	0	+370	+240	+305	+144	+209	+110	+175	+280	-	-	$\pm 55$	$\pm 87.5$	-	0	0	-	-68	-68	-	-110	-110	-195	-195
		-250	+260	+130	+130	+34	+34	0	0	0	-	-			-	-110	-175	-	-178	-243	-	-220	-285	-305	-370







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