

CATALOG 2009

TENGEN BEARING COMPANY



NEEDLE ROLLER BEARINGS
Catalog No. ND1200

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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>
Δ_{ds}	<i>Deviation of single bore diameter</i>
Δ_{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>
Δ_{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>
Δ_{Ds}	<i>Deviation of single outer diameter</i>
Δ_{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>
Δ_{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)		Δ_{dmp} Deviation of Mean Bore Diameter										<i>units</i> : μm	
		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					Δ_{Bs} (or Δ_{Cs}) Deviation of Single (Outer) Ring Width												<i>units</i> : μm	
		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	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>		Δ_{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 : μm</i>		Δ_{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		
		D (mm)		Normal	Class 6	Class 5	Class 4	Class 2	Normal	Class 6	Class 5	Class 4	Class 2	Class 5
Over	Incl.	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
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 : μm</i>		S_{ea}			V_{Cs}		
		Axial runout of end face to outer ring raceway of assembled bearing			Variation of outer ring width		
		D (mm)		Class 5	Class 4	Class 2	Class 5
Over	Incl.	Max	Max	Max	Max	Max	Max
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
Contact Angle Symbol				
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
Internal Design Symbol				
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
Material Symbol				
Case-hardened steel used in rings, rolling elements	G			G
Stainless steel used in rings, rolling elements	H		Z	H
Cage Symbol				
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
External Features – Seals, Shields Symbol				
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
Rings Design Symbol				
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
Bearing Arrangement Symbol				
Back to back arrangement	DB	DB	UA	DB
Face to face arrangement	DF	DF	UO	DF
Tandem arrangement	DT	DT	UL	DT
Internal Clearance Symbol				
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
Tolerance Class Symbol				
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
Special Specification Symbol				
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

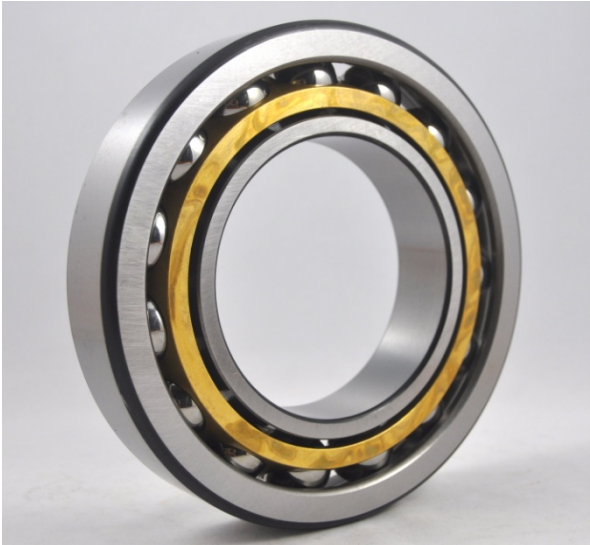
Bearing Units

- 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



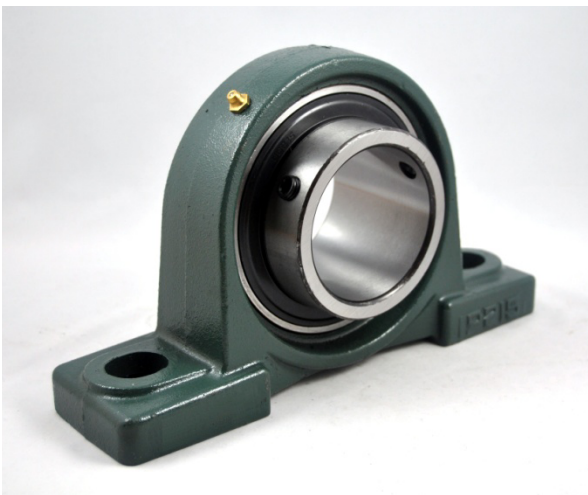
TAPERED ROLLER BEARINGS



NEEDLE ROLLER BEARINGS



HIGH PRECISION BEARINGS



BEARING UNITS

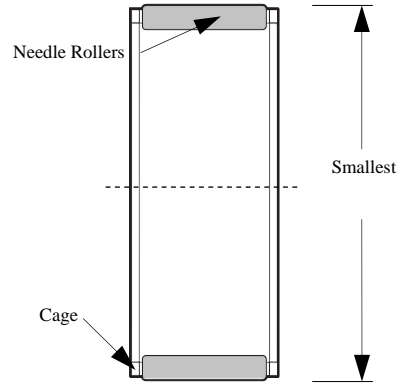
BEARING TABLES

NEEDLE ROLLER BEARINGS

The rolling elements of needle roller bearings are basically cylindrical rollers, but they are long and thin relatively to their diameter. The needle roller bearing has low cross section, but possessing high load carrying capacity, and therefore they are particularly suitable in applications where there is constraint of radial installation space. Needle roller bearings are presents in many designs and sizes, such as needle roller and cage assemblies, drawn cup needle roller bearings, as well as cam rollers and cam followers are also categorized as needle roller bearings.

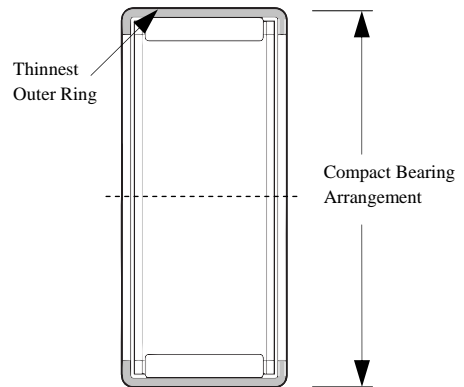
Needle Rollers and Cage Assemblies

The cage of the needle rollers and cage assemblies is acting an important role for the bearings to operate at high speed, in addition to high load carrying capacity. There are neither inner rings nor outer rings, the cage holds the needle rollers, with its' low cross section that provides the maximum load carrying capacity, and within the smallest radial space among all types of bearings. The cage is uniquely designed to precisely hold the needle rollers to possibly reduce stresses of bearing during operations, and allowing moderate shaft misalignment so that to extend the bearings life span.



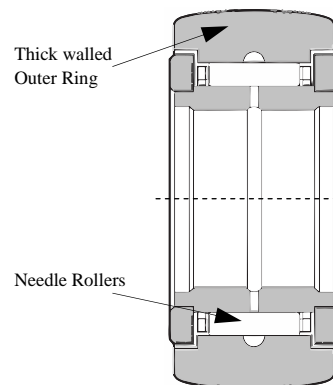
Drawn Cup Needle Roller Bearings

Drawn cup needle roller bearings has very uniquely designed thin walled outer ring structures, with either open or closed end. The drawn cup is the thinnest outer rings among all types of rolling bearings. In spite of its' thin outer rings, drawn cup needle roller bearings has capability of carrying high radial loads. The bearings' unique characteristics are suitable for application where the housing bore cannot be used as raceway for needle roller and cage assemblies, but requiring a very compact bearing arrangement.



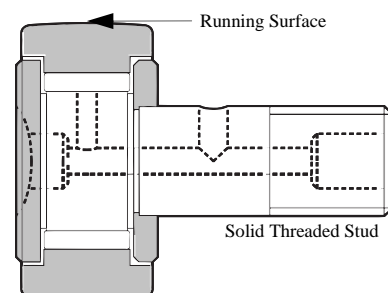
Cam Rollers

Cam rollers are designed to be non-separating unit to handle large loads and shock loads. It has thick walled outer rings and crowned roller surface, and it is pre-greased ready to mount unit. Cam rollers are widely used in industrial automation applications, such as cam drives and conveyor systems.



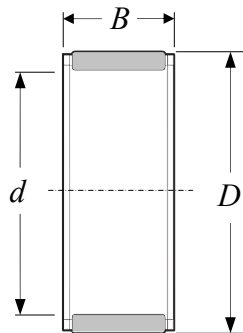
Cam Followers

Cam followers has similar internal design to cylindrical roller bearings, it has thick walled outer ring that enable it to withstand for heavy and shock loads and reducing distortion and bending stresses. The running surface of cam followers is available in crowned or flattened type. Cam followers do not have inner rings, but a solid threaded stud or pin that can be quickly attached to installation equipments. It has wide applications in cam drives, tracks, and conveyor systems.

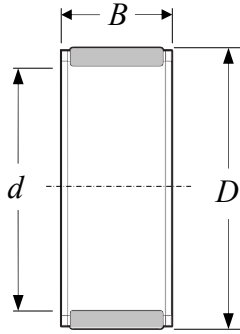


NEEDLE ROLLER BEARINGS
Needle Roller & Cage Assemblies

Table 112
Diameter 3mm - 17mm



Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic	Static	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			C	C ₀	r/min		kg				
3	5	7	1.51	1.34	40000	45000	0.0003	K3X5X7-TV	K 3x5x7 TN	K3X5X7-TV	-
3	5	9	1.72	1.63	38000	43000	0.0004	K3X5X9-TV	K 3x5x9 TN	K3X5X9-TV	-
3	6	7	1.42	1.02	38000	43000	0.0004	K3X6X7-TV	K 3x6x7 TN	K3X6X7-TV	-
4	7	7	1.72	1.32	36000	43000	0.0005	K4X7X7-TV	K 4x7x7 TN	K4X7X7-TV	FBNP-477
4	7	10	2.29	1.9	36000	43000	0.0007	K4X7X10-TV	K 4x7x10 TN	K4X7X10-TV	-
5	8	8	2.29	2	36000	40000	0.0007	K5X8X8-TV	K 5x8x8 TN	K5X8X8-TV	FBNP-588
5	8	10	2.92	2.7	36000	40000	0.0009	K5X8X10-TV	K 5x8x10 TN	K5X8X10-TV	-
6	9	8	2.55	2.36	34000	38000	0.0008	K6X9X8-TV	K 6x9x8 TN	K6X9X8-TV	FBNP-698
6	9	10	3.3	3.2	34000	38000	0.0011	K6X9X10-TV	K 6x9x10 TN	K6X9X10-TV	FBNP-6910
6	10	13	3.69	3.15	34000	38000	0.0019	K6X10X13-TV	K 6x10x13 TN	K6X10X13-TV	FBNP-61013
7	9	7	1.68	1.83	34000	38000	0.0006	K7X9X7-TV	K 7x9x7 TN	K7X9X7-TV	-
7	10	8	2.81	2.75	32000	36000	0.0009	K7X10X8-TV	K 7x10x8 TN	K7X10X8-TV	FBNP-7108
7	10	10	3.58	3.75	32000	36000	0.001	K7X10X10-TV	K 7x10x10 TN	K7X10X10-TV	FBNP-71010
8	11	8	3.03	3.1	32000	36000	0.001	K8X11X8-TV	K 8x11x8 TN	K8X11X8-TV	FBNP-8118
8	11	10	3.8	4.25	32000	36000	0.0012	K8X11X10-TV	K 8x11x10 TN	K8X11X10-TV	FBNP-81110
8	11	13	5.01	5.85	32000	36000	0.0017	K8X11X13-TV	K 8x11x13 TN	K8X11X13-TV	FBNP-81113
8	12	10	4.84	4.75	30000	34000	0.002	K8X12X10-TV	K 8x12x10 TN	K8X12X10-TV	-
9	12	10	4.4	5.2	30000	34000	0.0015	K9X12X10-TV	K 9x12x10 TN	K9X12X10-TV	FBNP-91210
9	12	13	5.72	7.2	30000	34000	0.0021	K9X12X13-TV	K 9x12x13 TN	K9X12X13-TV	FBNP-91213
10	13	10	4.57	5.7	28000	32000	0.0016	K10X13X10-TV	K 10x13x10 TN	K10X13X10-TV	FBN-101310
10	13	13	5.94	8	28000	32000	0.0023	K10X13X13-TV	K 10x13x13 TN	K10X13X13-TV	FBN-101313
10	13	16	6.82	9.5	28000	32000	0.0029	K10X13X16-TV	K 10x13x16 TN	K10X13X16-TV	-
10	14	10	5.61	6.1	28000	32000	0.0025	K10X14X10-TV	K 10x14x10 TN	K10X14X10-TV	FWF-101410
10	14	13	5.83	6.3	28000	32000	0.0046	K10X14X13-TV	K 10x14x13 TN	K10X14X13-TV	FWF-101413
10	16	12	7.65	7.2	28000	32000	0.0055	K10X16X12-TV	K 10x16x12 TN	K10X16X12-TV	FWF-101612
12	15	10	4.73	6.2	26000	30000	0.0019	K12X15X10-TV	K 12x15x10 TN	K12X15X10-TV	FBN-121510
12	15	13	6.16	8.65	26000	30000	0.0023	K12X15X13-TV	K 12x15x13 TN	K12X15X13-TV	FBN-121513
12	16	13	7.65	9.5	26000	30000	0.0036	K12X16X13-TV	K 12x16x13 TN	K12X16X13-TV	FWF-121613
12	17	13	9.13	10.4	26000	30000	0.0049	K12X17X13-TV	K 12x17x13 TN	K12X17X13-TV	FWF-121713
12	18	12	9.52	10	26000	30000	0.006	K12X18X12-TV	K 12x18x12 TN	K12X18X12-TV	FWF-121812
14	18	10	6.93	8.65	24000	28000	0.004	K14X18X10	K 14x18x10	K14X18X10	FWF-141810
14	18	13	7.92	10.2	24000	28000	0.0065	K14X18X13	K 14x18x13	K14X18X13	FWF-141813
14	18	15	9.13	12.5	24000	28000	0.005	K14X18X15-TV	K 14x18x15 TN	K14X18X15-TV	-
14	18	17	10.5	14.6	24000	28000	0.008	K14X18X17	K 14x18x17	K14X18X17	FWF-141817
14	20	12	9.9	10.6	24000	28000	0.0085	K14X20X12	K 14x20x12	K14X20X12	FWF-142012
15	18	17	7.65	12.2	24000	28000	0.0046	K15X18X17-TV	K 15x18x17 TN	K15X18X17-TV	-
15	19	10	7.21	9.3	24000	28000	0.005	K15X19X10	K 15x19x10	K15X19X10	FWF-151910
15	19	13	8.25	11.2	24000	28000	0.007	K15X19X13	K 15x19x13	K15X19X13	FWF-151913
15	19	17	10.8	15.6	24000	28000	0.0095	K15X19X17	K 15x19x17	K15X19X17	FWF-151917
15	20	13	9.52	11.6	24000	26000	0.007	K15X20X13	K 15x20x13	K15X20X13	FWF-152013
15	21	15	13.8	16.3	24000	26000	0.011	K15X21X15	K 15x21x15	K15X21X15	FWF-152115
15	21	21	18.7	24.5	24000	26000	0.017	K15X21X21	K 15x21x21	K15X21X21	FWF-152121A
16	20	10	7.48	10	24000	26000	0.0055	K16X20X10	K 16x20x10	K16X20X10	FWF-162010
16	20	13	8.58	12	24000	26000	0.0075	K16X20X13	K 16x20x13	K16X20X13	FWF-162013
16	20	17	11.2	17	24000	26000	0.01	K16X20X17	K 16x20x17	K16X20X17	FWF-162017
16	22	12	11	12.5	22000	26000	0.01	K16X22X12	K 16x22x12	K16X22X12	FWF-162212
16	22	16	14.2	17.6	22000	26000	0.012	K16X22X16	K 16x22x16	K16X22X16	-
16	22	20	17.6	22.8	22000	26000	0.017	K16X22X20	K 16x22x20	K16X22X20	FWF-162220
16	24	20	20.5	23.6	22000	24000	0.022	K16X24X20	K 16x24x20	K16X24X20	FWF-162420
17	21	10	7.81	10.8	22000	26000	0.0055	K17X21X10	K 17x21x10	K17X21X10	-



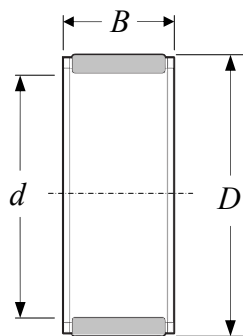
NEEDLE ROLLER BEARINGS
Needle Roller & Cage Assemblies

Table 113
Diameter 17mm - 26mm

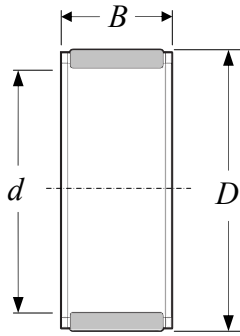
Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic	Static	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			C	C ₀	r/min		kg				
17	21	13	10.1	14.6	22000	26000	0.0065	K17X21X13	K 17x21x13	K17X21X13	FWJ-172113
17	21	17	11.7	18.3	22000	26000	0.0095	K17X21X17	K 17x21x17	K17X21X17	FWF-172117
18	22	10	8.09	11.4	22000	24000	0.006	K18X22X10	K 18x22x10	K18X22X10	FWF-182210
18	22	13	8.8	12.9	22000	24000	0.008	K18X22X13	K 18x22x13	K18X22X13	FWF-182213
18	22	17	11.7	18.3	22000	24000	0.011	K18X22X17	K 18x22x17	K18X22X17	FWF-182217
18	24	12	12.1	15	20000	24000	0.012	K18X24X12	K 18x24x12	K18X24X12	FWF-182412
18	24	13	12.5	15.3	20000	24000	0.013	K18X24X13	K 18x24x13	K18X24X13	FWF-182413
18	24	20	19.4	27	20000	24000	0.018	K18X24X20	K 18x24x20	K18X24X20	FWF-182420
18	25	22	22	29	20000	24000	0.023	K18X25X22	K 18x25x22	K18X25X22	FWF-182522
19	23	13	9.13	13.7	20000	24000	0.008	K19X23X13	K 19x23x13	K19X23X13	FWF-192313
19	23	17	12.1	19.3	20000	24000	0.011	K19X23X17	K 19x23x17	K19X23X17	FWF-192317
20	24	10	8.58	12.9	20000	22000	0.0065	K20X24X10	K 20x24x10	K20X24X10	FWF-202410
20	24	13	9.52	14.6	20000	22000	0.009	K20X24X13	K 20x24x13	K20X24X13	FWF-202413
20	24	17	12.5	20.8	20000	22000	0.012	K20X24X17	K 20x24x17	K20X24X17	FWF-202417
20	26	12	12.8	16.3	19000	22000	0.011	K20X26X12	K 20x26x12	K20X26X12	FWF-202612
20	26	13	13.8	18	19000	22000	0.012	K20X26X13	K 20x26x13	K20X26X13	FWF-202613
20	26	17	18.3	26	19000	22000	0.016	K20X26X17	K 20x26x17	K20X26X17	-
20	26	20	20.1	29	19000	22000	0.019	K20X26X20	K 20x26x20	K20X26X20	FWF-202620
20	28	16	19	22.4	18000	20000	0.02	K20X28X16	K 20x28x16	K20X28X16	-
20	28	20	22.9	28.5	18000	20000	0.027	K20X28X20	K 20x28x20	K20X28X20	FWF-202820
20	28	25	29.2	39	18000	20000	0.032	K20X28X25	K 20x28x25	K20X28X25	-
20	30	30	34.1	41.5	17000	20000	0.049	K20X30X30	K 20x30x30	K20X30X30	-
21	25	13	9.68	15.3	19000	22000	0.009	K21X25X13	K 21x25x13	K21X25X13	FWF-212513
22	26	10	8.8	13.7	18000	20000	0.0075	K22X26X10	K 22x26x10	K22X26X10	FWF-222610
22	26	13	10.1	16.3	18000	20000	0.0095	K22X26X13	K 22x26x13	K22X26X13	-
22	26	17	13.2	22.8	18000	20000	0.012	K22X26X17	K 22x26x17	K22X26X17	FWF-222617
22	28	17	18.3	27	17000	20000	0.018	K22X28X17	K 22x28x17	K22X28X17	FWF-222817
22	29	16	19.4	25.5	17000	19000	0.016	K22X29X16	K 22x29x16	K22X29X16	FWF-222916
22	30	15	19	23.6	17000	19000	0.018	K22X30X15-TV	K 22x30x15 TN	K22X30X15-TV	-
22	32	24	31.9	40	16000	18000	0.043	K22X32X24	K 22x32x24	K22X32X24	-
23	35	16	24.2	23.2	15000	17000	0.029	K23X35X16-TV	K 23x35x16 TN	K23X35X16-TV	-
24	28	10	9.35	15	17000	19000	0.0085	K24X28X10	K 24x28x10	K24X28X10	-
24	28	13	10.6	18	17000	19000	0.01	K24X28X13	K 24x28x13	K24X28X13	FWF-242813
24	28	17	14	25.5	17000	19000	0.013	K24X28X17	K 24x28x17	K24X28X17	FWF-242817
24	30	17	18.7	27.5	16000	18000	0.019	K24X30X17	K 24x30x17	K24X30X17	FWF-243017
24	30	31	26.4	43	16000	18000	0.032	-	K 24x30x31 ZW	-	-
25	29	10	9.52	15.6	16000	18000	0.0085	K25X29X10	K 25x29x10	K25X29X10	FWF-252910
25	29	13	10.8	18.6	16000	18000	0.011	K25X29X13	K 25x29x13	K25X29X13	FWF-252913
25	29	17	14.2	26.5	16000	18000	0.014	K25X29X17	K 25x29x17	K25X29X17	FWF-252917
25	30	17	17.9	30.5	16000	18000	0.016	K25X30X17	K 25x30x17	K25X30X17	FWF-253017
25	30	20	20.9	36.5	16000	18000	0.018	K25X30X20	K 25x30x20	K25X30X20	FWF-253020
25	30	26	20.5	36	16000	18000	0.019	-	K 25x30x26 ZW	-	-
25	31	17	18.7	28.5	16000	18000	0.019	K25X31X17	K 25x31x17	K25X31X17	FWF-253117
25	31	21	23.3	38	16000	18000	0.02	K25X31X21	K 25x31x21	K25X31X21	-
25	32	16	19.8	27.5	15000	17000	0.021	K25X32X16	K 25x32x16	K25X32X16	FWF-253216
25	33	20	27.5	38	15000	17000	0.033	K25X33X20	K 25x33x20	K25X33X20	FWJ-253320
25	33	24	31.9	47.5	15000	17000	0.039	K25X33X24	K 25x33x24	K25X33X24	FWJ-253324
25	35	30	44.6	62	15000	17000	0.065	K25X35X30	K 25x35x30	K25X35X30	-
26	30	13	11.2	19.6	16000	18000	0.011	K26X30X13	K 26x30x13	K26X30X13	FWF-263013
26	30	17	14.7	27.5	16000	18000	0.015	K26X30X17	K 26x30x17	K26X30X17	FWF-263017

NEEDLE ROLLER BEARINGS
Needle Roller & Cage Assemblies

Table 114
Diameter 26mm - 42mm



Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic	Static	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			C	C ₀	r/min		kg				
26	30	22	15.1	29	16000	18000	0.012		K 26x30x22 ZW		
28	33	13	14.7	24.5	14000	16000	0.013	K28X33X13	K 28x33x13	K28X33X13	FWF-283313
28	33	17	19	33.5	14000	16000	0.017	K28X33X17	K 28x33x17	K28X33X17	FWF-283317
28	34	17	20.9	33.5	14000	16000	0.024	K28X34X17	K 28x34x17	K28X34X17	FWF-283417
28	35	16	20.5	30	14000	16000	0.024	K28X35X16	K 28x35x16	K28X35X16	-
28	35	18	22.9	34.5	14000	16000	0.027	K28X35X18	K 28x35x18	K28X35X18	-
28	40	25	42.9	55	13000	15000	0.07	K28X40X25	K 28x40x25	K28X40X25	-
30	34	13	11.9	22	14000	15000	0.014	K30X34X13	K 30x34x13	K30X34X13	-
30	35	13	15.1	25.5	13000	15000	0.014	K30X35X13	K 30x35x13	K30X35X13	FWF-303513
30	35	17	18.7	34	13000	15000	0.019	K30X35X17	K 30x35x17	K30X35X17	FWF-303517A
30	35	27	29.2	60	13000	15000	0.03	K30X35X27	K 30x35x27	K30X35X27	FWF-303527
30	37	16	22	33.5	13000	15000	0.027	K30X37X16	K 30x37x16	K30X37X16	FWF-303716
30	37	18	25.1	39	13000	15000	0.03	K30X37X18	K 30x37x18	K30X37X18	-
30	40	18	30.3	40	12000	14000	0.048	K30X40X18	K 30x40x18	K30X40X18	-
30	40	30	46.8	69.5	12000	14000	0.073	K30X40X30	K 30x40x30	K30X40X30	-
32	37	13	14.7	25.5	13000	14000	0.018	K32X37X13	K 32x37x13	K32X37X13	FWF-323713
32	37	17	19	35.5	13000	14000	0.019	K32X37X17	K 32x37x17	K32X37X17	FWJ-323717
32	37	27	28.6	60	13000	14000	0.03	K32X37X27	K 32x37x27	K32X37X27	FWJ-323727
32	38	20	25.1	45	12000	14000	0.03	K32X38X20	K 32x38x20	K32X38X20	FWF-323820
32	39	16	22.9	35.5	12000	14000	0.037	K32X39X16	K 32x39x16	K32X39X16	FWJ-323916
32	39	18	25.5	41.5	12000	14000	0.031	K32X39X18	K 32x39x18	K32X39X18	-
32	40	25	35.8	58.5	12000	14000	0.049	K32X40X25	K 32x40x25	K32X40X25	-
32	40	42	48.4	83	14000	12000	0.077	-	K 32x40x42 ZWTN	-	-
32	46	32	62.7	83	11000	13000	0.119	K32X46X32	K 32x46x32	K32X46X32	-
35	40	13	15.4	28	12000	13000	0.019	K35X40X13	K 35x40x13	K35X40X13	FWF-354013
35	40	17	19.8	39	12000	13000	0.021	K35X40X17	K 35x40x17	K35X40X17	FWF-354017
35	40	25	28.1	60	12000	13000	0.031	K35X40X25	K 35x40x25	K35X40X25	FBN-354025
35	40	27	23.8	49	12000	13000	0.039	K35X40X27-TV	K 35x40x27 TN	K35X40X27-TV	FWF-354027
35	42	16	23.3	37.5	11000	13000	0.034	K35X42X16	K 35x42x16	K35X42X16	FWF-354216
35	42	18	26.4	44	11000	13000	0.034	K35X42X18	K 35x42x18	K35X42X18	FWF-354218
35	42	20	29.2	50	11000	13000	0.037	K35X42X20	K 35x42x20	K35X42X20	FWJ-354220
35	42	30	37.4	68	11000	13000	0.067	K35X42X30	K 35x42x30	K35X42X30	FWF-354230
35	45	20	35.2	50	11000	12000	0.056	K35X45X20	K 35x45x20	K35X45X20	-
35	45	30	50.1	80	11000	12000	0.08	K35X45X30	K 35x45x30	K35X45X30	-
37	42	17	21.6	43	11000	13000	0.022	K37X42X17	K 37x42x17	K37X42X17	FWJ-374217
38	43	17	19.8	39	11000	12000	0.029	K38X43X17	K 38x43x17	K38X43X17	FWF-384317
38	43	27	30.3	68	11000	12000	0.043	K38X43X27	K 38x43x27	K38X43X27	FWF-384327
38	46	20	34.1	57	10000	12000	0.047	K38X46X20	K 38x46x20	K38X46X20	FWF-384620
38	46	32	52.3	100	10000	12000	0.076	K38X46X32	K 38x46x32	K38X46X32	FWF-384632
39	44	26	26	57	10000	12000	0.045	-	K 39x44x26 ZW	-	-
40	45	13	16.8	32.5	10000	12000	0.022	K40X45X13	K 40x45x13	K40X45X13	FWF-404513
40	45	17	20.5	41.5	10000	12000	0.031	K40X45X17	K 40x45x17	K40X45X17	FWF-404517A
40	45	27	31.4	73.5	10000	12000	0.046	K40X45X27	K 40x45x27	K40X45X27	FWF-404527
40	47	18	28.6	50	10000	11000	0.039	K40X47X18	K 40x47x18	K40X47X18	-
40	47	20	31.4	57	10000	11000	0.042	K40X47X20	K 40x47x20	K40X47X20	-
40	48	20	34.7	58.5	10000	11000	0.049	K40X48X20	K 40x48x20	K40X48X20	FWF-404820
42	47	13	17.2	33.5	10000	11000	0.018	K42X47X13	K 42x47x13	K42X47X13	-
42	47	17	20.9	43	10000	11000	0.032	K42X47X17	K 42x47x17	K42X47X17	FBN-424717
42	47	30	31.9	76.5	10000	11000	0.054	-	K 42x47x30 ZW	-	-
42	50	20	31.9	54	9500	11000	0.053	K42X50X20	K 42x50x20	K42X50X20	FWF-425020



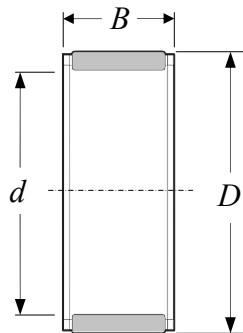
NEEDLE ROLLER BEARINGS
Needle Roller & Cage Assemblies

Table 115
Diameter 43mm - 70mm

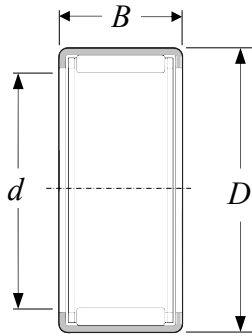
Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic	Static	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			C	C ₀	r/min		kg				
43	48	17	20.9	43	9500	11000	0.03	K43X48X17	K 43x48x17	K43X48X17	FWF-434817
43	48	27	31.9	76.5	9500	11000	0.05	K43X48X27	K 43x48x27	K43X48X27	FWF-434827
45	50	17	21.6	46.5	9000	10000	0.034	K45X50X17	K 45x50x17	K45X50X17	FWF-455017
45	50	27	33	81.5	9000	10000	0.051	K45X50X27	K 45x50x27	K45X50X27	FWF-455027
45	52	18	30.3	57	9000	10000	0.042	K45X52X18	K 45x52x18	K45X52X18	-
45	53	20	37.4	68	9000	10000	0.055	K45X53X20	K 45x53x20	K45X53X20	FWF-455320
45	53	21	36.9	67	9000	10000	0.06	K45X53X21	K 45x53x21	K45X53X21	-
45	53	28	49.5	98	9000	10000	0.081	K45X53X28	K 45x53x28	K45X53X28	-
45	59	18	44	53	8500	9500	0.072	K45X59X18-TV	K 45x59x18 TN	K45X59X18-TV	-
45	59	32	69.3	102	8500	9500	0.148	K45X59X32	K 45x59x32	K45X59X32	-
47	52	17	22.4	49	9000	10000	0.035	K47X52X17	K 47x52x17	K47X52X17	FWF-475217
47	52	27	33.6	83	9000	10000	0.051	K47X52X27	K 47x52x27	K47X52X27	FWF-475227
50	55	13.5	17.6	36.5	8500	9500	0.03	K50X55X13,5	K 50x55x13.5	K50X55X13,5	-
50	55	17	21.2	47.5	8500	9500	0.035	K50X55X17	K 50x55x17	K50X55X17	-
50	55	20	25.5	60	8500	9500	0.043	K50X55X20	K 50x55x20	K50X55X20	FWF-505520
50	55	30	37.4	98	8500	9500	0.065	K50X55X30	K 50x55x30	K50X55X30	FWF-505530
50	57	18	31.9	64	8000	9000	0.047	K50X57X18	K 50x57x18	K50X57X18	-
50	58	20	34.1	62	8000	9000	0.075	K50X58X20	K 50x58x20	K50X58X20	FWF-505820
50	58	25	41.8	81.5	8000	9000	0.09	K50X58X25	K 50x58x25	K50X58X25	FWF-505825
52	57	12	17.2	36.5	8000	9000	0.024	K52X57X12	K 52x57x12	K52X57X12	-
55	60	20	27	67	7500	8500	0.04	K55X60X20	K 55x60x20	K55X60X20	FWF-556020
55	60	27	35.8	96.5	7500	8500	0.06	K55X60X27	K 55x60x27	K55X60X27	FWF-556027
55	60	30	39.6	108	7500	8500	0.071	K55X60X30	K 55x60x30	K55X60X30	FWF-556030
55	62	18	34.1	71	7500	8500	0.052	K55X62X18	K 55x62x18	K55X62X18	-
55	63	20	38	75	7500	8500	0.067	K55X63X20	K 55x63x20	K55X63X20	FWF-556320
55	63	25	48.4	102	7500	8500	0.08	K55X63X25	K 55x63x25	K55X63X25	FWF-556325
55	63	32	59.4	129	7500	8500	0.1	K55X63X32	K 55x63x32	K55X63X32	-
58	65	18	33.6	71	7000	8000	0.052	K58X65X18	K 58x65x18	K58X65X18	-
58	65	36	47.3	108	7000	8000	0.13	-	K 58x65x36 ZW	-	-
60	65	20	28.1	72	7000	8000	0.052	K60X65X20	K 60x65x20	K60X65X20	FWF-606520
60	65	30	41.3	116	7000	8000	0.077	K60X65X30	K 60x65x30	K60X65X30	-
60	66	33	44	112	7000	8000	0.1	-	K 60x66x33 ZW	-	-
60	66	40	55	150	7000	8000	0.12	-	K 60x66x40 ZW	-	-
60	68	20	41.8	86.5	6700	7500	0.071	K60X68X20	K 60x68x20	K60X68X20	FWF-606820
60	68	23	47.3	102	6700	7500	0.094	K60X68X23	K 60x68x23	K60X68X23	FWF-606823
60	68	25	51.2	112	6700	7500	0.089	K60X68X25	K 60x68x25	K60X68X25	FWF-606825
60	68	30	42.9	88	6700	7500	0.13	-	K 60x68x30 ZW	-	-
60	75	42	112	196	6300	7500	0.24	K60X75X42	K 60x75x42	K60X75X42	-
62	70	40	62.7	146	6700	7500	0.17	-	K 62x70x40 ZW	-	-
64	70	16	26.4	60	6300	7500	0.053	K64X70X16	K 64x70x16	K64X70X16	-
65	70	20	29.2	76.5	6300	7500	0.056	K65X70X20	K 65x70x20	K65X70X20	FBN-657020
65	70	30	41.8	125	6300	7500	0.083	K65X70X30	K 65x70x30	K65X70X30	FWF-657030
65	73	23	41.8	90	6300	7000	0.11	K65X73X23	K 65x73x23	K65X73X23	-
65	73	30	53.9	125	6300	7000	0.14	K65X73X30	K 65x73x30	K65X73X30	FWF-657330
68	74	20	33.6	83	6000	7000	0.071	K68X74X20	K 68x74x20	K68X74X20	FBN-687420
68	74	30	44.6	118	6000	7000	0.1	K68X74X30	K 68x74x30	K68X74X30	FWF-687430
68	74	35	46.8	125	7000	6000	0.12	-	K 68x74x35 ZW	-	-
70	76	20	34.1	86.5	6000	6700	0.071	K70X76X20	K 70x76x20	K70X76X20	FWF-707620
70	76	30	50.1	140	6000	6700	0.11	K70X76X30	K 70x76x30	K70X76X30	FWF-707630
70	78	30	57.2	137	6000	6700	0.15	K70X78X30	K 70x78x30	K70X78X30	FWF-707830

NEEDLE ROLLER BEARINGS
Needle Roller & Cage Assemblies

Table 116
Diameter 72mm - 265mm



Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic	Static	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			C	C_0	r/min		kg				
72	80	20	39.6	85	5600	6300	0.098	K72X80X20	K 72x80x20	K72X80X20	-
73	79	20	35.2	90	5600	6300	0.075	K73X79X20	K 73x79x20	K73X79X20	FBN-737920
75	81	20	35.8	93	5600	6300	0.079	K75X81X20	K 75x81x20	K75X81X20	FBN-758120
75	81	30	50.1	143	5600	6300	0.11	K75X81X30	K 75x81x30	K75X81X30	FWF-758130
75	83	23	47.3	110	5300	6300	0.12	K75X83X23	K 75x83x23	K75X83X23	-
75	83	30	59.4	143	5300	6300	0.15	K75X83X30	K 75x83x30	K75X83X30	FWF-758330
75	83	35	60.5	146	6300	5300	0.182	-	K 75x83x35 ZW	-	-
75	83	40	69.3	176	6300	5300	0.211	-	K 75x83x40 ZW	-	FWF-788540
80	86	20	36.9	98	5300	6000	0.06	K80X86X20	K 80x86x20	K80X86X20	FWF-808620
80	88	30	68.2	176	5000	6000	0.14	K80X88X30	K 80x88x30	K80X88X30	FWF-808830
80	88	40	72.1	193	6000	5000	0.227	-	K 80x88x40 ZW	-	-
80	88	46	84.2	232	6000	5000	0.26	-	K 80x88x46 ZW	-	-
85	92	20	42.9	108	4800	5600	0.1	K85X92X20	K 85x92x20	K85X92X20	-
90	97	20	42.9	114	4500	5300	0.11	K90X97X20	K 90x97x20	K90X97X20	-
90	98	27	58.3	150	4500	5300	0.15	K90X98X27	K 90x98x27	K90X98X27	-
90	98	30	64.4	173	4500	5300	0.17	K90X98X30	K 90x98x30	K90X98X30	FWF-909830
95	103	30	66	180	4300	5000	0.17	K95X103X30	K 95x103x30	K95X103X30	FWF-9510330
95	103	40	79.2	228	5000	4300	0.266	-	K 95x103x40 ZW	-	-
100	107	21	45.7	127	4000	4800	0.12	K100X107X21	K 100x107x21	K100X107X21	-
100	108	27	55	143	4000	4800	0.19	K100X108X27	K 100x108x27	K100X108X27	-
100	108	30	67.1	190	4000	4800	0.18	K100X108X30	K 100x108x30	K100X108X30	FWF-10010830
105	112	21	45.7	129	4000	4500	0.13	K105X112X21	K 105x112x21	K105X112X21	-
110	117	24	53.9	160	3800	4300	0.17	K110X117X24	K 110x117x24	K110X117X24	-
110	118	30	73.7	220	3800	4300	0.22	K110X118X30	K 110x118x30	K110X118X30	FWF-11011830
115	123	27	60.5	170	3600	4000	0.2	K115X123X27	K 115x123x27	K115X123X27	-
120	127	24	56.1	176	3400	4000	0.17	K120X127X24	K 120x127x24	K120X127X24	-
125	133	35	82.5	260	3200	3800	0.28	K125X133X35	K 125x133x35	K125X133X35	FWF-12513335
130	137	24	58.3	186	3200	3600	0.17	K130X137X24	K 130x137x24	K130X137X24	-
135	143	35	88	290	3000	3400	0.3	K135X143X35	K 135x143x35	K135X143X35	-
145	153	26	70.4	224	2800	3200	0.26	K145X153X26	K 145x153x26	K145X153X26	-
150	160	46	140	475	2800	3000	0.57	K150X160X46	K 150x160x46	K150X160X46	-
155	163	26	72.1	236	2600	3000	0.27	K155X163X26	K 155x163x26	K155X163X26	-
160	170	46	145	510	2600	2800	0.55	K160X170X46	K 160x170x46	K160X170X46	-
165	173	26	76.5	265	2400	2800	0.32	K165X173X26	K 165x173x26	K165X173X26	-
175	183	32	95.2	355	2400	2600	0.4	K175X183X32	K 175x183x32	K175X183X32	-
185	195	37	123	425	2200	2400	0.61	K185X195X37	K 185x195x37	K185X195X37	-
195	205	37	125	450	2000	2400	0.62	K195X205X37	K 195x205x37	K195X205X37	-
210	220	42	147	560	1900	2200	0.74	K210X220X42	K 210x220x42	K210X220X42	-
220	230	42	151	585	1800	2000	0.79	K220X230X42	K 220x230x42	K220X230X42	-
240	250	42	157	630	1700	1900	0.85	K240X250X42	K 240x250x42	K240X250X42	-
265	280	50	242	850	1500	1700	1.8	K265X280X50	K 265x280x50	K265X280X50	-



NEEDLE ROLLER BEARINGS

Drawn Cup

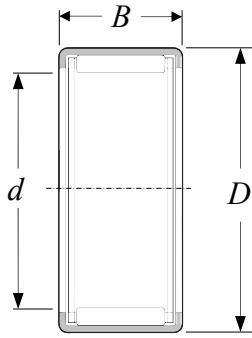
Table 117
Diameter 3mm - 30mm

Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic	Static	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			C	C_0	r/min		kg				
3	6.5	6	1.23	0.88	24000	26000	0.001	HK0306-TV	HK 0306 TN	HK0306-TV	FJP-36
4	8	8	1.76	1.37	22000	26000	0.002	HK0408	HK 0408	HK0408	FJP-48
5	9	9	2.38	2.08	22000	24000	0.002	HK0509	HK 0509	HK0509	FJ-59
6	10	6	1.72	1.29	22000	20000	0.0015	HK0606	HK 0606	HK0606	-
6	10	8	2.01	1.73	20000	22000	0.0021	HK0608	HK 0608	HK0608	-
6	10	9	2.81	2.7	20000	22000	0.0025	HK0609	HK 0609	HK0609	FJ-69
7	11	9	3.03	3.05	20000	22000	0.0026	HK0709	HK 0709	HK0709	FJ-79
8	12	8	2.7	2.75	19000	22000	0.0027	HK0808	HK 0808	HK0808	FJ-88-2
8	12	10	3.69	4.05	19000	22000	0.003	HK0810	HK 0810	HK0810	FJ-810
9	13	8	3.52	3.9	20000	20000	0.003	HK0908	HK 0908	HK0908	-
9	13	10	4.13	4.8	18000	20000	0.004	HK0910	HK 0910	HK0910	FJ-910
9	13	12	5.12	6.4	18000	20000	0.0046	HK0912	HK 0912	HK0912	-
10	14	10	4.29	5.3	18000	20000	0.0041	HK1010	HK 1010	HK1010	FJ-1010
10	14	12	5.39	6.95	18000	20000	0.0048	HK1012	HK 1012	HK1012	-
10	14	15	6.6	9	18000	20000	0.006	HK1015	HK 1015	HK1015	FJ-1015L
12	16	10	4.84	6.4	16000	18000	0.0046	HK1210	HK 1210	HK1210	FJ-1210
12	18	12	6.27	7.35	16000	18000	0.009	HK1212	HK 1212	HK1212	FJH-1212
13	19	12	6.6	8	16000	17000	0.01	HK1312	HK 1312	HK1312	FJ-1312
14	20	12	6.82	8.65	15000	17000	0.011	HK1412	HK 1412	HK1412	FJ-1412
15	21	12	7.65	9.5	15000	16000	0.011	HK1512	HK 1512	HK1512	FJ-1512
15	21	16	10.1	14.6	15000	16000	0.015	HK1516	HK 1516	HK1516	FJ-1516
15	21	22	13	20	15000	16000	0.02	HK1522-ZW	HK 1522	HK1522-ZW	-
16	22	12	7.37	9.8	14000	16000	0.012	HK1612	HK 1612	HK1612	FJ-1612
16	22	16	10.5	15.6	14000	16000	0.016	HK1616	HK 1616	HK1616	FJ-1616
16	22	22	12.8	19.6	14000	16000	0.022	HK1622-ZW	HK 1622	HK1622-ZW	-
17	23	12	7.65	10.6	14000	15000	0.012	HK1712	HK 1712	HK1712	FJ-1712
18	24	12	7.92	11.2	13000	15000	0.013	HK1812	HK 1812	HK1812	FJ-1812
18	24	16	11.2	17.6	13000	15000	0.018	HK1816	HK 1816	HK1816	FJ-1816
20	26	10	6.16	8.5	12000	14000	0.012	HK2010	HK 2010	HK2010	-
20	26	12	8.42	12.5	12000	14000	0.014	HK2012	HK 2012	HK2012	FJ-2012
20	26	16	12.3	20.4	12000	14000	0.019	HK2016	HK 2016	HK2016	FJ-2016
20	26	20	15.1	26.5	12000	14000	0.024	HK2020	HK 2020	HK2020	FJ-2020
20	26	30	20.9	40.5	12000	14000	0.035	HK2030-ZW	HK 2030	HK2030-ZW	-
22	28	10	7.21	10.6	11000	12000	0.013	HK2210	HK 2210	HK2210	-
22	28	12	8.8	13.7	11000	12000	0.015	HK2212	HK 2212	HK2212	FJ-2212
22	28	16	13	22.4	11000	12000	0.021	HK2216	HK 2216	HK2216	FJ-2216
22	28	20	15.7	29	11000	12000	0.026	HK2220	HK 2220	HK2220	FJ-2220
25	32	12	10.5	15.3	9500	11000	0.02	HK2512	HK 2512	HK2512	-
25	32	16	15.1	24	9500	11000	0.027	HK2516	HK 2516	HK2516	FJ-2516
25	32	20	19	32.5	9500	11000	0.033	HK2520	HK 2520	HK2520	FJ-2520
25	32	26	24.2	45	9500	11000	0.044	HK2526	HK 2526	HK2526	FJ-2526
25	32	38	33	65.5	9500	11000	0.064	HK2538-ZW	HK 2538	HK2538-ZW	-
28	35	16	15.7	26.5	9000	9500	0.029	HK2816	HK 2816	HK2816	FJ-2816
28	35	20	20.1	36.5	9000	9500	0.036	HK2820	HK 2820	HK2820	FJ-2820
30	37	12	11.7	18.3	8000	9000	0.023	HK3012	HK 3012	HK3012	-
30	37	16	16.5	29	8000	9000	0.031	HK3016	HK 3016	HK3016	FJ-3016L
30	37	20	20.9	40	8000	9000	0.039	HK3020	HK 3020	HK3020	FJ-3020
30	37	22	23.8	46.5	9000	8000	0.042	HK3022	HK 3022	HK3022	-
30	37	26	27	54	8000	9000	0.051	HK3026	HK 3026	HK3026	FJ-3026
30	37	38	35.8	80	8000	9000	0.076	HK3038-ZW	HK 3038	HK3038-ZW	-

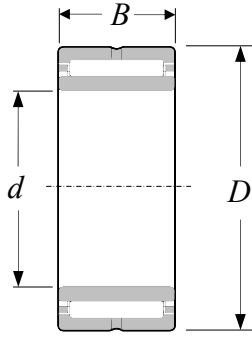
NEEDLE ROLLER BEARINGS

Drawn Cup

Table 118
Diameter 32mm - 60mm



Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic	Static	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			C	C ₀	r/min		kg				
32	39	20	22	43	8500	7500	0.041	HK3220	HK 3220	HK3220	-
32	39	24	26.4	54	8500	7500	0.049	HK3224	HK 3224	HK3224	-
35	42	12	12.5	21.6	7000	8000	0.027	HK3512	HK 3512	HK3512	FJ-3512
35	42	16	17.9	34	7000	8000	0.036	HK3516	HK 3516	HK3516	FJ-3516
35	42	20	22.9	46.5	7000	8000	0.044	HK3520	HK 3520	HK3520	FJ-3520
40	47	12	13.4	24.5	6300	7000	0.03	HK4012	HK 4012	HK4012	-
40	47	16	19	39	6300	7000	0.039	HK4016	HK 4016	HK4016	FJ-4016
40	47	20	24.2	53	6300	7000	0.054	HK4020	HK 4020	HK4020	FJ-4020
45	52	12	14.2	27.5	5600	6300	0.033	HK4512	HK 4512	HK4512	-
45	52	16	20.5	43	5600	6300	0.046	HK4516	HK 4516	HK4516	FJ-4516
45	52	20	26	60	5600	6300	0.056	HK4520	HK 4520	HK4520	FJ-4520
50	58	20	29.2	63	5000	5600	0.07	HK5020	HK 5020	HK5020	FJ-5020L
50	58	25	36.9	85	5000	5600	0.09	HK5025	HK 5025	HK5025	-
55	63	20	30.3	67	4500	5000	0.074	HK5520	HK 5520	HK5520	FJ-5520
55	63	28	41.8	104	4500	5000	0.11	HK5528	HK 5528	HK5528	-
60	68	12	17.6	32	4300	4800	0.049	HK6012	HK 6012	HK6012	-
60	68	20	31.9	75	4300	4800	0.081	HK6020	HK 6020	HK6020	-
60	68	32	51.2	137	4300	4800	0.14	HK6032	HK 6032	HK6032	-



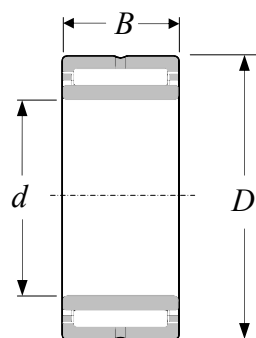
NEEDLE ROLLER BEARINGS
Solid Needle Roller Bearings

Table 119
Diameter 10mm - 120mm

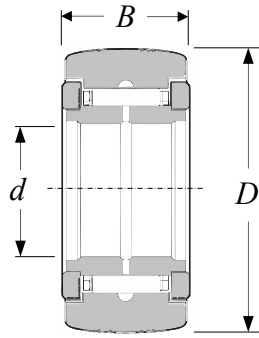
Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic	Static	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			C	C ₀	r/min		kg				
10	22	13	8.8	10.4	24000	28000	0.023	NA 4900	NA 4900	NA 4900	NA 4900
12	24	13	9.9	12.2	22000	26000	0.026	NA 4901	NA 4901	NA 4901	NA 4901
12	24	22	16.1	23.2	22000	26000	0.046	NA 6901	NA 6901	NA 6901	NA 6901
15	28	13	11.2	15.3	19000	22000	0.034	NA 4902	NA 4902	NA 4902	NA 4902
15	28	23	17.2	27	19000	22000	0.064	NA 6902	NA 6902	NA 6902	NA 6902
17	30	13	11.4	16.3	18000	20000	0.037	NA 4903	NA 4903	NA 4903	NA 4903
17	30	23	18.7	30.5	18000	20000	0.072	NA 6903	NA 6903	NA 6903	NA 6903
20	37	17	21.6	28	15000	17000	0.075	NA 4904	NA 4904	NA 4904	NA 4904
20	37	30	35.2	53	15000	17000	0.14	NA 6904	NA 6904	NA 6904	NA 6904
22	39	17	23.3	32	14000	15000	0.08	NA 49/22	NA 49/22	NA 49/22	NA 49/22
22	39	30	36.9	57	14000	15000	0.15	NA 69/22	NA 69/22	NA 69/22	NA 69/22
25	42	17	24.2	34.5	13000	15000	0.088	NA 4905	NA 4905	NA 4905	NA 4905
25	42	30	38	62	13000	15000	0.16	NA 6905	NA 6905	NA 6905	NA 6905
28	45	17	25.1	36.5	12000	14000	0.098	NA 49/28	NA 49/28	NA 49/28	NA 49/28
28	45	30	39.6	65.5	12000	14000	0.18	NA 69/28	NA 69/28	NA 69/28	NA 69/28
30	47	17	25.5	39	11000	13000	0.1	NA 4906	NA 4906	NA 4906	NA 4906
30	47	30	42.9	75	11000	13000	0.19	NA 6906	NA 6906	NA 6906	NA 6906
32	52	20	30.8	51	10000	11000	0.16	NA 49/32	NA 49/32	NA 49/32	NA 49/32
32	52	36	47.3	90	10000	11000	0.29	NA 69/32	NA 69/32	NA 69/32	NA 69/32
35	55	20	31.9	54	9500	11000	0.17	NA 4907	NA 4907	NA 4907	NA 4907
35	55	36	48.4	93	9500	11000	0.31	NA 6907	NA 6907	NA 6907	NA 6907
40	62	22	42.9	71	8000	9500	0.23	NA 4908	NA 4908	NA 4908	NA 4908
40	62	40	67.1	125	8000	9500	0.43	NA 6908	NA 6908	NA 6908	NA 6908
45	68	22	45.7	78	7500	8500	0.27	NA 4909	NA 4909	NA 4909	NA 4909
45	68	40	70.4	137	7500	8500	0.5	NA 6909	NA 6909	NA 6909	NA 6909
50	72	22	47.3	85	7000	8000	0.27	NA 4910	NA 4910	NA 4910	NA 4910
50	72	40	73.7	150	7000	8000	0.52	NA 6910	NA 6910	NA 6910	NA 6910
55	80	25	57.2	106	6300	7000	0.39	NA 4911	NA 4911	NA 4911	NA 4911
55	80	45	89.7	190	6300	7000	0.78	NA 6911	NA 6911	NA 6911	NA 6911
60	85	25	60.5	114	6000	6700	0.43	NA 4912	NA 4912	NA 4912	NA 4912
60	85	45	93.5	204	6000	6700	0.81	NA 6912	NA 6912	NA 6912	NA 6912
65	90	25	61.6	120	5600	6300	0.46	NA 4913	NA 4913	NA 4913	NA 4913
65	90	45	95.2	212	5600	6300	0.83	NA 6913	NA 6913	NA 6913	NA 6913
70	100	30	84.2	163	5000	5600	0.73	NA 4914	NA 4914	NA 4914	NA 4914
70	100	54	128	285	5000	5600	1.35	NA 6914	NA 6914	NA 6914	NA 6914
75	105	30	84.2	170	4800	5300	0.78	NA 4915	NA 4915	NA 4915	NA 4915
75	105	54	130	290	4800	5300	1.45	NA 6915	NA 6915	NA 6915	NA 6915
80	110	30	88	183	4500	5000	0.88	NA 4916	NA 4916	NA 4916	NA 4916
80	110	54	134	315	4500	5000	1.5	NA 6916	NA 6916	NA 6916	NA 6916
85	120	35	108	250	4000	4500	1.25	NA 4917	NA 4917	NA 4917	NA 4917
85	120	63	165	425	4000	4500	2.2	NA 6917	NA 6917	NA 6917	NA 6917
90	125	35	112	265	3800	4300	1.3	NA 4918	NA 4918	NA 4918	NA 4918
90	125	63	172	450	3800	4300	2.3	NA 6918	NA 6918	NA 6918	NA 6918
95	130	35	114	270	3600	4000	1.35	NA 4919	NA 4919	NA 4919	NA 4919
95	130	63	172	465	3600	4000	2.5	NA 6919	NA 6919	NA 6919	NA 6919
100	140	40	125	280	3400	4000	1.9	NA 4920	NA 4920	NA 4920	NA 4920
110	140	30	93.5	232	3400	3800	1.1	NA 4822	NA 4822	NA 4822	NA 4822
110	150	40	130	300	3200	3600	2.05	NA 4922	NA 4922	NA 4922	NA 4922
120	150	30	99	255	3200	3600	1.15	NA 4824	NA 4824	NA 4824	NA 4824
120	165	45	176	405	3000	3400	2.85	NA 4924	NA 4924	NA 4924	NA 4924

NEEDLE ROLLER BEARINGS
Solid Needle Roller Bearings

Table 120
Diameter 130mm - 380mm



Principal Dimensions			Basic Load Ratings		Speed Ratings		Mass	Designations			
d	D	B	Dynamic	Static	Ref. Speed	Limiting Speed		Local	SKF	FAG	NSK
mm			C	C_0	r/min		kg				
130	165	35	119	325	2800	3200	1.8	NA 4826	NA 4826	NA 4826	NA 4826
130	180	50	198	480	2600	3000	3.9	NA 4926	NA 4926	NA 4926	NA 4926
140	175	35	121	345	2600	3000	1.9	NA 4828	NA 4828	NA 4828	NA 4828
140	190	50	205	510	2400	2800	4.15	NA 4928	NA 4928	NA 4928	NA 4928
150	190	40	147	415	2400	2800	2.7	NA 4830	NA 4830	NA 4830	NA 4830
160	200	40	157	450	2200	2600	2.9	NA 4832	NA 4832	NA 4832	NA 4832
170	215	45	179	520	2200	2400	3.95	NA 4834	NA 4834	NA 4834	NA 4834
180	225	45	190	570	2000	2400	4.2	NA 4836	NA 4836	NA 4836	NA 4836
190	240	50	220	710	1900	2200	5.6	NA 4838	NA 4838	NA 4838	NA 4838
200	250	50	224	735	1800	2000	5.85	NA 4840	NA 4840	NA 4840	NA 4840
220	270	50	238	815	1700	1900	6.4	NA 4844	NA 4844	NA 4844	NA 4844
240	300	60	347	1120	1500	1700	10	NA 4848	NA 4848	NA 4848	NA 4848
260	320	60	358	1200	1400	1500	10.5	NA 4852	NA 4852	NA 4852	NA 4852
280	350	69	429	1320	1300	1400	15.5	NA 4856	NA 4856	NA 4856	NA 4856
300	380	80	594	1800	1100	1300	22	NA 4860	NA 4860	NA 4860	NA 4860
320	400	80	605	1900	1100	1200	23	NA 4864	NA 4864	NA 4864	NA 4864
340	420	80	616	1960	1000	1200	24	NA 4868	NA 4868	NA 4868	NA 4868
360	440	80	627	2040	950	1100	25.5	NA 4872	NA 4872	NA 4872	NA 4872
380	480	100	968	3000	900	1000	42.5	NA 4876	NA 4876	NA 4876	NA 4876



NEEDLE ROLLER BEARINGS

Cam Rollers

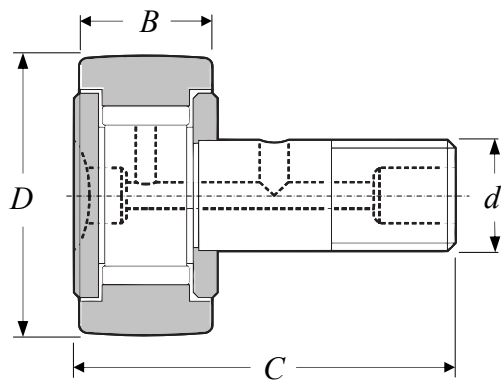
Table 121
Diameter 16mm - 310mm

Principal Dimensions			Basic Load Ratings		Limiting Speed	Mass	Designations			
D	d	B	Dynamic	Static			Local	SKF	FAG	NSK
mm	mm	mm	C	C ₀	r/min	kg				
16	5	11	3,14	3,2	6000	0,014	NATR 5	NATR 5	NATR 5	FYCJ-5
16	5	11	4,73	6,55	4300	0,015	NATV 5	NATR 5	NATR 5	FYCR-5
19	6	11	3,47	3,8	5600	0,02	NATR 6	NATR 6	NATR 6	FYCJ-6
19	6	11	5,28	8	4000	0,021	NATV 6	NATR 6	NATR 6	FYCR-6
24	8	14	5,28	6,1	5000	0,041	NATR 8	NATR 8	NATR 8	FYCJ-8
24	8	14	7,48	11,4	3600	0,042	NATV 8	NATR 8	NATR 8	FYCR-8
30	10	14	6,44	8	4800	0,064	NATR 10	NATR 10	NATR 10	FYCJ-10
30	10	14	8,97	14,6	3200	0,065	NATV 10	NATR 10	NATR 10	FYCR-10
32	12	14	6,6	8,5	4500	0,071	NATR 12	NATR 12	NATR 12	FYCJ-12
32	12	14	9,35	15,3	3000	0,072	NATV 12	NATR 12	NATR 12	FYCR-12
35	15	18	9,52	13,7	4000	0,10	NATR 15	NATR 15	NATR 15	FYCJ-15
35	15	18	12,3	23,2	2600	0,11	NATV 15	NATR 15	NATR 15	FYCR-15
35	15	18	16,8	17,6	5000	0,10	NUTR 15	NUTR 15 A	NUTR 15	-
42	15	18	20,1	23,2	5000	0,16	NUTR 1542	NUTR 1542 A	NUTR 1542	-
40	17	20	10,5	14,6	3400	0,14	NATR 17	NATR 17	NATR 17	FYCJ-17
40	17	20	14,2	26,5	2200	0,15	NATV 17	NATR 17	NATR 17	FYCR-17
40	17	20	19	22	4500	0,15	NUTR 17	NUTR 17 A	NUTR 17	-
47	17	20	22	27	4500	0,22	NUTR 1747	NUTR 1747 A	NUTR 1747	-
47	20	24	14,7	24,5	3000	0,25	NATR 20	NATR 20	NATR 20	FYCJ-20
47	20	24	19,4	41,5	1900	0,25	NATV 20	NATR 20	NATR 20	FYCR-20
47	20	24	28,6	33,5	3800	0,25	NUTR 20	NUTR 20 A	NUTR 20	-
52	20	24	31,9	39	3800	0,32	NUTR 2052	NUTR 2052 A	NUTR 2052	-
52	25	24	14,7	25,5	2400	0,28	NATR 25	NATR 25	NATR 25	FYCJ-25
52	25	24	19,8	44	1600	0,29	NATV 25	NATR 25	NATR 25	FYCR-25
52	25	24	29,7	36	3200	0,28	NUTR 25	NUTR 25 A	NUTR 25	-
62	25	24	35,8	48	3200	0,45	NUTR 2562	NUTR 2562 A	NUTR 2562	-
62	30	28	22,9	37,5	1800	0,47	NATR 30	NATR 30	NATR 30	FYCJ-30
62	30	28	29,2	62	1400	0,48	NATV 30	NATR 30	NATR 30	FYCR-30
62	30	28	41,3	47,5	2600	0,47	NUTR 30	NUTR 30 A	NUTR 30	-
72	30	28	48,4	61	2600	0,70	NUTR 3072	NUTR 3072 A	NUTR 3072	-
72	35	28	45,7	57	2000	0,63	NUTR 35	NUTR 35 A	NUTR 35	-
80	35	28	51,2	68	2000	0,84	NUTR 3580	NUTR 3580 A	NUTR 3580	-
80	40	30	57,2	72	1800	0,82	NUTR 40	NUTR 40 A	NUTR 40	-
90	40	30	68,2	91,5	1800	1,13	NUTR 4090	NUTR 4090 A	NUTR 4090	-
85	45	30	58,3	75	1700	0,88	NUTR 45	NUTR 45 A	NUTR 45	-
130	50	63	179	232	750	5,20	NNTR 50x130x65.2ZL	NNTR 50x130x65.2ZL	NNTR 50x130x65.2ZL	-
90	50	30	58,3	78	1600	0,95	NUTR 50	NUTR 50 A	NUTR 50	-
140	55	68	209	275	700	6,40	NNTR 55x140x70.2ZL	NNTR 55x140x70.2ZL	NNTR 55x140x70.2ZL	-
150	60	73	238	320	670	7,80	NNTR 60x150x75.2ZL	NNTR 60x150x75.2ZL	NNTR 60x150x75.2ZL	-
160	65	73	255	345	600	8,80	NNTR 65x160x75.2ZL	NNTR 65x160x75.2ZL	NNTR 65x160x75.2ZL	-
180	70	83	330	455	560	13,0	NNTR 70x180x85.2ZL	NNTR 70x180x85.2ZL	NNTR 70x180x85.2ZL	-
200	80	88	391	540	500	17,0	NNTR 80x200x90.2ZL	NNTR 80x200x90.2ZL	NNTR 80x200x90.2ZL	-
220	90	98	468	670	430	22,5	NNTR 90x220x100.2ZL	NNTR 90x220x100.2ZL	NNTR 90x220x100.2ZL	-
240	100	103	528	780	380	28,0	NNTR 100x240x105.2ZL	NNTR 100x240x105.2ZL	NNTR 100x240x105.2ZL	-
260	110	113	627	930	360	35,5	NNTR 110x260x115.2ZL	NNTR 110x260x115.2ZL	NNTR 110x260x115.2ZL	-
290	120	133	825	1270	320	53,0	NNTR 120x290x135.2ZL	NNTR 120x290x135.2ZL	NNTR 120x290x135.2ZL	-
310	130	144	952	1460	300	65	NNTR 130x310x146.2ZL	NNTR 130x310x146.2ZL	NNTR 130x310x146.2ZL	-

NEEDLE ROLLER BEARINGS

Cam Rollers

Table 122
Diameter 16mm - 90mm



Principal Dimensions				Basic Load Ratings		Limiting Speed	Mass	Designations			
D	d	B	C	Dynamic	Static			Local	SKF	FAG	NSK
mm				C	C ₀	r/min	kg				
16	6	28	11	3.14	3.2	6000	0.018	KR 16	KR 16	KR 16	FCJ-16
16	6	28	11	3.14	3.2	6000	0.018	KR 16 PP	KR 16 PPA	KR 16 PP	-
19	8	32	11	3.47	3.8	5600	0.029	KR 19	KR 19	KR 19	FCJ-19
19	8	32	11	3.47	3.8	5600	0.029	KR 19 PP	KR 19 PPA	KR 19 PP	-
22	10	36	12	4.4	5	5300	0.045	KR 22	KR 22 B	KR 22	FCJ-22
22	10	36	12	4.4	5	5300	0.043	KR 22 PP	KR 22 PPA	KR 22 PP	-
26	10	36	12	4.84	6	5300	0.059	KR 26	KR 26 B	KR 26	FCJ-26
26	10	36	12	4.84	6	5300	0.057	KR 26 PP	KR 26 PPA	KR 26 PP	-
30	12	40	14	6.44	8	4800	0.092	KR 30	KR 30 B	KR 30	FCJ-30
30	12	40	14	6.44	8	4800	0.088	KR 30 PP	KR 30 PPA	KR 30 PP	-
32	12	40	14	6.71	8.5	4800	0.1	KR 32	KR 32 B	KR 32	FCJ-32
32	12	40	14	6.71	8.5	4800	0.098	KR 32 PP	KR 32 PPA	KR 32 PP	-
35	16	52	18	9.52	13.7	4000	0.17	KR 35	KR 35 B	KR 35	FCJ-35
35	16	52	18	9.52	13.7	4000	0.16	KR 35 PP	KR 35 PPA	KR 35 PP	-
40	18	58	20	10.5	14.6	3400	0.25	KR 40	KR 40 B	KR 40	FCJ-40
40	18	58	20	10.5	14.6	3400	0.25	KR 40 PP	KR 40 PPA	KR 40 PP	-
47	20	66	24	14.7	24.5	3000	0.38	KR 47 PP	KR 47 PPA	KR 47 PP	FCJ-47
52	20	66	24	15.7	27	3000	0.45	KR 52 PP	KR 52 PPA	KR 52 PP	FCJ-52
62	24	80	29	24.6	44	2400	0.77	KR 62 PP	KR 62 PPA	KR 62 PP	FCJ-62
72	24	80	29	26	48	2400	1.05	KR 72 PP	KR 72 PPA	KR 72 PP	FCJ-72
80	30	100	35	36.9	72	1800	1.61	KR 80 PP	KR 80 PPA	KR 80 PP	FCJ-80
90	30	100	35	38	76.5	1800	1.98	KR 90 PP	KR 90 PPA	KR 90 PP	FCJ-90
16	6	28	11	4.73	6.55	4300	0.019	KRV 16 PP	KRV 16 PPA	KRV 16 PP	FCR-16
19	8	32	11	5.28	8	4000	0.031	KRV 19 PP	KRV 19 PPA	KRV 19 PP	FCR-19
22	10	36	12	6.05	9.15	3600	0.045	KRV 22 PP	KRV 22 PPA	KRV 22 PP	FCR-22
26	10	36	12	6.82	11	3600	0.059	KRV 26 PP	KRV 26 PPA	KRV 26 PP	FCR-26
30	12	40	14	8.97	14.6	3200	0.091	KRV 30 PP	KRV 30 PPA	KRV 30 PP	FCR-30
32	12	40	14	9.35	15.3	3200	0.1	KRV 32 PP	KRV 32 PPA	KRV 32 PP	FCR-32
35	16	52	18	12.3	23.2	2600	0.17	KRV 35 PP	KRV 35 PPA	KRV 35 PP	FCR-35
40	18	58	20	14.2	26.5	2200	0.25	KRV 40 PP	KRV 40 PPA	KRV 40 PP	FCR-40
47	20	66	24	19.4	41.5	1900	0.39	KRV 47 PP	KRV 47 PPA	KRV 47 PP	FCR-47
52	20	66	24	20.9	46.5	1900	0.46	KRV 52 PP	KRV 52 PPA	KRV 52 PP	FCR-52
62	24	80	29	31.4	72	1700	0.79	KRV 62 PP	KRV 62 PPA	KRV 62 PP	FCR-62
72	24	80	29	33	80	1700	1.03	KRV 72 PP	KRV 72 PPA	KRV 72 PP	FCR-72
80	30	100	35	45.7	114	1400	1.64	KRV 80 PP	KRV 80 PPA	KRV 80 PP	FCR-80
90	30	100	35	47.3	122	1400	2	KRV 90 PP	KRV 90 PPA	KRV 90 PP	FCR-90

APPENDICES CONTENTS

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

Tolerance Tables for Shaft Diameters

Tolerance Tables for Housing Bore Diameters



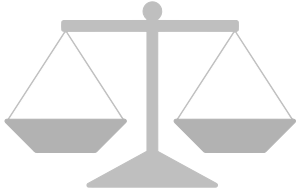
CONVERSION TABLE [N-kgf] [kg-lb]

<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

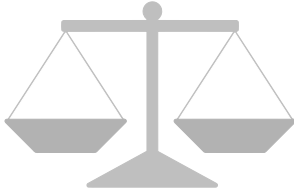
<i>kg</i>	-	<i>lb</i>	<i>kg</i>	-	<i>lb</i>
0.454	1	2.205	23.133	51	112.44
0.907	2	4.409	23.587	52	114.64
1.361	3	6.614	24.040	53	116.84
1.814	4	8.818	24.494	54	119.05
2.268	5	11.023	24.948	55	121.25
2.722	6	13.228	25.401	56	123.46
3.175	7	15.432	25.855	57	125.66
3.629	8	17.637	26.308	58	127.87
4.082	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											
1/64	0.015625	0.3969	25.4000	50.8000	76.2000	101.6000	127.0000	152.4000	177.8000	203.2000	228.6000	254.0000	
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	
1/16	0.0625	1.5875	26.9875	52.3875	77.7875	103.1875	128.5875	153.9875	179.3875	204.7875	230.1875	255.5875	
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	
1/8	0.125	3.1750	28.5750	53.9750	79.3750	104.7750	130.1750	155.5750	180.9750	206.3750	231.7750	257.1750	
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	
3/16	0.1875	4.7625	30.1625	55.5625	80.9625	106.3625	131.7625	157.1625	182.5625	207.9625	233.3625	258.7625	
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	
1/4	0.25	6.3500	31.7500	57.1500	82.5500	107.9500	133.3500	158.7500	184.1500	209.5500	234.9500	260.3500	
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	
5/16	0.3125	7.9375	33.3375	58.7375	84.1375	109.5375	134.9375	160.3375	185.7375	211.1375	236.5375	261.9375	
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	
3/8	0.375	9.5250	34.9250	60.3250	85.7250	111.1250	136.5250	161.9250	187.3250	212.7250	238.1250	263.5250	
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	
7/16	0.4375	11.1125	36.5125	61.9125	87.3125	112.7125	138.1125	163.5125	188.9125	214.3125	239.7125	265.1125	
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	
1/2	0.5	12.7000	38.1000	63.5000	88.9000	114.3000	139.7000	165.1000	190.5000	215.9000	241.3000	266.7000	
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	
9/16	0.5625	14.2875	39.6875	65.0875	90.4875	115.8875	141.2875	166.6875	192.0875	217.4875	242.8875	268.2875	
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	
5/8	0.625	15.8750	41.2750	66.6750	92.0750	117.4750	142.8750	168.2750	193.6750	219.0750	244.4750	269.8750	
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	
11/16	0.6875	17.4625	42.8625	68.2625	93.6625	119.0625	144.4625	169.8625	195.2625	220.6625	246.0625	271.4625	
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	
3/4	0.75	19.0500	44.4500	69.8500	95.2500	120.6500	146.0500	171.4500	196.8500	222.2500	247.6500	273.0500	
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	
13/16	0.8125	20.6375	46.0375	71.4375	96.8375	122.2375	147.6375	173.0375	198.4375	223.8375	249.2375	274.6375	
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	
7/8	0.875	22.2250	47.6250	73.0250	98.4250	123.8250	149.2250	174.6250	200.0250	225.4250	250.8250	276.2250	
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	
15/16	0.9375	23.8125	49.2125	74.6125	100.0125	125.4125	150.8125	176.2125	201.6125	227.0125	252.4125	277.8125	
61/64	0.95312												



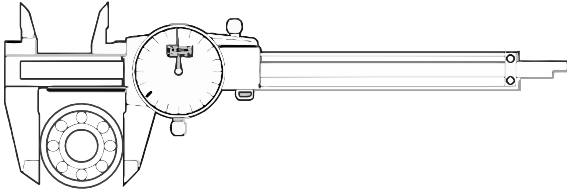
CONVERSION TABLE

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>									
0	0.0000	279.400	304.800	330.200	355.600	381.000	406.400	431.800	457.200	482.600	508.000
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
1 / 4	0.2500	285.750	311.150	336.550	361.950	387.350	412.750	438.150	463.550	488.950	514.350
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
1 / 2	0.5000	292.100	317.500	342.900	368.300	393.700	419.100	444.500	469.900	495.300	520.700
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
3 / 4	0.7500	298.450	323.850	349.250	374.650	400.050	425.450	450.850	476.250	501.650	527.050
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>									
0	0.0000	533.400	558.800	584.200	609.600	635.000	660.400	685.800	711.200	736.600	762.000
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
1 / 4	0.2500	539.750	565.150	590.550	615.950	641.350	666.750	692.150	717.550	742.950	768.350
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
1 / 2	0.5000	546.100	571.500	596.900	622.300	647.700	673.100	698.500	723.900	749.300	774.700
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
3 / 4	0.7500	552.450	577.850	603.250	628.650	654.050	679.450	704.850	730.250	755.650	781.050
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

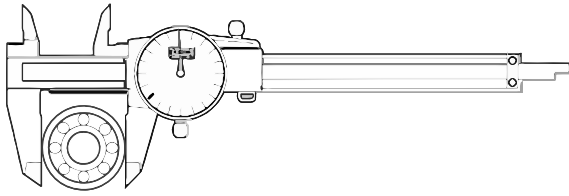
		<i>Inches</i>									
<i>Inch</i>		<i>31</i>	<i>32</i>	<i>33</i>	<i>34</i>	<i>35</i>	<i>36</i>	<i>37</i>	<i>38</i>	<i>39</i>	<i>40</i>
<i>Fraction</i>	<i>Decimal</i>	<i>mm</i>									
0	0.0000	787.400	812.800	838.200	863.600	889.000	914.400	939.800	965.200	990.600	1016.000
1 / 16	0.0625	788.988	814.388	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
1 / 4	0.2500	793.750	819.150	844.550	869.950	895.350	920.750	946.150	971.550	996.950	1022.350
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
1 / 2	0.5000	800.100	825.500	850.900	876.300	901.700	927.100	952.500	977.900	1003.300	1028.700
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
3 / 4	0.7500	806.450	831.850	857.250	882.650	908.050	933.450	958.850	984.250	1009.650	1035.050
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 : μm

Diameter (mm)		Δ_{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	± 2.5	± 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	± 3.0	± 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	± 4.0	± 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	± 4.5	± 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	± 5.5	± 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	± 6.5	± 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	± 7.5	± 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	± 9.0	± 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	± 10.0	± 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	± 11.5	± 16.0	+7	± 16	± 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	± 12.5	± 18.0	+7	± 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	± 13.5	± 20.0	+7	± 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	-	± 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	-	± 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	-	± 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	-	± 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	-	± 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	-	± 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 : μm

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

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