Heavy Duty Needle Roller Bearings

Machined Ring Bearings – Inch Nominal Dimensions

Prefixes
HJ inch nominal dimensions
M matched pair
T one seal (lip facing outward), old design
R one seal (lip facing inward), old design

Outside Diameter
20 = $^{20}/_{16}$ = 1 ¼"
104 = $^{104}/_{16}$ = 6 ½"

Suffixes
RS one seal*
2RS two seals*
* Seals used on new designs. Replace T and R seals.

HJ - 80 104 36 2RS

Bore
16 = $^{16}/_{16}$ = 1"
80 = $^{80}/_{16}$ = 5"

Width
32 = $^{32}/_{16}$ = 2"
36 = $^{36}/_{16}$ = 2 ¼"

Inner Rings (6-digit number)

IR for use with machined ring needle roller bearings only

Outside Diameter
64 = $^{64}/_{16}$ = 4"
80 = $^{80}/_{16}$ = 5"

IR - 64 80 36

Bore
10 = $^{10}/_{16}$ = $^{5}/_{8}$"
64 = $^{64}/_{16}$ = 4"

Width
14 = $^{14}/_{16}$ = $^{7}/_{8}$"
36 = $^{36}/_{16}$ = 2 ¼"

INTRODUCTION

Before selecting specific heavy duty needle roller bearings, the general Engineering section of this catalog should be reviewed for detailed information concerning:

- bearing type selection
- bearing life and reliability
- definition of load ratings
- life and load relationships
- effect of raceway hardness
- example of life calculation
- lubrication
- limiting speeds
- shaft design
- housing design

In addition to these general considerations, review the material which follows when selecting heavy duty needle roller bearings.

Type HJ

IDENTIFICATION

The prefix letters **HJ** in the bearing designation for heavy duty needle roller bearings denote that the bearings are manufactured to inch nominal dimensions.

Bearings are available with one or two lip contact seals as listed on pages 410 and 411. One seal is designated by the suffix letters RS, two seals by .2RS.

Inner rings can be used with heavy duty needle roller bearings for applications where it is impractical to use the shaft as the inner raceway. These inner rings are identified by the prefix **IR**.

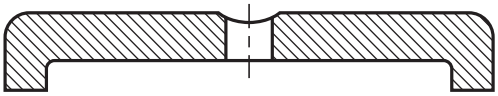
Since the entire identification code may not appear on the bearing itself, the manufacturer's parts list or another reliable source should always be consulted when ordering bearings for service or field replacement, to make certain that the correct bearing with the correct lubricant is used.

Type IR

CONSTRUCTION

The Torrington heavy duty needle roller bearing has a one-piece channel shaped outer ring of bearing quality steel, heat treated to provide maximum load rating. The integral end flanges provide axial location for the rollers. The bores of the end flanges serve as piloting surfaces for the cage, locating it to prevent removal of the lubricant film on the raceway.

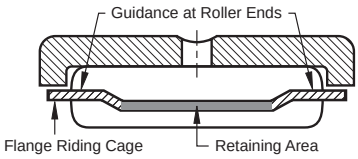
These bearings have a steel cage which provides inward retention for the needle rollers. The design assures roller stability and minimizes friction between the cage and the needle rollers. The cage has maximum strength consistent with the inherent high load ratings of needle roller bearings.

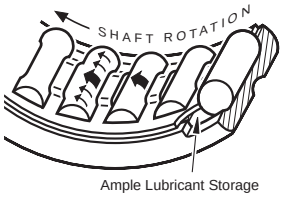


One-Piece Channel-Shaped Outer Ring

CONSTRUCTION *(continued)*

The needle rollers are made from high carbon chrome steel, through hardened, ground and lapped to close tolerance with Controlled Contour for optimum load distribution (see page E78).





LUBRICATION

The outer rings of the **HJ** bearings are supplied with a lubrication groove in the o.d. and a lubrication hole in the groove to facilitate relubrication through the outer ring. The **IR** inner rings have lubrication grooves in the bore and a relubrication hole to facilitate relubrication through the inner ring.

For general information regarding lubrication of heavy duty needle roller bearings, refer to page E76 of the Engineering section.

SEALS

Shaft contact seals which fit into the same housing bore as the heavy duty needle roller bearings may be obtained from recognized seal manufacturers. Bearings can also be made available with one or two integral seals - for information and listing of sealed bearings see pages 410-411.

SPECIAL BEARINGS

For heavy duty needle roller bearings with special dimensions or special features such as a split outer ring, consult the Torrington Engineering Sales Office.

MOUNTING DIMENSIONS

Heavy duty needle roller bearings are normally mounted in their housings with a clearance fit if the load is stationary relative to the housing, and with a tight transition fit if the load rotates relative to the housing. Since the tight transition fit of the bearing in the housing may result in a reduction of the needle roller complement bore diameter, the shaft raceway diameter should be reduced a like amount.

The tables of dimensions list the recommended **ISO H7** tolerances for the housing bore and the recommended **ISO h6** tolerances for the shaft raceway when the outer ring is to be mounted with a clearance fit. They also list the recommended **ISO N7** tolerances for the housing bore and the recommended **ISO f6** tolerances for the shaft raceway when the outer ring is to be mounted with a tight transition fit.

Other mounting dimensions may be required by special conditions such as:

(1) Extremely heavy radial loads
(2) Shock loads
(3) Load rotating relative to both inner and outer rings
(4) Temperature gradient across bearing
(5) Housing with heat expansion coefficient differing from that of the bearing.

If these conditions are expected, please consult the Torrington Engineering department.

Regardless of the fit of the bearing outer ring in the housing, the outer rings should be located by housing shoulders or other positive means. The maximum allowable fillet radius for the housing shoulder is listed in the table of dimensions.

DIMENSIONAL ACCURACY, BEARINGS

Tolerances for the **HJ** bearings are given in Tables 1 and 2.

Pages 406 through 411 list the nominal outside diameter, width and needle roller complement bore diameter for the **HJ** bearings.

Inch-metric conversions given in these table are for the convenience of the user. The controlling dimensions are in inches.

Table 1 - Outside Diameter and Width Tolerances, HJ Bearings

Nominal Outside Diameter, D				Deviations from Nominal							
				of Single Mean Outside Diameter, D_{mp} ①				of Width, C			
inch		mm		inch		mm		inch		mm	
over	incl	over	incl	high	low	high	low	high	low	high	low
0.7500	2.0000	19.050	50.800	+0	-0.0005	+0	-0.013	+0	-0.005	+0	-0.13
2.0000	3.2500	50.800	82.550	+0	-0.0006	+0	-0.015	+0	-0.005	+0	-0.13
3.2500	4.7500	82.550	120.650	+0	-0.0008	+0	-0.020	+0	-0.005	+0	-0.13
4.7500	7.2500	120.650	184.150	+0	-0.0010	+0	-0.025	+0	-0.005	+0	-0.13
7.2500	10.2500	184.150	260.350	+0	-0.0012	+0	-0.030	+0	-0.005	+0	-0.13
10.2500	12.5000	260.350	317.500	+0	-0.0014	+0	-0.036	+0	-0.005	+0	-0.13

① "Single mean diameter" is defined as the mean diameter in a single radial plane.

Table 2 - Roller Complement Bore Tolerance, HJ Bearings

Nominal Roller Complement Bore Diameter, F_w				Deviations from Nominal of the Smallest Single Diameter ① of the Roller Complement Bore F_w min.			
inch		mm		inch		mm	
over	incl	over	incl	low	high	low	high
0.5000	0.6250	12.700	15.875	+0.0008	+0.0017	+0.020	+0.043
0.6250	1.1250	15.875	28.575	+0.0009	+0.0018	+0.023	+0.046
1.1250	1.6250	28.575	41.275	+0.0010	+0.0019	+0.025	+0.048
1.6250	1.8750	41.275	47.625	+0.0010	+0.0020	+0.025	+0.050
1.8750	2.7500	47.625	69.850	+0.0011	+0.0021	+0.028	+0.053
2.7500	3.0000	69.850	76.200	+0.0011	+0.0023	+0.028	+0.058
3.0000	4.0000	76.200	101.600	+0.0012	+0.0024	+0.030	+0.060
4.0000	4.5000	101.600	114.300	+0.0012	+0.0026	+0.030	+0.066
4.5000	6.0000	114.300	152.400	+0.0013	+0.0027	+0.033	+0.069
6.0000	6.5000	152.400	165.100	+0.0013	+0.0029	+0.033	+0.074
6.5000	7.7500	165.100	196.850	+0.0014	+0.0030	+0.036	+0.077
7.7500	9.2500	196.850	234.950	+0.0014	+0.0032	+0.036	+0.082

① "The smallest single diameter of the roller complement bore" is defined as the diameter of the cylinder which, when used as a bearing inner ring, results in zero radial internal clearance in the bearing on at least one diameter.

DIMENSIONAL ACCURACY, INNER RINGS

Tolerances for the **IR** inner rings are given in tables 3 and 4.

Pages 412 through 415 list the nominal outside diameter, width and bore diameter for the **IR** series inner rings.

Inch-metric conversions given in these tables are for the convenience of the user. The controlling dimensions are in inches.

Table 3 - Bore and Width Tolerances, IR Inner Rings

Nominal Bore Diameter, d				Deviations from Nominal							
				of Single Mean Bore Diameter, d_{mp} ①				of Width, B			
inch		mm		inch		mm		inch		mm	
over	incl	over	incl	high	low	high	low	high	low	high	low
0.3125	0.7500	7.938	19.050	+0	-0.0004	+0	-0.010	+0.010	+0.005	+0.25	+0.12
0.7500	2.0000	19.050	50.800	+0	-0.0005	+0	-0.013	+0.010	+0.005	+0.25	+0.12
2.0000	3.2500	50.800	82.550	+0	-0.0006	+0	-0.015	+0.010	+0.005	+0.25	+0.12
3.2500	4.2500	82.550	107.950	+0	-0.0008	+0	-0.020	+0.010	+0.005	+0.25	+0.12
4.2500	4.7500	107.950	120.650	+0	-0.0008	+0	-0.020	+0.015	+0.010	+0.38	+0.25
4.7500	7.0000	120.650	177.800	+0	-0.0010	+0	-0.025	+0.015	+0.010	+0.38	+0.25
7.0000	8.0000	177.800	203.200	+0	-0.0012	+0	-0.030	+0.015	+0.010	+0.38	+0.25

① "Single mean diameter" is defined as the mean diameter in a single radial plane.

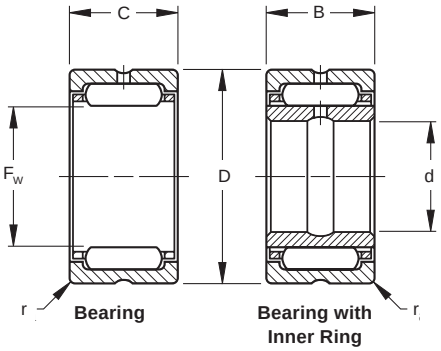
Table 4 - Outside Diameter Tolerance, IR Inner Rings

Nominal Outside Diameter, F				Deviations from Nominal of Single Mean Outside Diameter F_{mp} ①			
inch		mm		inch		mm	
over	incl	over	incl	high	low	high	low
0.5000	0.6250	12.700	15.875	-0.0005	-0.0009	-0.013	-0.023
0.6250	1.0000	15.875	25.400	-0.0007	-0.0012	-0.018	-0.031
1.0000	1.1250	25.400	28.575	-0.0009	-0.0014	-0.023	-0.036
1.1250	1.3750	28.575	34.925	-0.0009	-0.0015	-0.023	-0.038
1.3750	1.8750	34.925	47.625	-0.0010	-0.0016	-0.025	-0.040
1.8750	3.0000	47.625	76.200	-0.0011	-0.0018	-0.028	-0.046
3.0000	3.7500	76.200	95.250	-0.0013	-0.0022	-0.033	-0.056
3.7500	4.5000	95.250	114.300	-0.0015	-0.0024	-0.038	-0.061
4.5000	5.5000	114.300	139.700	-0.0015	-0.0025	-0.038	-0.063
5.5000	6.5000	139.700	165.100	-0.0017	-0.0027	-0.043	-0.068
6.5000	8.2500	165.100	209.550	-0.0019	-0.0031	-0.048	-0.078
8.2500	9.2500	209.550	234.950	-0.0020	-0.0032	-0.051	-0.081

① "Single mean diameter" is defined as the mean diameter in a single radial plane.

HJ Type

Check for availability.
These bearings meet Military Standard MS 51961.
Inch-metric conversions given are for the convenience of the user.
The controlling dimensions are in inches for nominal inch bearings.
Load ratings are given in pounds-force:
1 lbf = 0.454 kgf = 4.448 N
Bearing diameters and widths listed below are nominal. For inspection purposes, see tolerance tables on page 404.



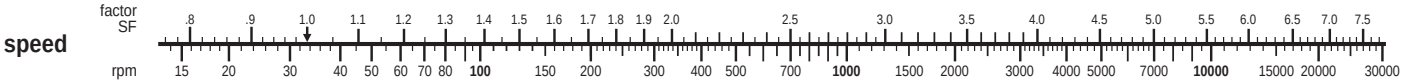
DIMENSIONS AND LOAD RATINGS

Fw Bore (nom.)		D Outside Diameter (nom.)		C/B Width (nom.)		Bearing Designation	Load Ratings: Basic Dynamic C_r (T) ISO 281	Load Ratings: Basic Static C_o ISO 76	Limiting Speed	r_a* Housing Fillet (max.)		Used with Inner Ring Designation †	F Housing Shoulder Diameter ±1/64	F Housing Shoulder Diameter ±0.4
inch	mm	inch	mm	inch	mm		lbf	lbf	rpm	inch	mm		inch	mm
0.6250	15,875	1.1250	28,575	0.750	19,05	**HJ-101812**	2 980	3 980	4 150	30 000	0.025	0,6	**IR-061012**	15/16	23,8
0.7500	19,050	1.2500	31,750	0.750	19,05	**HJ-122012**	3 180	4 250	4 680	25 000	0.04	1,0	**IR-081212**	1 1/16	27,0
0.7500	19,050	1.2500	31,750	1.000	25,40	**HJ-122016**	4 350	5 830	7 020	25 000	0.04	1,0	**IR-081216**	1 1/16	27,0
0.8750	22,225	1.3750	34,925	0.750	19,05	**HJ-142212**	3 540	4 750	5 600	21 000	0.04	1,0	**IR-101412** **IR-111412**	1 3/16	30,2
0.8750	22,225	1.3750	34,925	1.000	25,40	**HJ-142216**	4 850	6 500	8 400	21 000	0.04	1,0	**IR-101416**	1 3/16	30,2
1.0000	25,400	1.5000	38,100	0.750	19,05	**HJ-162412**	3 870	5 200	6 520	18 000	0.04	1,0	**IR-121612**	1 5/16	33,3
1.0000	25,400	1.5000	38,100	1.000	25,40	**HJ-162416**	5 310	7 120	9 780	18 000	0.04	1,0	**IR-121616** **IR-131616**	1 5/16	33,3
1.1250	28,575	1.6250	41,275	1.000	25,40	**HJ-182616**	5 740	7 700	11 200	16 000	0.04	1,0	**IR-141816** **IR-151816**	1 7/16	36,5
1.1250	28,575	1.6250	41,275	1.250	31,75	**HJ-182620**	7 190	9 650	14 900	16 000	0.04	1,0	**IR-141820** **IR-151820**	1 7/16	36,5
1.2500	31,750	1.7500	44,450	1.000	25,40	**HJ-202816**	5 900	7 920	11 900	14 000	0.04	1,0	**IR-162016**	1 9/16	39,7
1.2500	31,750	1.7500	44,450	1.250	31,75	**HJ-202820**	7 400	9 930	16 000	14 000	0.04	1,0	**IR-162020**	1 9/16	39,7
1.3750	34,925	1.8750	47,625	1.000	25,40	**HJ-223016**	6 290	8 430	13 300	13 000	0.04	1,0	**IR-182216**	1 11/16	42,9
1.3750	34,925	1.8750	47,625	1.250	31,75	**HJ-223020**	7 880	10 600	17 800	13 000	0.04	1,0	**IR-182220**	1 11/16	42,9
1.5000	38,100	2.0625	52,388	1.000	25,40	**HJ-243316**	7 400	9 930	14 800	12 000	0.06	1,5	**IR-202416**	1 7/8	47,6
1.5000	38,100	2.0625	52,388	1.250	31,75	**HJ-243320**	9 320	12 500	20 000	12 000	0.06	1,5	**IR-192420** **IR-202420**	1 7/8	47,6
1.6250	41,275	2.1875	55,562	1.000	25,40	**HJ-263516**	7 600	10 200	15 700	11 000	0.06	1,5	**IR-212616**	2	50,8
1.6250	41,275	2.1875	55,562	1.250	31,75	**HJ-263520**	9 570	12 800	21 100	11 000	0.06	1,5	**IR-212620** **IR-222620**	2	50,8
1.7500	44,450	2.3125	58,738	1.000	25,40	**HJ-283716**	7 790	10 500	16 600	9 900	0.06	1,5	**IR-232816** **IR-242816**	2 1/8	54,0
1.7500	44,450	2.3125	58,738	1.250	31,75	**HJ-283720**	9 810	13 200	22 300	9 900	0.06	1,5	**IR-222820** **IR-232820** **IR-242820**	2 1/8	54,0
1.8750	47,625	2.4375	61,912	1.250	31,75	**HJ-303920**	10 400	13 900	24 500	9 200	0.06	1,5	**IR-253020**	2 1/4	57,2
2.0000	50,800	2.5625	65,088	1.000	25,40	**HJ-324116**	8 410	11 300	19 100	8 600	0.06	1,5	**IR-273216**	2 3/8	60,3
2.0000	50,800	2.5625	65,088	1.250	31,75	**HJ-324120**	10 600	14 200	25 700	8 600	0.06	1,5	**IR-243220** **IR-253220** **IR-263220** **IR-273220**	2 3/8	60,3
2.2500	57,150	3.0000	76,200	1.500	38,10	**HJ-364824**	14 800	19 900	36 200	7 600	0.06	1,5	**IR-283624**	2 11/16	68,3
2.2500	57,150	3.0000	76,200	1.750	44,45	**HJ-364828**	17 200	23 100	43 700	7 600	0.06	1,5	**IR-283628**	2 11/16	68,3
2.5000	63,500	3.2500	82,550	1.500	38,10	**HJ-405224**	16 000	21 500	41 300	6 800	0.08	2,0	**IR-314024** **IR-324024**	2 15/16	74,6
2.5000	63,500	3.2500	82,550	1.750	44,45	**HJ-405228**	18 600	24 900	49 900	6 800	0.08	2,0	**IR-314028** **IR-324028**	2 15/16	74,6
2.7500	69,850	3.5000	88,900	1.000	25,40	**HJ-445616**	10 900	14 700	26 100	6 200	0.08	2,0	—	3 3/16	81,0
2.7500	69,850	3.5000	88,900	1.500	38,10	**HJ-445624**	16 700	22 300	44 800	6 200	0.08	2,0	**IR-364424**	3 3/16	81,0
2.7500	69,850	3.5000	88,900	1.750	44,45	**HJ-445628**	19 300	25 900	54 100	6 200	0.08	2,0	**IR-354428** **IR-364428**	3 3/16	81,0

Required Basic Dynamic Load Rating (C_r) = Applied Load • SF • LF • HF (see page E75).
†See pages 412-415 for inch series inner rings. Order inner rings separately.
*Equal to minimum bearing chamfer at unstamped end.

(T) Symbol denotes Torrington Basic Dynamic Load Rating to be used in load-life calculations taking into consideration the application guidelines and limitations given in this catalog. Applications involving loads approaching this rating should be referred to our Engineering Department before a final selection is made.

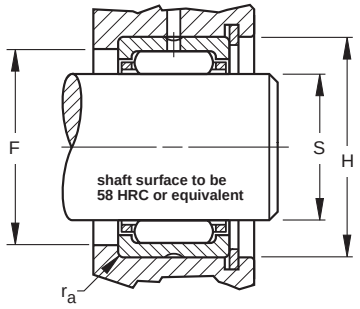
Load Ratings are based on a minimum raceway hardness of 58 HRC or equivalent.



The bearing outer ring should normally be a clearance fit when the housing is stationary relative to the load. When the housing rotates relative to the load, the tight transition fit is normally used. See page 403 for further discussion on mounting practice.

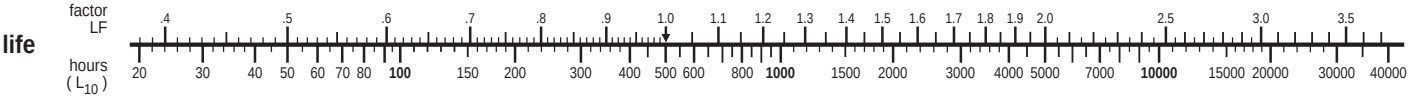
For oscillating applications, where low radial clearance may be important, consult the Torrington Engineering Sales Office for recommendation of mounting dimentions.

The unstamped end of the outer ring should be assembled against the housing shoulder to assure clearing the maximum allowable housing fillet (r_a) indicated in the tables.



BEARING MOUNTING DIMENSIONS

Mounting Dimensions, Clearance Fit									Mounting Dimensions, Tight Transition Fit							
Inch Mounting				Metric Mounting (mm)					Inch Mounting				Metric Mounting (mm)			
S Shaft Raceway Diameter		H Housing Bore Diameter		S Shaft Raceway Diameter		H Housing Bore Diameter		Bearing Designation	S Shaft Raceway Diameter		H Housing Bore Diameter		S Shaft Raceway Diameter		H Housing Bore Diameter	
max.	min.	min.	max.	max.	min.	min.	max.		max.	min.	min.	max.	max.	min.	min.	max.
0.6250	0.6246	1.1250	1.1258	15,875	15,865	28,575	28,595	**HJ-101812**	0.6244	0.6240	1.1239	1.1247	15,860	15,850	28,547	28,567
0.7500	0.7495	1.2500	1.2510	19,050	19,037	31,750	31,775	**HJ-122012**	0.7492	0.7487	1.2487	1.2497	19,030	19,017	31,717	31,742
0.7500	0.7495	1.2500	1.2510	19,050	19,037	31,750	31,775	**HJ-122016**	0.7492	0.7487	1.2487	1.2497	19,030	19,017	31,717	31,742
0.8750	0.8745	1.3750	1.3760	22,225	22,212	34,925	34,950	**HJ-142212**	0.8742	0.8737	1.3737	1.3747	22,205	22,192	34,892	34,917
0.8750	0.8745	1.3750	1.3760	22,225	22,212	34,925	34,950	**HJ-142216**	0.8742	0.8737	1.3737	1.3747	22,205	22,192	34,892	34,917
1.0000	0.9995	1.5000	1.5010	25,400	25,387	38,100	38,125	**HJ-162412**	0.9992	0.9987	1.4987	1.4997	25,380	25,367	38,067	38,092
1.0000	0.9995	1.5000	1.5010	25,400	25,387	38,100	38,125	**HJ-162416**	0.9992	0.9987	1.4987	1.4997	25,380	25,367	38,067	38,092
1.1250	1.1245	1.6250	1.6260	28,575	28,562	41,275	41,300	**HJ-182616**	1.1242	1.1237	1.6237	1.6247	28,555	28,542	41,242	41,267
1.1250	1.1245	1.6250	1.6260	28,575	28,562	41,275	41,300	**HJ-182620**	1.1242	1.1237	1.6237	1.6247	28,555	28,542	41,242	41,267
1.2500	1.2494	1.7500	1.7510	31,750	31,735	44,450	44,475	**HJ-202816**	1.2490	1.2484	1.7487	1.7497	31,725	31,710	44,417	44,442
1.2500	1.2494	1.7500	1.7510	31,750	31,735	44,450	44,475	**HJ-202820**	1.2490	1.2484	1.7487	1.7497	31,725	31,710	44,417	44,442
1.3750	1.3744	1.8750	1.8760	34,925	34,910	47,625	47,650	**HJ-223016**	1.3740	1.3734	1.8737	1.8747	34,900	34,885	47,592	47,617
1.3750	1.3744	1.8750	1.8760	34,925	34,910	47,625	47,650	**HJ-223020**	1.3740	1.3734	1.8737	1.8747	34,900	34,885	47,592	47,617
1.5000	1.4994	2.0625	2.0637	38,100	38,085	52,388	52,418	**HJ-243316**	1.4990	1.4984	2.0610	2.0622	38,075	38,060	52,349	52,379
1.5000	1.4994	2.0625	2.0637	38,100	38,085	52,388	52,418	**HJ-243320**	1.4990	1.4984	2.0610	2.0622	38,075	38,060	52,349	52,379
1.6250	1.6244	2.1875	2.1887	41,275	41,260	55,562	55,592	**HJ-263516**	1.6240	1.6234	2.1860	2.1872	41,250	41,235	55,524	55,554
1.6250	1.6244	2.1875	2.1887	41,275	41,260	55,562	55,592	**HJ-263520**	1.6240	1.6234	2.1860	2.1872	41,250	41,235	55,524	55,554
1.7500	1.7494	2.3125	2.3137	44,450	44,435	58,738	58,768	**HJ-283716**	1.7490	1.7484	2.3110	2.3122	44,425	44,410	58,699	58,729
1.7500	1.7494	2.3125	2.3137	44,450	44,435	58,738	58,768	**HJ-283720**	1.7490	1.7484	2.3110	2.3122	44,425	44,410	58,699	58,729
1.8750	1.8744	2.4375	2.4387	47,625	47,610	61,912	61,942	**HJ-303920**	1.8740	1.8734	2.4360	2.4372	47,600	47,585	61,874	61,904
2.0000	1.9993	2.5625	2.5637	50,800	50,782	65,088	65,118	**HJ-324116**	1.9988	1.9981	2.5610	2.5622	50,770	50,752	65,049	65,079
2.0000	1.9993	2.5625	2.5637	50,800	50,782	65,088	65,118	**HJ-324120**	1.9988	1.9981	2.5610	2.5622	50,770	50,752	65,049	65,079
2.2500	2.2493	3.0000	3.0012	57,150	57,132	76,200	76,230	**HJ-364824**	2.2488	2.2481	2.9985	2.9997	57,120	57,102	76,162	76,192
2.2500	2.2493	3.0000	3.0012	57,150	57,132	76,200	76,230	**HJ-364828**	2.2488	2.2481	2.9985	2.9997	57,120	57,102	76,162	76,192
2.5000	2.4993	3.2500	3.2514	63,500	63,482	82,550	82,586	**HJ-405224**	2.4988	2.4981	3.2481	3.2495	63,470	63,452	82,502	82,538
2.5000	2.4993	3.2500	3.2514	63,500	63,482	82,550	82,586	**HJ-405228**	2.4988	2.4981	3.2481	3.2495	63,470	63,452	82,502	82,538
2.7500	2.7493	3.5000	3.5014	69,850	69,832	88,900	88,936	**HJ-445616**	2.7488	2.7481	3.4981	3.4995	69,820	69,802	88,852	88,888
2.7500	2.7493	3.5000	3.5014	69,850	69,832	88,900	88,936	**HJ-445624**	2.7488	2.7481	3.4981	3.4995	69,820	69,802	88,852	88,888
2.7500	2.7493	3.5000	3.5014	69,850	69,832	88,900	88,936	**HJ-445628**	2.7488	2.7481	3.4981	3.4995	69,820	69,802	88,852	88,888



HJ Type

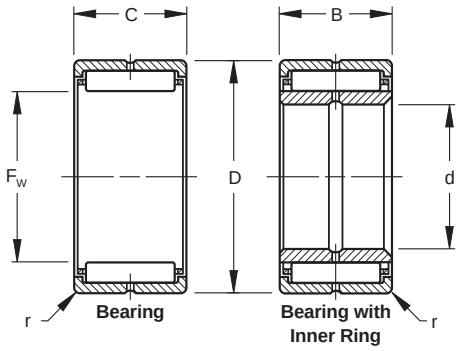
Check for availability.

These bearings meet Military Standard MS 51961

Inch-metric conversions given are for the convenience of the user. The controlling dimensions are in inches for nominal inch bearings.

Load ratings are given in pounds-force:
1 lbf = 0.454 kgf = 4.448 N

Bearing diameters and widths listed below are nominal. For inspection purposes, see tolerance tables on page 404.



DIMENSIONS AND LOAD RATINGS

Fw Bore (nom.)		D Outside Diameter (nom.)		C/B Width (nom.)		Bearing Designation	Load Ratings: Basic Dynamic C_r (T)	Load Ratings: Basic Dynamic C_r ISO 281	Load Ratings: Basic Static C_o ISO 76	Limiting Speed	r_a* Housing Fillet (max.)		Used with Inner Ring Designation †	F Housing Shoulder Diameter ±1/64	F Housing Shoulder Diameter ±0.4
inch	mm	inch	mm	inch	mm		lbf	lbf	lbf	rpm	inch	mm		inch	mm
3.0000	76,200	3.7500	95,250	1.500	38,10	**HJ-486024**	17 700	23 800	49 900	5 600	0.08	2,0	**IR-404824**	3 7/16	87,3
3.0000	76,200	3.7500	95,250	1.750	44,45	**HJ-486028**	20 500	27 500	60 300	5 600	0.08	2,0	**IR-384828** **IR-404828**	3 7/16	87,3
3.2500	82,550	4.2500	107,950	1.750	44,45	**HJ-526828**	26 800	36 000	67 400	5 300	0.08	2,0	**IR-445228**	3 7/8	98,4
3.2500	82,550	4.2500	107,950	2.000	50,80	**HJ-526832**	30 400	40 800	79 300	5 300	0.08	2,0	**IR-445232**	3 7/8	98,4
3.5000	88,900	4.5000	114,300	2.000	50,80	**HJ-567232**	31 000	41 500	83 000	4 900	0.08	2,0	**IR-475632** **IR-485632**	4 1/8	104,8
3.7500	95,250	4.7500	120,650	2.000	50,80	**HJ-607632**	32 900	44 200	91 000	4 540	0.10	2,5	**IR-506032** **IR-526032**	4 3/8	111,1
4.0000	101,600	5.0000	127,000	2.000	50,80	**HJ-648032**	34 300	46 000	98 000	4 230	0.10	2,5	**IR-526432** **IR-546432** **IR-566432**	4 5/8	117,5
4.2500	107,950	5.2500	133,350	2.000	50,80	**HJ-688432**	34 700	46 500	102 000	3 970	0.10	2,5	**IR-566832** **IR-606832**	4 7/8	123,8
4.5000	114,300	6.0000	152,400	2.250	57,15	**HJ-729636**	48 000	64 400	116 000	3 850	0.10	2,5	**IR-607236**	5 7/16	138,1
4.5000	114,300	6.0000	152,400	2.500	63,50	**HJ-729640**	53 400	71 700	134 000	3 850	0.10	2,5	**IR-607240**	5 7/16	138,1
5.0000	127,000	6.5000	165,100	2.000	50,80	**HJ-8010432**	46 100	61 200	113 000	3 430	0.10	2,5	—	5 15/16	150,8
5.0000	127,000	6.5000	165,100	2.250	57,15	**HJ-8010436**	52 000	69 400	133 000	3 430	0.10	2,5	**IR-648036** **IR-688036**	5 15/16	150,8
5.0000	127,000	6.5000	165,100	2.500	63,50	**HJ-8010440**	57 800	77 300	152 000	3 430	0.10	2,5	**IR-648040**	5 15/16	150,8
5.5000	139,700	7.0000	177,800	2.500	63,50	**HJ-8811240**	58 600	78 600	160 000	3 120	0.10	2,5	**IR-728840**	6 7/16	163,5
5.5000	139,700	7.0000	177,800	3.000	76,20	**HJ-8811248**	69 500	93 300	199 000	3 120	0.10	2,5	**IR-728848**	6 7/16	163,5
5.7500	146,050	7.2500	184,150	3.000	76,20	**HJ-9211648**	70 600	94 800	207 000	2 960	0.12	3,0	**IR-769248**	6 11/16	169,9
6.0000	152,400	7.5000	190,500	2.500	63,50	**HJ-9612040**	61 900	83 000	178 000	2 830	0.12	3,0	**IR-809640**	6 15/16	176,2
6.0000	152,400	7.5000	190,500	3.000	76,20	**HJ-9612048**	74 000	99 300	224 000	2 830	0.12	3,0	**IR-809648**	6 15/16	176,2
6.5000	165,100	8.0000	203,200	2.500	63,50	**HJ-10412840**	64 100	86 000	191 000	2 600	0.12	3,0	**IR-8810440**	7 7/16	188,9
6.5000	165,100	8.0000	203,200	3.000	76,20	**HJ-10412848**	76 300	102 000	237 000	2 600	0.12	3,0	**IR-8810448**	7 7/16	188,9
7.2500	184,150	9.1250	231,775	3.000	76,20	**HJ-11614648**	88 600	118 300	253 000	2 340	0.12	3,0	**IR-9611648**	8 1/2	215,9
7.7500	196,850	9.6250	244,475	3.000	76,20	**HJ-12415448**	92 000	123 000	271 000	2 180	0.12	3,0	**IR-10412448**	9	228,6
8.2500	209,550	10.1250	257,175	3.000	76,20	**HJ-13216248**	95 400	127 000	290 000	2 040	0.12	3,0	**IR-11213248**	9 1/2	241,3
8.7500	222,250	10.6250	269,875	3.000	76,20	**HJ-14017048**	98 600	130 000	308 000	1 920	0.16	4,0	**IR-12014048**	10	254,0
9.2500	234,950	11.1250	282,575	3.000	76,20	**HJ-14817848**	101 000	136 000	326 000	1 810	0.16	4,0	**IR-12814848**	10 1/2	266,7

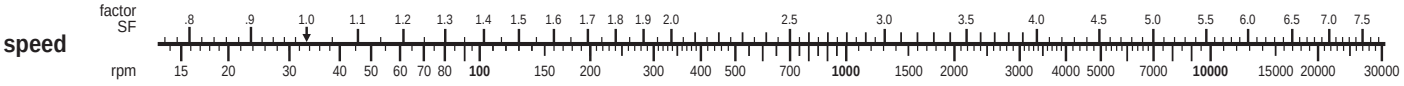
Required Basic Dynamic Load Rating (C_r) = Applied Load • SF • LF • HF (see page E75).

†See pages 412-415 for inch series inner rings. Order inner rings separately.

*Equal to minimum bearing chamferat unstamped end.

(T) Symbol denotes Torrington Basic Dynamic Load Rating to be used in load-life calculations taking into consideration the application guidelines and limitations given in this catalog. Applications involving loads approaching this rating should be referred to the Torrington Engineering Department before a final selection is made.

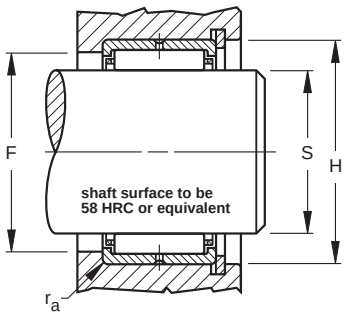
Load Ratings are based on a minimum raceway hardness of 58 HRC or equivalent.



The bearing outer ring should normally be a clearance fit when the housing is stationary relative to the load. When the housing rotates relative to the load, the tight transition fit is normally used. See page 403 for further discussion on mounting practice.

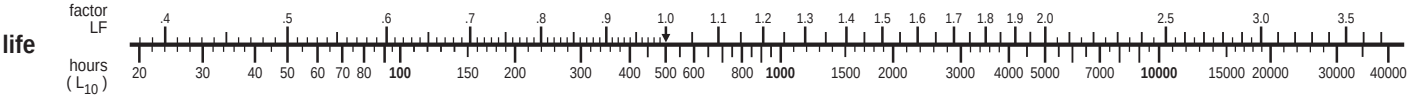
For oscillating applications, where low radial clearance may be important, consult the Torrington Engineering Sales Office for recommendation of mounting dimentions.

The marked end of the outer ring should be assembled against the housing shoulder to assure clearing the maximum allowable housing fillet (r_a) indicated in the tables.



BEARING MOUNTING DIMENSIONS

Mounting Dimensions, Clearance Fit									Mounting Dimensions, Tight Transition Fit							
Inch Mounting				Metric Mounting (mm)					Inch Mounting				Metric Mounting (mm)			
S Shaft Raceway Diameter		H Housing Bore Diameter		S Shaft Raceway Diameter		H Housing Bore Diameter		Bearing Designation	S Shaft Raceway Diameter		H Housing Bore Diameter		S Shaft Raceway Diameter		H Housing Bore Diameter	
max.	min.	min.	max.	max.	min.	min.	max.		max.	min.	min.	max.	max.	min.	min.	max.
3.0000	2.9993	3.7500	3.7514	76,200	76,182	95,250	95,286	**HJ-486024**	2.9988	2.9981	3.7481	3.7495	76,170	76,152	95,202	95,238
3.0000	2.9993	3.7500	3.7514	76,200	76,182	95,250	95,286	**HJ-486028**	2.9988	2.9981	3.7481	3.7495	76,170	76,152	95,202	95,238
3.2500	3.2491	4.2500	4.2514	82,550	82,527	107,950	107,986	**HJ-526828**	3.2486	3.2477	4.2481	4.2495	82,514	82,491	107,902	107,938
3.2500	3.2491	4.2500	4.2514	82,550	82,527	107,950	107,986	**HJ-526832**	3.2486	3.2477	4.2481	4.2495	82,514	82,491	107,902	107,938
3.5000	3.4991	4.5000	4.5014	88,900	88,877	114,300	114,336	**HJ-567232**	3.4986	3.4977	4.4981	4.4995	88,864	88,841	114,252	114,288
3.7500	3.7491	4.7500	4.7516	95,250	95,227	120,650	120,691	**HJ-607632**	3.7487	3.7477	4.7478	4.7494	95,214	95,191	120,594	120,635
4.0000	3.9991	5.0000	5.0016	101,600	101,577	127,000	127,041	**HJ-648032**	3.9986	3.9977	4.9978	4.9994	101,564	101,541	126,944	126,985
4.2500	4.2491	5.2500	5.2516	107,950	107,927	133,350	133,391	**HJ-688432**	4.2486	4.2477	5.2478	5.2494	107,914	107,891	133,294	133,335
4.5000	4.4991	6.0000	6.0016	114,300	114,277	152,400	152,441	**HJ-729636**	4.4986	4.4977	5.9978	5.9994	114,264	114,241	152,344	152,385
4.5000	4.4991	6.0000	6.0016	114,300	114,277	152,400	152,441	**HJ-729640**	4.4986	4.4977	5.9978	5.9994	114,264	114,241	152,344	152,385
5.0000	4.9990	6.5000	6.5016	127,000	126,975	165,100	165,141	**HJ-8010432**	4.9984	4.9974	6.4978	6.4994	126,959	126,934	165,044	165,085
5.0000	4.9990	6.5000	6.5016	127,000	126,975	165,100	165,141	**HJ-8010436**	4.9984	4.9974	6.4978	6.4994	126,959	126,934	165,044	165,085
5.0000	4.9990	6.5000	6.5016	127,000	126,975	165,100	165,141	**HJ-8010440**	4.9984	4.9974	6.4978	6.4994	126,959	126,934	165,044	165,085
5.5000	5.4990	7.0000	7.0016	139,700	139,675	177,800	177,841	**HJ-8811240**	5.4984	5.4974	6.9978	6.9994	139,659	139,634	177,744	177,785
5.5000	5.4990	7.0000	7.0016	139,700	139,675	177,800	177,841	**HJ-8811248**	5.4984	5.4974	6.9978	6.9994	139,659	139,634	177,744	177,785
5.7500	5.7490	7.2500	7.2518	146,050	146,025	184,150	184,196	**HJ-9211648**	5.7484	5.7474	7.2476	7.2494	146,009	145,984	184,089	184,135
6.0000	5.9990	7.5000	7.5018	152,400	152,375	190,500	190,546	**HJ-9612040**	5.9984	5.9974	7.4976	7.4994	152,359	152,334	190,439	190,485
6.0000	5.9990	7.5000	7.5018	152,400	152,375	190,500	190,546	**HJ-9612048**	5.9984	5.9974	7.4976	7.4994	152,359	152,334	190,439	190,485
6.5000	6.4990	8.0000	8.0018	165,100	165,075	203,200	203,246	**HJ-10412840**	6.4984	6.4974	7.9976	7.9994	165,059	165,034	203,139	203,185
6.5000	6.4990	8.0000	8.0018	165,100	165,075	203,200	203,246	**HJ-10412848**	6.4984	6.4974	7.9976	7.9994	165,059	165,034	203,139	203,185
7.2500	7.2488	9.1250	9.1268	184,150	184,120	231,775	231,821	**HJ-11614648**	7.2480	7.2468	9.1226	9.1244	184,099	184,069	231,714	231,760
7.7500	7.7488	9.6250	9.6268	196,850	196,820	244,475	244,521	**HJ-12415448**	7.7480	7.7468	9.6226	9.6244	196,799	196,769	244,414	244,460
8.2500	8.2488	10.1250	10.1270	209,550	209,520	257,175	257,226	**HJ-13216248**	8.2480	8.2468	10.1224	10.1244	209,499	209,469	257,109	257,160
8.7500	8.7488	10.6250	10.6270	222,250	222,220	269,875	269,926	**HJ-14017048**	8.7480	8.7468	10.6224	10.6244	222,199	222,169	269,809	269,860
9.2500	9.2488	11.2500	11.1270	234,950	234,920	282,575	282,626	**HJ-14817848**	9.2480	9.2468	11.1224	11.1244	234,899	234,869	282,509	282,560



Sealed Heavy Duty Needle Roller Bearings

Check for availability.

Inch-metric conversions given are for the convenience of the user. The controlling dimensions are in inches for nominal inch bearings.

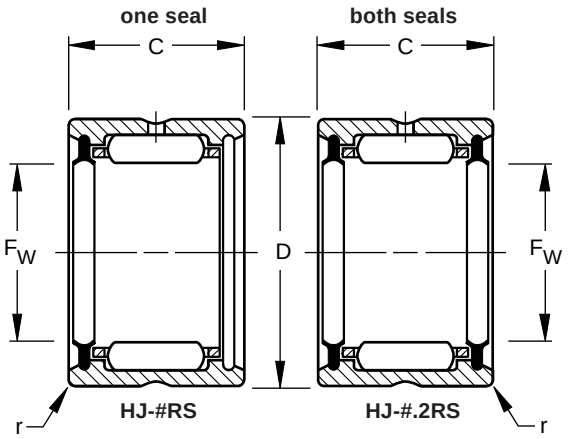
Load ratings are given in pounds-force:

1 lbf = 0.454 kgf = 4.448 N

Bearing diameters and widths listed below are nominal. For inspection purposes, see tolerance tables on page 404.

Bearings are available with one or two lip contact seals as shown. These seals are designed to retain lubricant in the bearing and to exclude foreign material. The single seal is normally installed in the marked end of the bearing.

These seals limit the bearing operating temperature between -25°F and +225°F (-30°C and +110° C). If the operating temperature must be outside of the above range or if the seals are exposed to unusual fluids please consult your Torrington Engineering Sales Office.



DIMENSIONS AND LOAD RATINGS

F_w Bore (nom.)		D Outside Diameter (nom.)		C Width (nom.)		Bearing • Designation	Load Ratings: Basic Dynamic C_r ISO 281 Ⓣ	Load Ratings: Basic Static C_o ISO 76	§ Limiting Speed	r_a* Housing Fillet (max.)		† Used with Inner Ring Designation
inch	mm	inch	mm	inch	mm	(with both seals)	lbf	lbf	rpm	inch	mm	
0.6250	15,875	1.1250	28,570	1.000	25,40	**HJ-101816.2RS**	2 970	3 980	4 150	6 100	0.025	0,6	—
0.7500	19,050	1.2500	31,750	1.000	25,40	**HJ-122016.2RS**	3 170	4 250	4 680	5 100	0.04	1,0	**IR-081216**
0.8750	22,225	1.3750	34,925	1.000	25,40	**HJ-142216.2RS**	3 540	4 750	5 600	4 400	0.04	1,0	**IR-101416**
1.0000	25,400	1.5000	38,100	1.000	25,40	**HJ-162416.2RS**	3 870	5 200	6 520	3 800	0.04	1,0	**IR-121616** **IR-131616**
1.1250	28,575	1.6250	41,275	1.250	31,75	**HJ-182620.2RS**	5 740	7 700	11 200	3 400	0.04	1,0	**IR-141820** **IR-151820**
1.2500	31,750	1.7500	44,450	1.250	31,75	**HJ-202820.2RS**	5 900	7 920	11 900	3 100	0.04	1,0	**IR-162020**
1.3750	34,925	1.8750	47,625	1.250	31,75	**HJ-223020.2RS**	6 290	8 430	13 300	2 800	0.04	1,0	**IR-182220**
1.5000	38,100	2.0625	52,388	1.250	31,75	**HJ-243320.2RS**	7 400	9 930	14 800	2 500	0.06	1,5	**IR-192420** **IR-202420**
1.6250	41,275	2.1875	55,562	1.250	31,75	**HJ-263520.2RS**	7 600	10 200	15 700	2 400	0.06	1,5	**IR-212620** **IR-222620**
1.7500	44,450	2.3125	58,738	1.250	31,75	**HJ-283720.2RS**	7 790	10 500	16 600	2 200	0.06	1,5	**IR-222820** **IR-232820** **IR-242820**
2.0000	50,800	2.5625	65,088	1.250	31,75	**HJ-324120.2RS**	8 410	11 300	19 100	1 900	0.06	1,5	**IR-243220** **IR-253220** **IR-263220** **IR-273220**
2.2500	57,150	3.0000	76,200	1.750	44,45	**HJ-364828.2RS**	14 800	19 900	36 200	1 700	0.06	1,5	**IR-283628**
2.5000	63,500	3.2500	82,550	1.750	44,45	**HJ-405228.2RS**	16 000	21 500	41 300	1 500	0.08	2,0	**IR-314028** **IR-324028**
2.7500	69,850	3.5000	88,900	1.750	44,45	**HJ-445628.2RS**	16 700	22 300	44 800	1 400	0.08	2,0	**IR-354428** **IR-364428**
3.0000	76,200	3.7500	95,250	1.750	44,45	**HJ-486028.2RS**	17 700	23 800	49 900	1 300	0.08	2,0	**IR-384828** **IR-404828**

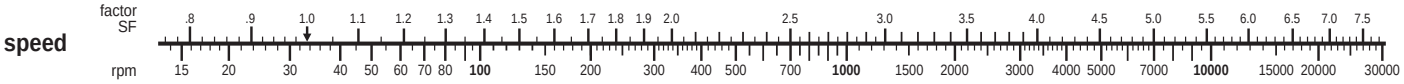
Required Basic Dynamic Load Rating (C_r) = Applied Load • SF • LF • HF (see page E75).

† See pages 412-415 for inch series inner rings. Order inner rings separately.

* Equal to minimum bearing chamfer at unstamped end.

• Example: HJ-162416.2RS - a bearing with 1.0000 inch nominal bore, 1.5000 inch nominal o.d. and 1.000 inch nominal width with two seals. As single sealed version: HJ-162416RS

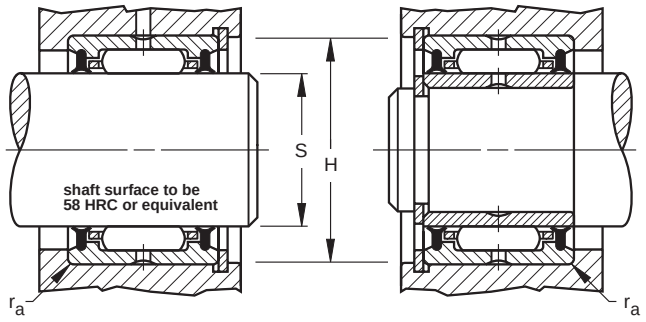
§ Based on standard seal shaft contact speed of 1000 ft./min.



The bearing outer ring should normally be a clearance fit when the housing is stationary relative to the load. When the housing rotates relative to the load, the tight transition fit is normally used. See page 403 for further discussion on mounting practice.

For oscillating applications, where low radial clearance may be important, consult the Torrington Engineering Department for recommendation of mounting dimentions.

The unstamped end of the outer ring should be assembled against the housing shoulder to assure clearing the maximum allowable housing fillet (r_a) indicated in the tables. For the proper housing shoulder diameter, consult your Torrington Engineering Sales Office.



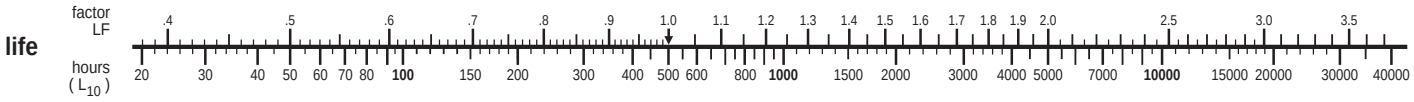
Bearing | Bearing with Inner Ring

BEARING MOUNTING DIMENSIONS

Mounting Dimensions, Clearance Fit									Mounting Dimensions, Tight Transition Fit							
Inch Mounting				Metric Mounting (mm)					Inch Mounting				Metric Mounting (mm)			
S Shaft Raceway Diameter		H Housing Bore Diameter		S Shaft Raceway Diameter		H Housing Bore Diameter		Bearing Designation	S Shaft Raceway Diameter		H Housing Bore Diameter		S Shaft Raceway Diameter		H Housing Bore Diameter	
max.	min.	min.	max.	max.	min.	min.	max.		max.	min.	min.	max.	max.	min.	min.	max.
0.6250	0.6246	1.1250	1.1258	15,875	15,865	28,575	28,595	**-101816**	0.6244	0.6240	1.1239	1.1247	15,860	15,850	28,547	28,567
0.7500	0.7495	1.2500	1.2510	19,050	19,037	31,750	31,775	**-122016**	0.7492	0.7487	1.2487	1.2497	19,030	19,017	31,717	31,742
0.8750	0.8745	1.3750	1.3760	22,225	22,212	34,925	34,950	**-142216**	0.8742	0.8737	1.3737	1.3747	22,205	22,192	34,892	34,917
1.0000	0.9995	1.5000	1.5010	25,400	25,387	38,100	38,125	**-162416**	0.9992	0.9987	1.4987	1.4997	25,380	25,367	38,067	38,092
1.1250	1.1245	1.6250	1.6260	28,575	28,562	41,275	41,300	**-182620**	1.1242	1.1237	1.6237	1.6247	28,555	28,542	41,242	41,267
1.2500	1.2494	1.7500	1.7510	31,750	31,735	44,450	44,475	**-202820**	1.2490	1.2484	1.7487	1.7497	31,725	31,710	44,417	44,442
1.3750	1.3744	1.8750	1.8760	34,925	34,910	47,625	47,650	**-223020**	1.3740	1.3734	1.8737	1.8747	34,900	34,885	47,592	47,617
1.5000	1.4994	2.0625	2.0637	38,100	38,085	52,388	52,418	**-243320**	1.4990	1.4984	2.0610	2.0622	38,075	38,060	52,349	52,379
1.6250	1.6244	2.1875	2.1887	41,275	41,260	55,562	55,592	**-263520**	1.6240	1.6234	2.1860	2.1872	41,250	41,235	55,524	55,554
1.7500	1.7494	2.3125	2.3137	44,450	44,435	58,738	58,768	**-283720**	1.7490	1.7484	2.3110	2.3122	44,425	44,410	58,699	58,729
2.0000	1.9993	2.5625	2.5637	50,800	50,782	65,088	65,118	**-324120**	1.9988	1.9981	2.5610	2.5622	50,770	50,752	65,049	65,079
2.2500	2.2493	3.0000	3.0012	57,150	57,132	76,200	76,230	**-364828**	2.2488	2.2481	2.9985	2.9997	57,120	57,102	76,162	76,192
2.5000	2.4993	3.2500	3.2514	63,500	63,482	82,550	82,586	**-405228**	2.4988	2.4981	3.2481	3.2495	63,470	63,452	82,502	82,538
2.7500	2.7493	3.5000	3.5014	69,850	69,832	88,900	88,936	**-445628**	2.7488	2.7481	3.4981	3.4995	69,820	69,802	88,852	88,888
3.0000	2.9993	3.7500	3.7514	76,200	76,182	95,250	95,286	**-486028**	2.9988	2.9981	3.7481	3.7495	76,170	76,152	95,202	95,238

Ⓣ Symbol denotes Torrington Basic Dynamic Load Rating to be used in load-life calculations taking into consideration the application guidelines and limitations given in this catalog. Applications involving loads approaching this rating should be referred to your Torrington Engineering Sales Office before a final selection is made.

Load Ratings are based on a minimum raceway hardness of 58 HRC or equivalent.



Needle Roller Bearings – Metric Nominal Dimensions

Bore diameter from 10 mm; to 17 mm for NA49..; NA69..
00 = 10 mm
01 = 12 mm
02 = 15 mm
03 = 17 mm

Bore diameter > 17 mm, Bore code x 5 = bore diameter for NA48..; NA49..; NA69..
04 = 20 mm
05 = 25 mm
06 = 30 mm
07 = 35 mm

NA49 | 04 | A.2RS

Suffix
A = modified internal design
ARS = modified internal design, lip contact seal on one side of the bearing
A.2RS = modified internal design, lip contact seals on each side of the bearing

Prefix
NA48 = needle roller bearing, with inner ring, lubrication hole in outer ring
RNA48 = needle roller bearing, without inner ring, lubrication hole in outer ring
NA49 = needle roller bearing, with inner ring, lubrication hole in outer ring
RNA49 = needle roller bearing, without inner ring, lubrication hole in outer ring
NA69 = needle roller bearing, with inner ring, lubrication hole in outer ring, when bore ≥ 32 mm then as double row
RNA69 = needle roller bearing, without inner ring, lubrication hole in outer ring, when bore ≥ 40 mm then as double row
NAO = needle roller bearing, with inner ring, without flanges
RNAO = needle roller bearing, without inner ring, without flanges

NA69 | /28 | A

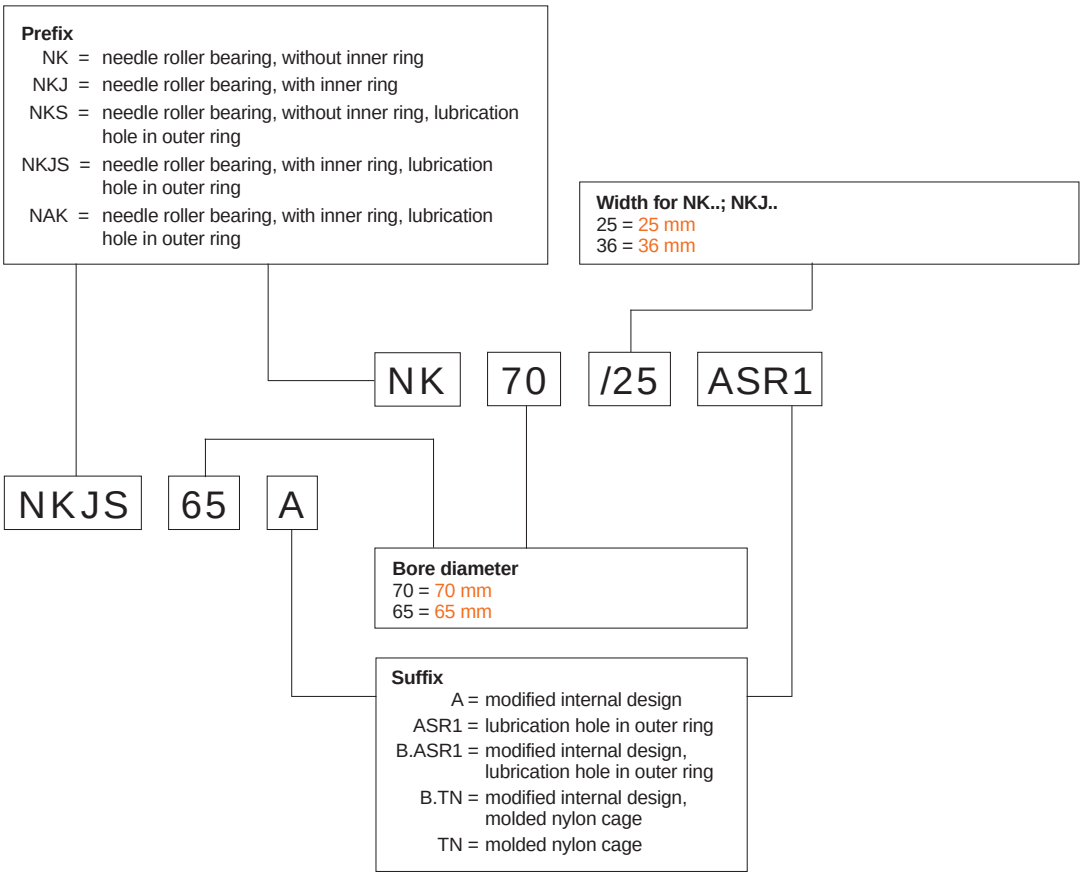
Bore diameter for NA49/..; NA69/..; NAO; RNAO
28 = 28 mm
25 = 25 mm

RNAO | 25 x 37 x 16

Outside diameter for NAO, RNAO
37 = 37 mm
55 = 55 mm

Width for NAO, RNAO
16 = 16 mm
20 = 20 mm

Needle Roller Bearings – Metric Nominal Dimensions



Inner Rings for Needle Roller Bearings – Metric Nominal Dimensions

Prefix

JR = Inner ring for use with metric needle roller bearing
JRZ = Inner ring for use with metric needle roller bearing, without mounting chamfers

JRZ	25	x30	x18	JS1
	Bore diameter 25 = 25mm	Outside Diameter 30 = 30mm	Width 18 = 18mm	Suffix JS1 = Lubrication hole

NEEDLE ROLLER BEARINGS (with machined rings)

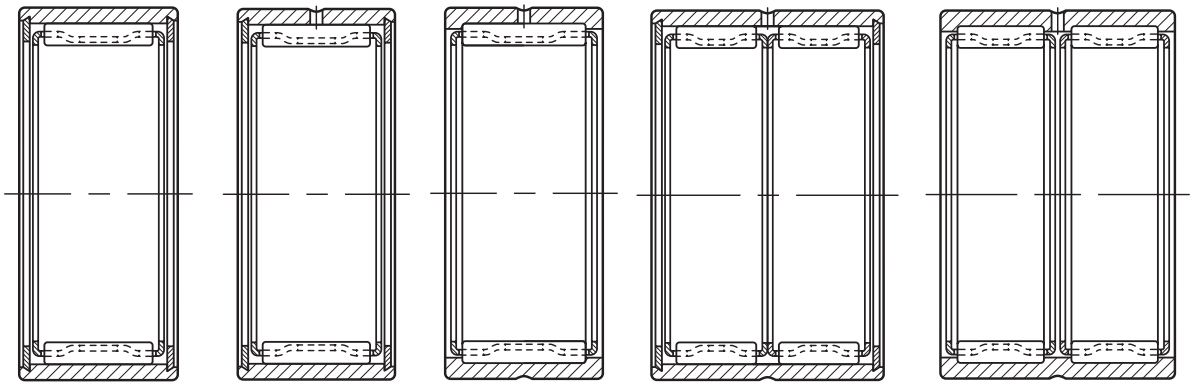
When applications involve very heavy dynamic, static or even shock load conditions the needle roller bearing may be found to give best results.

Reference standards are:

- ISO 1206 - Needle roller bearings - Light and medium series - Dimensions and tolerances.
- DIN 617 - Rolling bearings - Needle roller bearings - with cage - Dimension series 48 and 49

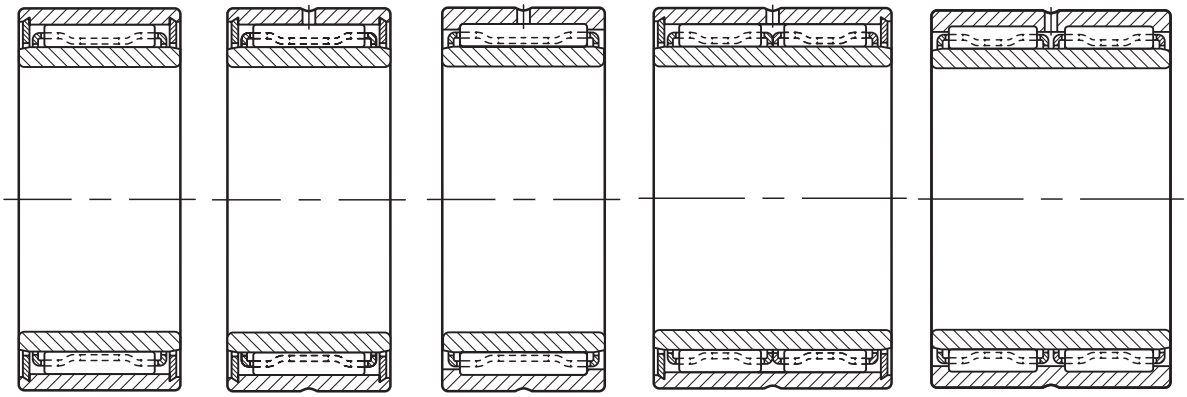
Types of needle roller bearings

Needle roller bearings without inner rings



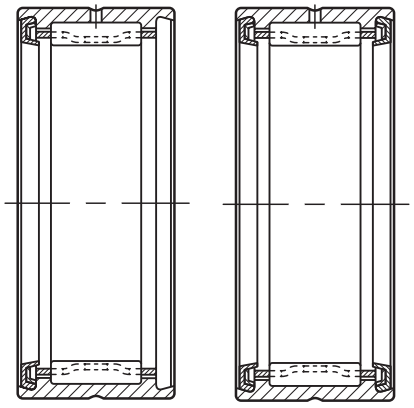
NK | **NK.ASR1** | **NK, NKS, RNA48, RNA49, RNA69 ($F_w \leqq 35$mm)** | **RNA69** | **RNA69 ($F_w \geqq 40$ mm)**

Needle roller bearings with inner rings



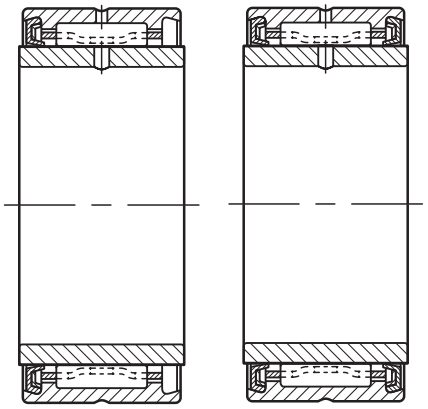
NKJ | **NKJ.ASR1** | **NKJ, NKJS, NA48, NA49, NA69 ($d \leqq 30$mm)** | **NA69** | **NA69 ($d \geqq 32$mm)**

Sealed needle roller bearings without inner rings



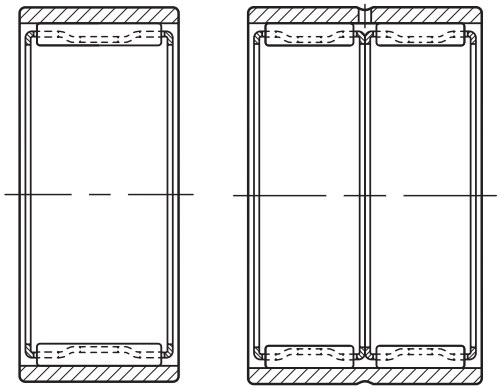
RNA49.RS | **RNA49.2RS**

Sealed needle roller bearings with inner rings



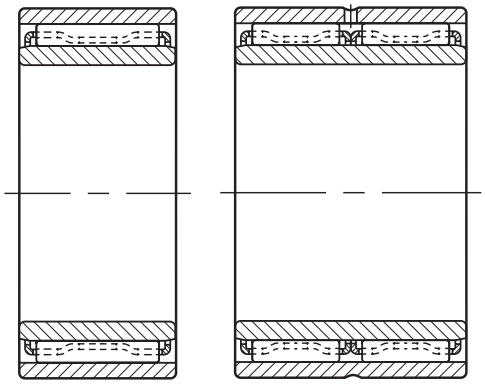
NA49.RS | **NA49.2RS**

Needle roller bearings without flanges, without inner rings



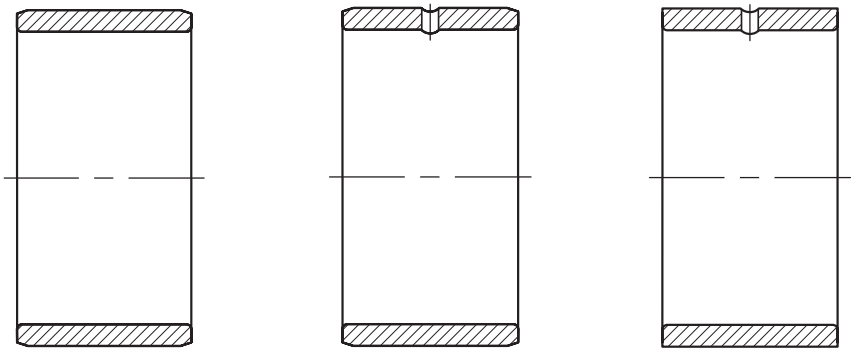
RNAO RNAO

Needle roller bearings without flanges, with inner rings



NAO NAO

Inner Rings



JR JR.JS1 JRZ.JS1

Suffixes

RS	one seal
.2RS	two seals
ASR1	lubrication groove and one lubrication hole in the outer ring
TN	molded cage of reinforced engineered polymer
JS1	lubrication hole in inner ring

Construction

The basic constructions of needle roller bearings are:

- with integral end flanges on the one piece channel-shaped outer rings.
- with inserted end washers to provide axial retention of the needle roller and cage assemblies.
- without flanges where separate end washers are required to provide axial retention of the needle roller and cage assemblies.

Needle roller bearings with integral flanges

The Torrington needle roller bearing has a one-piece channel-shaped outer ring of bearing quality steel, heat treated to yield maximum load rating. The integral end flanges provide axial location for the needle rollers. The bores of the end flanges serve as piloting surfaces for the cage where its location prevents removal of the lubricant film from the raceway.

A steel cage provides inward retention for the needle rollers and the design assures roller stability and minimizes friction between the cage and the needle rollers. The cage has maximum strength consistent with the inherent high load ratings of needle roller bearings.

Needle roller bearings of series NKJ, NKJS, NA48, NA49 and NAK contain one needle roller and cage assembly. Bearings of series NA69 with bearing bores of 32 mm and above have two needle roller and cage assemblies.

The outer ring has a lubrication groove and a lubrication hole for more convenient lubrication of the bearing. However, the smaller bearings of series NKJ and NK do not have a lubrication groove or a lubrication hole.

Needle roller bearings without flanges

The needle roller and cage radial assembly used in Torrington needle roller bearings without flanges is slightly narrower than the inner and outer rings to ensure unobstructed operation. Separate end washers are required to provide axial retention of the needle roller and cage radial assembly. Wide needle roller bearings using two needle roller and cage assemblies have a lubrication groove and one lubrication hole in the outer ring to facilitate relubrication of the bearing. Narrow needle roller bearings do not have a lubrication groove or a lubrication hole in the outer ring.

Needle roller bearings without inner rings

Whenever the shaft can be used as the inner raceway, needle roller bearings without inner rings provide advantages of economy and close control of radial internal clearance in operation. Tolerance class F6 is the normal specification for the needle roller complement bore diameter of an unmounted bearing as shown in Table 1. In the case of needle roller bearings of series RNAO without flanges and without inner rings, the outer rings and needle roller and cage assemblies are not interchangeable.

Table 1
Needle Roller Complement Bore Diameter For Bearings Without Inner Ring.

F_w mm		ΔF_w min µm	
over	incl.	low	high
	6	+10	+18
6	10	+13	+22
10	18	+16	+27
18	30	+20	+33
30	50	+25	+41
50	80	+30	+49
80	120	+36	+58
120	180	+43	+68
180	250	+50	+79
250	315	+56	+88
315	400	+62	+98

Needle roller bearings with inserted end washers

Some needle roller bearings have inserted end washers to provide axial retention of the needle roller and cage assembly. The needle roller and cage radial assemblies, consistent with other Torrington designs, provide inward and outward retention for the needle rollers. The accurate guidance of the needle rollers by the cage bars allows for operation at high speeds and severe shaft misalignments or deflections.

Sealed needle roller bearings of dimension - series 49

Torrington needle roller bearings of series 49 are available with one or two integral lip contact seals as listed on pages 442-443. One seal is designated by suffix lefters RS. Two seals are designated by .2RS. When combining sealed needle roller bearings with inner rings it is recommended to use inner rings shown on page 452-455 with designation JRZ because they are one millimeter wider than the outer rings to ensure positive seal contact.

These seals limit the bearing operating temperature between -30°C and 110°C. If the operating temperature must be outside the above range or if the seals are exposed to unusual fluids, external seals using suitable seal materials or other solutions should be investigated. Sealed bearings are normally packed with a high quality lithium soap base grease suitable up to 120°C for short periods of operation.

Needle roller bearings with inner rings

Needle roller bearings without inner rings may be combined with standard inner rings to form complete bearings (such as NA series). These meet quality requirements in accordance with ISO standards. For inner and outer ring tolerances refer to Standard 492, for radial internal clearance refer to Standard 5753 and for chamfer dimensions refer to Standard 582. In general these bearings follow the normal tolerance class for cylindrical roller bearings. Bearings to more precise tolerance classes P6 and P5 may be obtained upon request (see Tables 5 and 6).

These complete bearings have the same radial internal clearance as given for cylindrical roller bearings. Mostly they follow the normal (N) radial clearance group although bearings to clearance groups 2, 3 and 4 may be made available on request. (see Table 7)

BEARING MOUNTING

Mounting dimensions

It is recommended that needle roller bearings are mounted in their housings with a clearance fit if the load is stationary relative to the housing, or with a tight transition fit if the load rotates relative to the housing. Table 2 lists the recommended tolerances for the housing bore and the shaft raceway for bearings without inner rings. Table 3 lists the recommended shaft tolerances for the above two mounting conditions when the bearings are used with inner rings.

Other mounting dimensions may be required for special operating conditions such as:

1. Extremely heavy radial loads
2. Shock loads
3. Temperature gradient across bearing
4. Housing material with heat expansion coefficient different to that of the bearing

Needle roller bearings without flanges of series RNAO and NAO must have the needle roller and cage radial assembly properly end guided by shoulders as shown in table 4 or other suitable means such as the spring steel washers (SNSH) shown on page 458. These end guiding surfaces should be hardened and precision turned or ground to minimize wear and should properly fit against the outer rings and the inner rings to provide the desired end clearance for the needle roller and cage assembly.

Mounting in sets

Needle roller bearings which are mounted side by side (must be specially ordered to ensure uniform load distribution) or (must have the same cross-section and radial internal clearances, after mounting).

Table 2 - Mounting Tolerances For Bearings Without Inner Ring

Rotation conditions	Nominal housing bore diameter D mm	ISO tolerance zone for housing	Nominal shaft raceway diameter F mm	ISO tolerance zone for shaft raceway diameter
Load stationary relative to housing	all diameters	H7 (J7)	all diameters	h6
General work with larger clearance	all diameters	K7	all diameters	g6
Load rotates relative to housing	all diameters	N7	all diameters	f6

NOTE:

1. Care should be taken that the selected bearing internal clearance is appropriate for the operating conditions.
2. Details of shaft and housing quality requirements are given in the Engineering section of this catalog.

Table 3 - Shaft Tolerances For Bearings With Inner Rings

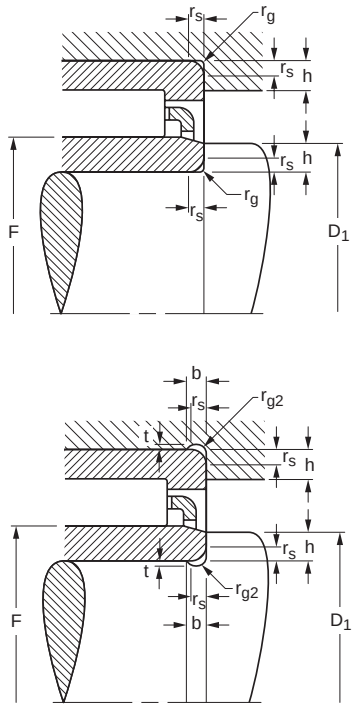
Rotation conditions	Nominal shaft diameter d, mm		ISO tolerance zone for shaft
Shaft stationary relative to load	all diameters		g6
Shaft rotates relative to load	over	incl.	
		40	k6
	40	100	m6
	100	140	m6
	140		n6

NOTE:

1. Care should be taken that the selected bearing internal clearance is appropriate for the operating conditions.
2. Details of shaft and housing quality requirements are given in the Engineering section of this catalog.

Regardless of the fit of the bearing outer ring in the housing, the outer ring should be axially located by housing shoulders or other positive means. The bearing rings should closely fit against the shaft and housing shoulders and must not contact the fillet radius. In fact, the maximum shaft or housing fillet r_g max should be equal to or smaller than the minimum bearing chamfer r_s min.

Fillets, undercuts, and shoulder heights



r_s min mm	r_g max	t	r_{g2}	b	h min
0,15	0,15				0,6
0,3	0,3				1
0,6	0,6				2
1	1	0,2	1,3	2	2,5
1,1	1	0,3	2	3	3,25
1,5	1,5	0,4	2	3,2	4
2	2	0,5	2,5	4	5
2,1	2,1	0,5	3	4,7	5,5
3	2,5	0,5	3,5	5,3	6

In order to permit mounting and dismounting of the shaft, the maximum diameter D_1 of the following table must not be exceeded. F_w is shown in the bearing tables.

Shoulder diameter $D_{1\ max}$

Dimensions in mm

Nominal diameter under needle rollers	over		20	55	100	250
	incl.	20	55	100	250	
	F_w					
Diameter	$D_{1\ max}$	F_w -0.3	F_w -0.5	F_w -0.7	F_w -1	F_w -1.5

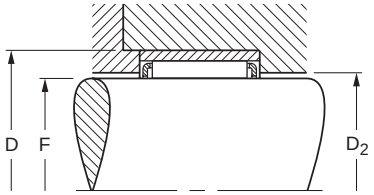
Inner rings
Inner rings are made of hardened rolling bearing steel; their bores, raceways and side faces are ground. Inner rings are used on unhardened shafts, together with needle roller and cage assemblies, needle roller bearings and drawn cup needle roller bearings. The extended inner rings are suitable for applications where major axial displacements have to be taken into account, and as running surfaces for contact seals.

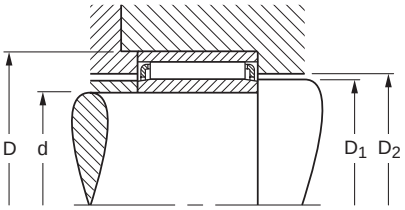
Designs
The various inner ring designs differ by their mounting chamfers at the raceway ends and by their lubrication holes: series JR — for shaft diameters from 5 to 380 mm — has mounting chamfers and no lubrication holes. Inner rings of series JR.JS1 have mounting chamfers and lubrication holes (diameter range 5 to 50 mm). Inner rings of series JRZ.JS1 have cylindrical raceways (no mounting chamfers) which permit large axial displacements. Inner rings of this series — for diameters from 6 to 50 mm — have lubrication holes.

Tolerances
The dimensional, form and running tolerances of Torrington inner rings are the normal tolerances of radial bearings (Table 5). The raceways are machined to h5 (raceway diameters from 8 to 195 mm) and to f6 (raceway diameters from 210 to 415 mm). Other machining tolerances are reserved for cases requiring either a larger or a smaller radial clearance, or increased precision.

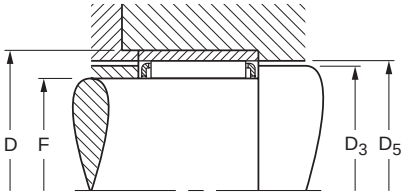
Mounting dimensions
The shafts should be machined to the tolerances recommended in Table 3.

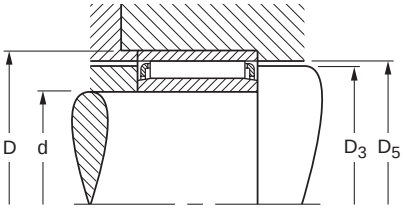
End washers
End washers of series SNSH are made of spring steel. They are used together with needle roller bearings without flanges of series NAO and RNAO if the adjoining machine parts cannot be used as contact surfaces for the needle roller and cage assembly. The end washers are guided in the housing bore.





Guidance in the Housing





Guidance on the Shaft

Table 4 – Mounting dimensions for needle roller bearings without flanges

Dimensions	Bearing series RNAO			Dimensions	Bearing series NAO			
FxD	D_2 min	D_3 max	D_5 min	dxD	D_1 max	D_2 min	D_3 max	D_5 min
mm	mm	mm	mm	mm	mm	mm	mm	mm
10x17	10,3	12,7	13,3	**6x17**	9,7	10,3	12,7	13,3
12x19	12,3	14,7	15,3	**8x19**	11,7	12,3	14,7	15,3
14x22	14,4	17,6	18,3	**10x22**	13,7	14,4	17,6	18,3
15x23	15,4	18,6	19,3	**10x26**	13,7	14,6	19,6	20,3
16x24	16,4	19,6	20,3		15,7	16,4	19,6	20,3
17x25	17,4	20,6	21,3	**12x28**	15,7	16,6	21,6	22,3
18x26	18,4	21,6	22,3	**15x28**	19,5	20,4	23,6	24,3
18x30	18,6	23,6	24,5	**15x32**	19,5	20,6	25,6	26,5
20x28	20,4	23,6	24,3	**17x30**	21,5	22,4	25,6	26,3
20x32	20,6	25,6	26,5	**17x35**	21,5	22,8	28,4	29,5
22x30	22,4	25,6	26,3	**20x35**	24,5	25,6	29,4	30,5
22x35	22,8	28,4	29,5	**20x37**	24,5	25,8	31,4	32,5
25x35	25,6	29,4	30,5	**25x40**	29,5	30,6	34,4	35,5
25x37	25,8	31,4	32,5	**25x42**	29,5	30,8	36,4	37,5
28x40	28,8	34,4	35,5	**30x45**	34,5	35,6	39,4	40,5
30x40	30,6	34,4	35,5	**30x47**	34,5	35,8	41,4	42,5
30x42	30,8	36,4	37,5	**35x50**	39,5	40,6	44,4	45,5
35x45	35,6	39,4	40,5	**35x55**	39,5	41	47,2	48,5
35x47	35,8	41,4	42,5	**40x55**	44,5	45,6	49,4	50,5
40x50	40,6	44,4	45,5	**40x62**	44,5	46	52,2	53,5
40x55	41	47,2	48,5	**45x62**	49,5	50,6	54,4	55,8
45x55	45,6	49,4	50,5	**45x72**	54,5	56	62,2	63,8
45x62	46	52,2	53,5	**50x68**	54,5	55,6	59,4	60,8
50x62	50,6	54,4	55,8	**50x78**	59,3	61	67,2	68,8
50x65	51	57,2	58,5	**55x85**	64,3	66	72,2	73,8
55x68	55,6	59,4	60,8	**60x90**	69,3	71	77,2	78,8
55x72	56	62,2	63,8	**65x95**	74,3	76	82,2	84
60x78	61	67,2	68,8	**70xl00**	79,3	81	87,2	89
65x85	66	72,2	73,8	**75x105**	84,3	86	92,2	94
70x90	71	77,2	78,8	**80x110**	89,3	91	97,2	99
75x95	76	82,2	84	**85x115**	94,3	96	102,2	104
80x100	81	87,2	89	**90x120**	99,3	101	107,2	109
85x105	86	92,2	94					
90x110	91	97,2	99					
95x115	96	102,2	104					
100x120	101	107,2	109					

RADIAL BEARING TOLERANCES, RADIAL INTERNAL CLEARANCE AND CHAMFER DIMENSIONS.

The tolerances given in the following Tables 5 and 6 apply to inner rings and outer rings of radial needle roller bearing types in which their rings are finished by precision grinding or lapping.

The radial internal clearance values given in Table 7 apply to complete needle roller bearings (containing inner and outer rings) except drawn cup bearings.

When making a bearing selection for specific operating conditions in an application, consideration should be given to the bearing radial internal clearance group. This is to ensure that proper running clearance is maintained due to installation conditions as well as the effects of thermal expansion.

The following factors will influence the resultant reduction of radial internal clearance upon bearing installation. When an inner ring is pressed onto a solid steel shaft, the inner ring expansion is approximately 80% of the interference fit. For an outer ring pressed into a steel or a cast iron housing, the reduction in radial clearance can be expected to be between 60% and 70% of the interference fit.

The chamfer dimension limits given in table 8 apply to radial needle rolling bearings. The smallest permissible single chamfer dimension is frequently the only limit given because it is equivalent to the maximum limit of the corresponding shaft or housing fillet radius.

Reference standards:

ISO 492 - Rolling bearings - Radial Bearings -Tolerances

ISO 582 - Rolling bearings - Metric series - Chamfer dimension limits

ISO 5753 - Rolling bearings - Radial internal clearance

BEARING DATA

Tolerances

The specified tolerances and running accuracy apply to metric needle roller bearings except drawn cup needle roller bearings. Definitions of the concepts to which the tolerances apply are given in ISO 1132, ISO 5593 DIN 620, and ANSI/ABMA 4 standards.

TOLERANCE TERMS, SYMBOLS AND DEFINITIONS

Axes, planes etc.

Inner ring (or shaft washer) axis: Axis of the cylinder inscribed in a basically cylindrical or tapered bore of an inner ring (or shaft washer).

Outer ring (or housing washer) axis: Axis of the cylinder circumscribed around a basically cylindrical outside surface of an outer ring.

Radial plane: Plane perpendicular to the bearing or ring axis. It is, however, acceptable to consider radial planes referred to in the definitions as being parallel with the plane tangential to the reference face of a ring or the back face of a thrust bearing washer.

Radial direction: Direction through the bearing or ring axis in a radial plane.

Axial direction: Direction parallel with the bearing or ring axis. It is, however, generally acceptable to consider axial directions as being perpendicular to the plane tangential to the reference face of a ring or back face of a thrust bearing washer.

Reference face: Face so designated by the manufacturer of the bearings and which may be the datum for measurements.

NOTE: The reference face for measurement is generally taken as the unmarked face. In case of symmetrical rings when it is not possible to identify the reference face, the tolerances are deemed to comply relative to either face, but not both. The reference face of a shaft and housing washer as a thrust bearing is that face intended to support axial load and is generally opposite the raceway face.

Middle of raceway: Point or line on a raceway surface, halfway between the two edges of the raceway.

Raceway contact diameter: Diameter of the circle through the nominal points on a raceway.

NOTE: For roller bearings, the nominal point of contact is generally at the middle of the roller.

Diameter deviation near ring faces: In radial planes, nearer the face of a ring than 1.2 times the maximum (axial direction) ring chamfer, only the maximum material limits apply.

BOUNDARY DIMENSIONS

Bore diameter

Nominal bore diameter, d: Diameter of the cylinder containing the theoretical bore surface of a cylindrical bore.

Single bore diameter, d_{sp}**:** Distance between two parallel tangents to the line of intersection of the actual bore surface and a radial plane

Mean bore diameter in a single plane, d_{mp}: Arithmetical mean of the largest and smallest of the single bore diameters in a single radial plane. This diameter, d_{mp}, measured at the middle of the ring, is used for classification purposes.

Deviation of mean bore diameter in a single plane, Δ_{dmp} (of a basically cylindrical bore): Difference between the mean bore diameter and the nominal bore diameter in a single radial plane. $\Delta_{dmp} = d_{mp} - d$.

Variation of single bore diameter in a single plane, V_{dsp}: Difference between the largest and the smallest of the single bore diameters in a single radial plane. This is also referred to as bore out-of-roundness. $V_{dsp} = d_{sp\,max} - d_{sp\,min}$.

Variation of mean bore diameter, V_{dmp} (of a basically cylindrical bore): Difference between the largest and the smallest of the mean bore diameters in a single radial plane of an individual ring. This is also referred to as bore taper. $V_{dmp} = d_{mp\,max} - d_{mp\,min}$.

Nominal bore diameter of a rolling element complement, F_w: Diameter of the theoretical cylinder inscribed inside all of the rolling elements in a radial contact rolling bearing.

Outside diameter

Nominal outside diameter, D (of a basically cylindrical outside surface): Diameter of the cylinder containing the theoretical outside surface.

NOTE: For rolling bearings, the nominal outside diameter is generally the reference value (basic diameter) for deviations of the actual outside surface.

Single outside diameter, D_{sp}: Distance between two parallel tangents to the line of intersection of the actual outside surface and a radial plane.

Mean outside diameter in a single plane, D_{mp}: Arithmetical mean of the largest and the smallest single outside diameters in a single radial plane.

Deviation of mean outside diameter in a single plane, Δ_{Dmp} (of a basically cylindrical outside surface): Difference between the mean outside diameter and the nominal outside diameter in a single radial plane. $\Delta_{Dmp} = D_{mp} - D$.

Variation of single outside diameter in a single radial plane, V_{Dsp}: Difference between the largest and the smallest of the single outside diameters in a single radial plane. This is also referred to as outside diameter out-of-roundness. $V_{Dsp} = D_{spmax} - D_{spmin}$.

Variation of mean outside diameter, V_{Dmp} (of a basically cylindrical outside surface): Difference between the largest and smallest of the mean outside diameters in a single plane of an individual ring. This is also referred to as outside diameter taper. $V_{Dmp} = D_{mpmax} - D_{mpmin}$.

Nominal outside diameter of rolling element complement, E_w**:** Diameter of the theoretical cylinder circumscribed around all of the rolling elements in a radial contact rolling bearing.

Width

Nominal ring width, B (inner ring) or C (outer ring): Distance between the two theoretical side faces of a ring.

NOTE: For rolling bearing rings, the nominal width is generally the reference value (basic dimension) for deviations of the actual width.

Single ring width, B_s **or** C_s**:** Distance between the points of intersection of the two actual side faces of a ring and a straight line perpendicular to the plane tangential to the reference face of the ring.

Deviation of a single ring width, Δ_{Bs} or Δ_{Cs}: Difference between a single ring width and the nominal ring width. $\Delta_{Bs} = B_s - B$, $\Delta_{Cs} = C_s - C$

Variation of ring width, V_{Bs} **or** V_{Cs}: Difference between the largest and the smallest of the single widths of an individual ring.
$V_{Bs} = B_{smax} - B_{smin}$, $V_{Cs} = C_{smax} - C_{smin}$.

Ring chamfer dimension

Single chamfer dimension, r_s, r_{1s}

Radial single chamfer dimension: Actual distance, in a single axial plane, between the imaginary sharp corner of a ring and the intersection of the chamfer surface and the face of the ring.

Axial single chamfer dimension: Actual distance, in a single axial plane, between the imaginary sharp corner of a ring and the intersection of the chamfer surface and the bore or outside surface of the ring.

Smallest single chamfer dimension, $r_s\ min$, $r_{1s}\ min$. (minimum limit): In addition to defining the smallest permissible radial and axial single chamfer dimension, this is the radius of an imaginary circular arc, in an axial plane, tangential to the ring face and the bore or outside surface of the ring, beyond which no ring material is allowed to project.

Largest single chamfer dimension, r_{1smax}, r_{2smax} (maximum limit): Largest permissible radial and axial single chamfer dimension.

RUNNING ACCURACY

Radial runout

Radial runout of inner ring of assembled bearing, K_{ia} (radial bearing): Difference between the largest and smallest of the radial distances between the bore surface of the inner ring, in different angular positions of this ring, and a point in a fixed position relative to the outer ring. At the angular position of the point mentioned, or on each side and close to it, rolling elements are to be in contact with both the inner and outer ring raceways.

Radial runout of outer ring of assembled bearing, K_{ea} (radial bearing): Difference between the largest and the smallest of the radial distances between the outside surface of the outer ring, in different angular positions of this ring, and a point in a fixed position relative to the inner ring. At the angular position of the point mentioned, or on each side and close to it, rolling elements are to be in contact with both the inner and outer ring raceways.

Face runout with bore

Face runout with bore, S_d (inner ring, reference or back face): Difference between the largest and the smallest axial distances between a plane perpendicular to the inner ring axis and the reference or back face of the ring, at radial distance from the axis of half the mean diameter of the face.

INTERNAL CLEARANCE

Radial clearance

Radial internal clearance, G_r (bearing capable of taking purely radial load, nonpreloaded): The arithmetical mean of the radial distances through which one of the rings may be displaced relative to the other, from one eccentric extreme position to the diametrically opposite extreme position, in different angular directions and without being subjected to any external load. The mean value includes displacements with the rings in different angular positions relative to each other and with the set of rolling elements in different angular positions in relation to the rings.

BEARING DATA TOLERANCES
Tolerances of radial bearings
Table 5 Inner Ring

Dimensions in mm

Nominal bore diameter over	2,5	10	18	30	50	80	120	180	250	315	400
incl.	10	18	30	50	80	120	180	250	315	400	500

Tolerance class P_0 (normal tolerance)

Tolerance in micrometers (0.001 mm)

Deviation	Δ_{dmp}	0 -8	0 -8	0 -10	0 -12	0 -15	0 -20	0 -25	0 -30	0 -35	0 -40	0 -45
Variation V_{dsp}	diameter series 8-9	10	10	13	15	19	25	31	38	44	50	56
Variation	V_{dmp}	6	6	8	9	11	15	19	23	26	30	34
Width deviation	Δ_{Bs}	0 -120	0 -120	0 -120	0 -120	0 -150	0 -200	0 -250	0 -300	0 -350	0 -400	0 -450
Width variation	V_{Bs}	15	20	20	20	25	25	30	30	35	40	50
Radial runout	K_{ia}	10	10	13	15	20	25	30	40	50	60	65

Tolerance class P6

Deviation	Δ_{dmp}	0 -7	0 -7	0 -8	0 -10	0 -12	0 -15	0 -18	0 -22	0 -25	0 -30	0 -35
Variation V_{dsp}	diameter series 8-9	9	9	10	13	15	19	23	28	31	38	44
Variation	V_{dmp}	5	5	6	8	9	11	14	17	19	23	26
Width deviation	Δ_{Bs}	0 -120	0 -120	0 -120	0 -120	0 -150	0 -200	0 -250	0 -300	0 -350	0 -400	0 -450
Width variation	V_{Bs}	15	20	20	20	25	25	30	30	35	40	45
Radial runout	K_{ia}	6	7	8	10	10	13	18	20	25	30	35

Tolerance class P5

Deviation	Δ_{dmp}	0 -5	0 -5	0 -6	0 -8	0 -9	0 -10	0 -13	0 -15	0 -18	0 -23
Variation V_{dsp}	diameter series 8-9	5	5	6	8	9	10	13	15	18	23
Variation	V_{dmp}	3	3	3	4	5	5	7	8	9	12
Width deviation	Δ_{Bs}	0 -40	0 -80	0 -120	0 -120	0 -150	0 -200	0 -250	0 -300	0 -350	0 -400
Width variation	V_{Bs}	5	5	5	5	6	7	8	10	13	15
Radial runout	K_{ia}	4	4	4	5	5	6	8	10	13	15
Axial runout	S_d	7	7	8	8	8	9	10	11	13	15

Table 6 Outer Ring

Dimensions in mm

Nominal outside diameter	over	6	18	30	50	80	120	150	180	250	315	400
	incl.	18	30	50	80	120	150	180	250	315	400	500

Tolerance class P0 (normal tolerance)

Tolerances in micrometers (0.001 mm)

Deviation	Δ_{Dmp}	0 -8	0 -9	0 -11	0 -13	0 -15	0 -18	0 -25	0 -30	0 -35	0 -40	0 -45
Variation V_{Dsp}	diameter series 8-9	10	12	14	16	19	23	31	38	44	50	56
Variation	V_{Dmp}	6	7	8	10	11	14	19	23	26	30	34
Radial runout	K_{ea}	15	15	20	25	35	40	45	50	60	70	80

The width tolerances Δ_{Cs} and V_{Cs} are identical to Δ_{Bs} and V_{Bs} for the inner ring.

Tolerance class P6

Deviation	Δ_{Dmp}	0 -7	0 -8	0 -9	0 -11	0 -13	0 -15	0 -18	0 -20	0 -25	0 -28	0 -33
Variation V_{Dsp}	diameter series 8-9	9	10	11	14	16	19	23	25	31	35	41
Variation	V_{Dmp}	5	6	7	8	10	11	14	15	19	21	25
Radial runout	K_{ea}	8	9	10	13	18	20	23	25	30	35	40

The width tolerances Δ_{Cs} and V_{Cs} are identical to Δ_{Bs} and V_{Bs} for the inner ring.

Tolerance class P5

Deviation	Δ_{Dmp}	0 -5	0 -6	0 -7	0 -9	0 -10	0 -11	0 -13	0 -15	0 -18	0 -20	0 -23
Variation V_{Dsp}	diameter series 8-9	5	6	7	9	10	11	13	15	18	20	23
Variation	V_{Dmp}	3	3	4	5	5	6	7	8	9	10	12
Width variation	V_{Cs}	5	5	5	6	8	8	8	10	11	13	15
Radial runout	K_{ea}	5	6	7	8	10	11	13	15	18	20	23
Surface Perpendicularity	S_p	8	8	8	8	9	10	10	11	13	13	15

The width tolerance Δ_{Cs} is identical to Δ_{Bs} for the inner ring.

BEARING DATA

Bearing Radial Internal Clearance

Table 7 Radial Internal Clearance of Needle Roller Bearings (Except Drawn Cup Bearings)

Dimensions in mm

Nominal bore	over		24	30	40	50	65	80	100	120	140	160	180	200	225
diameter	incl	24	30	40	50	65	80	100	120	140	160	180	200	225	250

Bearing clearance in micrometers

Clearance group	min	0	0	5	5	10	10	15	15	15	20	25	35	45	45
C2	max	25	25	30	35	40	45	50	55	60	70	75	90	105	110
Clearance group	min	20	20	25	30	40	40	50	50	60	70	75	90	105	110
C0 (normal)	max	45	45	50	60	70	75	85	90	105	120	125	145	165	175
Clearance group	min	35	35	45	50	60	65	75	85	100	115	120	140	160	170
C3	max	60	60	70	80	90	100	110	125	145	165	170	195	220	235
Clearance group	min	50	50	60	70	80	90	105	125	145	165	170	195	220	235
C4	max	75	75	85	100	110	125	140	165	190	215	220	250	280	300

Dimensions in mm

Nominal bore	over	250	280	315	355	400	450
diameter	incl	280	315	355	400	450	500

Bearing clearance in micrometers

Clearance group	min	55	55	65	100	110	110
C2	max	125	130	145	190	210	220
Clearance group	min	125	130	145	190	210	220
C0 (normal)	max	195	205	225	280	310	330
Clearance group	min	190	200	225	280	310	330
C3	max	260	275	305	370	410	440
Clearance group	min	260	275	305	370	410	440
C4	max	330	350	385	460	510	550

BEARING DATA

CHAMFER DIMENSIONS

Chamfer dimension limits
Symbols

d Bearing bore diameter, nominal
D Bearing outside diameter, nominal
r_s min Smallest permissible single chamfer dimension (minimum limit)
r_{1s} max Largest permissible single chamfer dimension in a radial direction
r_{2s} max Largest permissible single chamfer dimension in an axial direction

Radial bearings

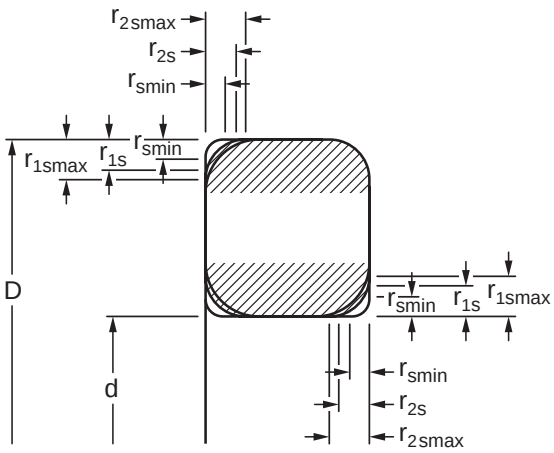
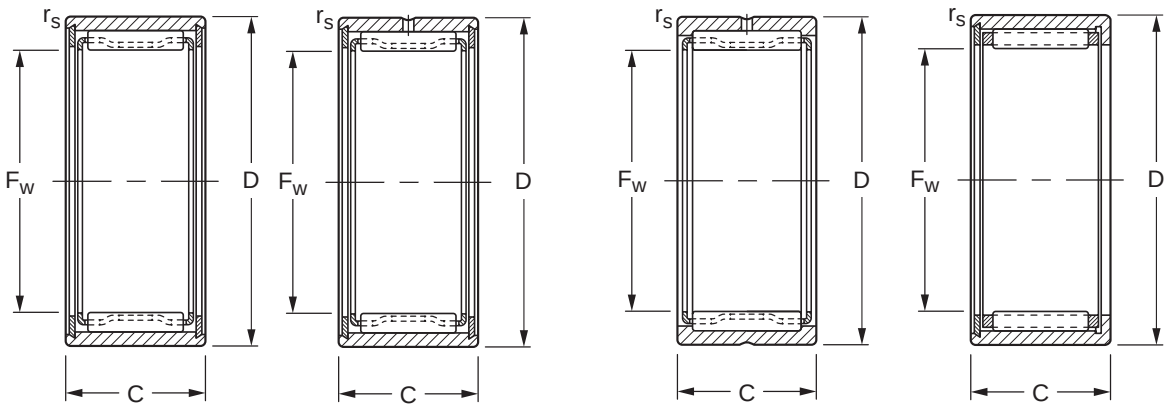


Table 8 Chamfer Dimensions Of Radial Bearings

Dimensions in mm

r_s min		0,15	0,2	0,3		0,6		1		1,1		1,5		2			2,1	
Nominal bore diameter d	over incl			≤40	>40	≤40	>40	≤50	>50	≤120	>120	≤120	>120	≤80	>80 ≤220	>220	≤280	>280
r_{1s} max		0,3	0,5	0,6	0,8	1	1,3	1,5	1,9	2	2,5	2,3	3	3	3,5	3,8	4	4,5
r_{2s} max		0,6	0,8	1	1	2	2	3	3	3,5	4	4	5	4,5	5	6	6,5	7

Needle roller bearings without inner rings



NK | NK.ASR1 | NK.A, NKS.A, RNA49, RNA69A | NK.B.TN

DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions				Bearing Designation	Load ratings		Limiting speed	Mass
						Basic Dynamic C_r	Basic Static C_0	Oil †	
	F_w	D	C	r_s min		Ⓣ ISO281	ISO76		
	mm					kN	kN	RPM	kg
5	5	10	10	0,15	NK5/10B,TN**)	1,63	2,18	1,71	47 000	0,004
	5	10	12	0,15	NK5/12TN**)	2,27	3,04	2,63	47 000	0,004
6	6	12	10	0,15	NK6/10	2,38	3,19	2,90	44 000	0,005
	6	12	12	0,15	NK6/12TN**)	2,29	3,07	2,74	44 000	0,006
7	7	14	10	0,3	NK7/10TN**)	2,04	2,74	2,44	42 000	0,007
	7	14	12	0,3	NK7/12TN**)	2,53	3,40	3,22	42 000	0,009
8	8	15	12	0,3	NK8/12	3,41	4,57	4,89	41 000	0,011
	8	15	16	0,3	NK8/16	3,89	5,22	5,78	41 000	0,013
9	9	16	12	0,3	NK9/12	3,18	4,27	4,60	40 000	0012
	9	16	16	0,3	NK9/16	4,15	5,57	6,47	40 000	0,015
10	10	17	12	0,3	NK10/12	4,03	5,40	6,43	39 000	0,013
	10	17	16	0,3	NK10/16TN**)	3,95	5,30	6,27	39 000	0,016
12	12	19	12	0,3	NK12/12A	5,11	6,86	7,60	30 000	0,013
	12	19	16	0,3	NK12/16	5,06	6,78	9,03	30 000	0,018
14	14	22	13	0,3	RNA4900	7,00	9,39	10,3	24 000	0,018
	14	22	16	0,3	NK14/16A	9,24	12,4	14,8	24 000	0,023
	14	22	20	0,3	NK14/20A	11,0	14,7	18,4	24 000	0,028
15	15	23	16	0,3	NK15/16A	9,24	12,4	15,0	24 000	0,024
	15	23	20	0,3	NK15/20A	11,0	14,7	18,6	24 000	0,031
16	16	24	13	0,3	RNA4901	7,83	10,5	12,3	23 000	0,02
	16	24	16	0,3	NK16/16A	9,69	13,0	16,2	23 000	0,025
	16	24	20	0,3	NK16/20A	11,5	15,4	20,2	23 000	0,032
	16	24	22	0,3	RNA6901A	12,0	16,1	21,3	23 000	0,036
17	17	25	16	0,3	NK17/16A	10,1	13,6	17,5	23 000	0,027
	17	25	20	0,3	NK17/20A	11,5	15,4	20,4	23 000	0,034
18	18	26	16	0,3	NK18/16A	10,1	13,6	17,7	25 000	0,028
	18	26	20	0,3	NK18/20A	12,0	16,1	22,0	25 000	0,035
19	19	27	16	0,3	NK19/16A	10,5	14,1	19,0	24 000	0,029
	19	27	20	0,3	NK19/20A	12,5	16,8	23,6	24 000	0,037

*) With two needle roller and cage assemblies and one lubricating hole in the outer ring.

**) Before applying assemblies with engineered polymer cages, consult Torrington Sales Engineers.

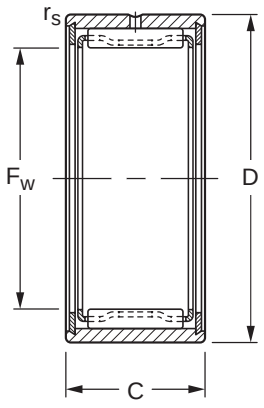
† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.

Needle roller bearings without inner rings

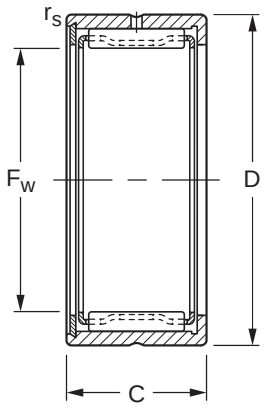
DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions				Bearing Designation	Load ratings			Limiting speed	Mass
						Basic Dynamic C_r		Basic Static C_0	Oil †	
	F_w	D	C	r_s min		Ⓣ	ISO281	ISO76		
		mm				kN	kN	kN	RPM	kg
20	20	28	13	0,3	**RNA4902**	8,80	11,8	15,3	22 000	0,023
	20	28	16	0,3	**NK20/16A**	10,5	14,1	19,1	22 000	0,032
	20	28	20	0,3	**NK20/20A**	13,0	17,5	25,3	22 000	0,038
	20	28	23	0,3	**RNA6902A**	13,7	18,4	26,9	22 000	0,042
	20	32	20	0,6	**NKS20A**	18,2	24,4	26,7	24 000	0,058
21	21	29	16	0,3	**NK21/16A**	11,4	15,3	21,6	21 000	0,032
	21	29	20	0,3	**NK21/20A**	13,5	18,1	26,9	21 000	0,04
22	22	30	13	0,3	**RNA4903**	9,09	12,2	16,4	20 000	0,025
	22	30	16	0,3	**NK22/16A**	11,3	15,2	21,7	20 000	0,033
	22	30	20	0,3	**NK22/20A**	13,4	18,0	27,0	20 000	0,041
	22	30	23	0,3	**RNA6903A**	14,8	19,8	30,6	20 000	0,056
	22	35	20	0,6	**NKS22A**	17,1	22,9	27,1	21 000	0,069
24	24	32	16	0,3	**NK24/16A**	12,1	16,2	24,3	18 000	0,035
	24	32	20	0,3	**NK24/20A**	14,4	19,3	30,3	18 000	0,045
	24	37	20	0,6	**NKS24A**	21,7	29,1	32,8	20 000	0,073
25	25	33	16	0,3	**NK25/16A**	12,0	16,1	24,4	17 000	0,037
	25	33	20	0,3	**NK25/20A**	14,2	19,1	30,4	17 000	0,047
	25	37	17	0,3	**RNA4904**	15,9	21,3	25,5	18 000	0,061
	25	37	30	0,3	**RNA6904A**	27,3	36,6	51,0	18 000	0,091
	25	38	20	0,6	**NKS25A**	21,7	29,1	33,0	19 000	0,076
26	26	34	16	0,3	**NK26/16A**	12,4	16,6	25,7	17 000	0,039
	26	34	20	0,3	**NK26/20A**	14,7	19,7	32,0	17 000	0,048
28	28	37	20	0,3	**NK28/20A**	16,8	22,6	34,4	16 000	0,057
	28	37	30	0,3	**NK28/30ASR1**	21,6	29,0	53,8	15 000	0,088
	28	39	17	0,3	**RNA49/22**	17,4	23,3	29,6	16 000	0,059
	28	39	30	0,3	**RNA69/22*)**	22,8	30,6	50,7	16 000	0,107
	28	42	20	0,6	**NKS28A**	22,6	30,3	38,4	16 000	0,094
29	29	38	20	0,3	**NK29/20A**	17,4	23,4	36,4	15 000	0,059
	29	38	30	0,3	**NK29/30A**	22,2	29,8	56,4	15 000	0,09
30	30	40	20	0,3	**NK30/20A**	18,0	24,2	38,3	15 000	0,071
	30	40	30	0,3	**NK30/30A**	25,9	34,7	61,0	15 000	0,107
	30	42	17	0,3	**RNA4905**	18,1	24,3	31,7	15 000	0,071
	30	42	30	0,3	**RNA6905A**	29,6	39,7	59,6	15 000	0,127
	30	45	22	0,6	**NKS30A**	25,6	34,3	42,8	15 000	0,114

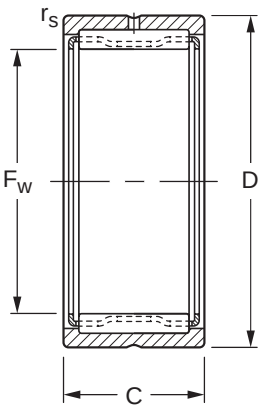
† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.



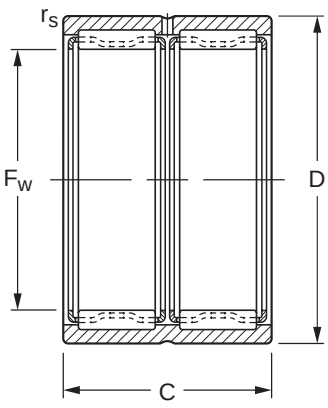
NK.ASR1



NK.B.ASR1



NK.A, NKS.A,
RNA49, RNA69A
($F_w \leqq 35mm$)



RNA69A
($F_w \geqq 40$ mm)

DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions				Bearing Designation	Load ratings			Limiting speed	Mass
						Basic Dynamic C_r		Basic Static C_0	Oil †	
	F_w	D	C	r_s min		Ⓣ	ISO281	ISO76		
	mm					kN	kN	kN	RPM	kg
32	32	42	20	0,3	NK32/20A	18,5	24,8	40,4	14 000	0,074
	32	42	30	0,3	NK32/30A	26,5	35,6	64,3	14 000	0,112
	32	45	17	0,3	RNA49/28	18,7	25,1	33,8	14 000	0,08
	32	45	30	0,3	RNA69/28A	32,2	43,2	62,5	14 000	0,14
	32	47	22	0,6	NKS32A	26,8	36,0	46,2	14 000	0,12
35	35	45	20	0,3	NK35/20A	19,5	26,1	44,4	12 000	0,081
	35	45	30	0,3	NK35/30A	27,9	37,4	70,6	12 000	0,122
	35	47	17	0,3	RNA4906	19,3	25,9	36,0	13 000	0,081
	35	47	30	0,3	RNA6906A	31,8	42,6	68,2	13 000	0,148
	35	50	22	0,6	NKS35A	28,0	37,5	49,9	13 000	0,13
37	37	47	20	0,3	NK37/20A	19,8	26,6	46,4	12 000	0,084
	37	47	30	0,3	NK37/30A	28,5	38,2	73,9	12 000	0,128
	37	52	22	0,6	NKS37A	29,1	39,0	53,4	12 000	0,134
38	38	48	20	0,3	NK38/20B.ASR1	16,2	21,7	40,9	11 000	0,087
	38	48	30	0,3	NK38/30ASR1	23,8	31,9	67,0	11 000	0,131
40	40	50	20	0,3	NK40/20A	20,7	27,8	50,4	11 000	0,089
	40	50	30	0,3	NK40/30A	29,8	40,0	80,2	11 000	0,137
	40	52	20	0,6	RNA49/32	23,9	32,0	49,3	11 000	0,1
	40	52	36	0,6	RNA69/32A	36,2	48,6	84,5	11 000	0,185
	40	55	22	0,6	NKS40A	30,0	40,3	57,0	11 000	0,14
42	42	52	20	0,3	NK42/20A	21,1	28,3	52,4	10 000	0,085
	42	52	30	0,3	NK42/30A	30,3	40,7	83,5	10 000	0,141
	42	55	20	0,6	RNA4907	24,5	32,8	51,7	10 000	0,114
	42	55	36	0,6	RNA6907A	37,2	49,9	88,7	10 000	0,218
43	43	53	20	0,3	NK43/20A	21,6	29,0	54,4	9 900	0,096
	43	53	30	0,3	NK43/30A	31,0	41,6	86,6	9 900	0,134
	43	58	20	0,6	NKS43A	31,0	41,6	60,7	10 000	0,15
45	45	55	20	0,3	NK45/20A	22,0	29,5	56,4	9 400	0,1
	45	55	30	0,3	NK45/30A	31,5	42,3	89,8	9 400	0,151
	45	60	22	0,6	NKS45A	32,1	43,0	64,2	9 800	0,156
47	47	57	20	0,3	NK47/20A	22,4	30,0	58,5	9 000	0,104
	47	57	30	0,3	NK47/30A	32,1	43,0	93,1	9 000	0,158
48	48	62	22	0,6	RNA4908	32,9	44,2	67,8	9 100	0,154
	48	62	40	0,6	RNA6908A	52,8	70,8	124	9 100	0,3

*) With two needle roller and cage assemblies and one lubricating hole in the outer ring.

**) Before applying assemblies with engineered polymer cages, consult Torrington sales engineers.

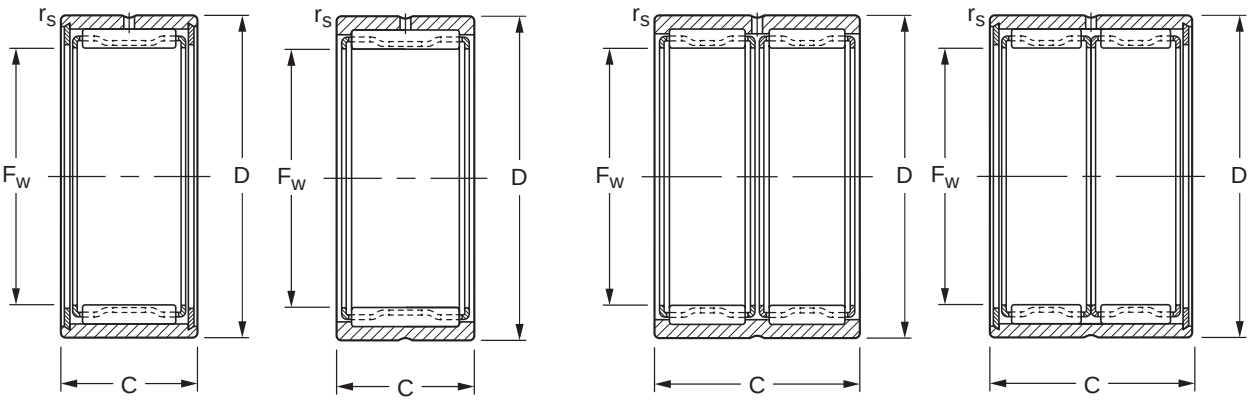
† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.

Needle roller bearings without inner rings

DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions				Bearing Designation	Load ratings			Limiting speed	Mass
						Basic Dynamic C_r		Basic Static C_0	Oil †	
	F_w	D	C	r_s min		Ⓣ	ISO281	ISO76		
	mm					kN	kN	kN	RPM	kg
50	50	62	25	0,6	**NK50/25A**	30,3	40,7	79,3	8 500	0,171
	50	62	35	0,6	**NK50/35A**	41,0	55,0	117	8 500	0,242
	50	65	22	1	**NKS50A**	33,9	45,5	71,3	8 700	0,17
52	52	68	22	0,6	**RNA4909**	34,9	46,8	74,8	8 400	0,201
	52	68	40	0,6	**RNA6909A**	55,7	74,7	137	8 400	0,392
55	55	68	25	0,6	**NK55/25A**	34,4	46,1	87,3	7 800	0,207
	55	68	35	0,6	**NK55/35A**	46,4	62,3	129	7 800	0,293
	55	72	22	1	**NKS55A**	35,7	47,9	78,4	7 900	0,225
58	58	72	22	0,6	**RNA4910**	36,5	48,9	82,0	7 400	0,179
	58	72	40	0,6	**RNA6910A**	56,4	75,7	144	7 400	0,364
60	60	72	25	0,6	**NK60/25A**	33,0	44,3	94,0	7 000	0,202
	60	72	35	0,6	**NK60/35A**	44,7	59,9	139	7 000	0,286
	60	80	28	1,1	**NKS60A**	49,9	66,9	103	7 300	0,337
63	63	80	25	1	**RNA4911**	46,2	62,0	107	6 900	0,285
	63	80	45	1	**RNA6911A**	70,2	94,2	172	6 900	0,54
65	65	78	25	0,6	**NK65/25A**	35,9	48,2	97,7	6 500	0,257
	65	78	35	0,6	**NK65/35A**	48,6	65,2	144	6 500	0,3
	65	85	28	1,1	**NKS65A**	52,9	71,0	114	6 700	0,362
68	68	82	25	0,6	**NK68/25A**	36,5	49,0	101	6 200	0,287
	68	82	35	0,6	**NK68/35A**	49,3	66,2	149	6 200	0,35
	68	85	25	1	**RNA4912**	48,3	64,8	116	6 300	0,304
	68	85	45	1	**RNA6912A**	74,0	99,3	189	6 400	0,546
70	70	85	25	0,6	**NK70/25ASR1**	32,5	43,6	87,9	6 000	0,298
	70	85	35	0,6	**NK70/35ASR1**	46,4	62,2	139	6 000	0,411
	70	90	28	1,1	**NKS70A**	54,1	72,6	120	6 200	0,383
72	72	90	25	1	**RNA4913**	49,2	66,0	121	5 900	0,346
	72	90	45	1	**RNA6913A**	79,8	107	213	6 000	0,679
73	73	90	25	0,6	**NK73/25A**	45,8	61,5	119	5 800	0,32
	73	90	35	0,6	**NK73/35A**	61,5	82,5	173	5 800	0,45

† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.



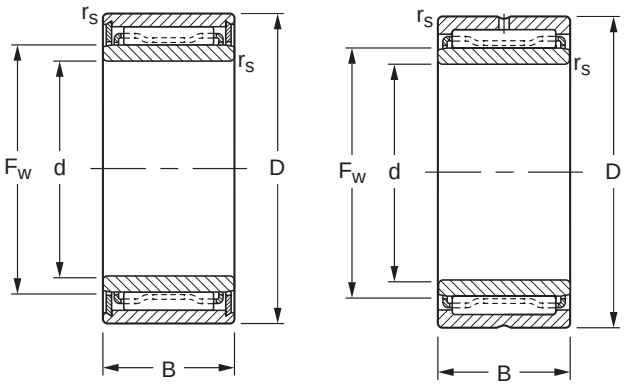
NK.ASR1 | NK.A, NKS.A RNA48, RNA48A RNA49 | RNA69A | RNA69

DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions				Bearing Designation	Load ratings			Limiting speed	Mass
						Basic Dynamic C_r		Basic Static C_0	Oil †	
	F_w	D	C	r_s min		Ⓣ kN	ISO281 kN	ISO76 kN	RPM	kg
		mm								
75	75	92	25	0,6	NK75/25ASR1	32,6	43,7	90,2	5 600	0,364
	75	92	35	0,6	NK75/35ASR1	45,4	60,9	138	5 600	0,518
	75	95	28	1,1	NKS75A	57,0	76,5	132	5 800	0,413
80	80	95	25	1	NK80/25A	48,5	65,0	131	5 300	0,331
	80	95	35	1	NK80/35A	59,4	79,7	184	5 300	0,38
	80	100	30	1	RNA4914	64,3	86,3	157	5 400	0,502
	80	100	54	1	RNA6914A	102	137	286	5 400	0,946
85	85	105	25	1	NK85/25A	57,0	76,4	137	5 000	0,4
	85	105	30	1	RNA4915	68,9	92,4	175	5 000	0,528
	85	105	35	1	NK85/35A	80,5	108	214	5 000	0,712
	85	105	54	1	RNA6915A	107	143	308	5 000	1,02
90	90	110	25	1	NK90/25A	59,3	79,5	147	4 700	0,53
	90	110	30	1	RNA4916	68,2	91,5	176	4 700	0,556
	90	110	35	1	NK90/35A	84,2	113	230	4 700	0,62
	90	110	54	1	RNA6916	93,9	126	320	4 700	1,05
95	95	115	26	1	NK95/26ASR1	36,8	49,3	114	4 400	0,572
	95	115	36	1	NK95/36A	85,0	114	238	4 500	0,64
100	100	120	26	1	NK100/26A	62,3	83,6	163	4 200	0,48
	100	120	35	1,1	RNA4917	82,0	110	230	4 200	0,715
	100	120	36	1	NK100/36A	88,0	118	254	4 200	0,658
	100	120	63	1,1	RNA6917	112	150	416	4 200	1,35
105	105	125	26	1	NK105/26ASR1	38,9	52,2	127	3 900	0,625
	105	125	35	1,1	RNA4918	85,0	114	245	4 000	0,746
	105	125	36	1	NK105/36ASR1	54,3	72,8	195	3 900	0,87
	105	125	63	1,1	RNA6918A	130	175	427	4 000	1,5
110	110	130	30	1,1	NK110/30A	76,8	103	220	3 800	0,6
	110	130	35	1,1	RNA4919	85,7	115	253	3 800	0,777
	110	130	40	1,1	NK110/40A	98,4	132	301	3 800	0,9
	110	130	63	1,1	RNA6919	117	157	455	3 800	1,47
115	115	140	40	1,1	RNA4920	104	139	296	3 700	1,22
120	120	140	30	1	RNA4822	66,9	89,7	228	3 500	0,785
125	125	150	40	1,1	RNA4922	110	147	325	3 400	1,32
130	130	150	30	1	RNA4824	69,8	93,6	247	3 200	0,85
135	135	165	45	1,1	RNA4924	132	177	407	3 100	1,98
145	145	165	35	1,1	RNA4826	82,7	111	321	2 900	1,1
150	150	180	50	1,5	RNA4926	156	209	521	2 800	2,42
155	155	175	35	1,1	RNA4828	86,5	116	344	2 700	1,17
160	160	190	50	1,5	RNA4928	160	214	549	2 600	2,56
165	165	190	40	1,1	RNA4830A	105	141	399	2 500	1,54
175	175	200	40	1,1	RNA4832A	114	153	451	2 400	1,91

† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.

Needle roller bearings with inner rings



NKJ

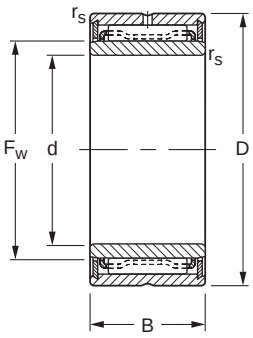
NKJ.A, NKJS.A
NA49, NA69A

DIMENSIONS AND LOAD RATINGS

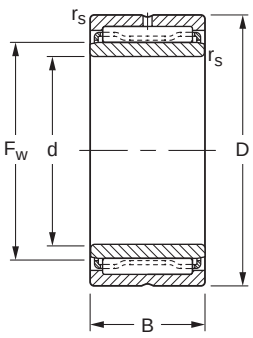
Shaft Dia.	Dimensions						Bearing Designation	Load ratings		Limiting speed	Mass
	d	D	B	r_s min	F	s		Basic Dynamic C_r Ⓣ ISO281	Basic static C_0 ISO76	Oil †	
	mm							kN	kN	RPM	kg
5	5	15	12	0,3	8	1,5	**NKJ5/12**	3,41	4,57	4,89	58 000	0,014
	5	15	16	0,3	8	1,5	**NKJ5/16**	3,89	5,22	5,78	58 000	0,017
6	6	16	12	0,3	9	1,5	**NKJ6/12**	3,18	4,27	4,60	51 000	0,015
	6	16	16	0,3	9	1,5	**NKJ6/16**	4,15	5,57	6,47	51 000	0,019
7	7	17	12	0,3	10	1,5	**NKJ7/12**	4,03	5,40	6,43	45 000	0,017
	7	17	16	0,3	10	1,5	**NKJ7/16**	3,95	5,30	6,27	45 000	0,021
9	9	19	12	0,3	12	1,5	**NKJ9/12A**	5,11	6,86	7,60	38 000	0,018
	9	19	16	0,3	12	1,5	**NKJ9/16**	5,06	6,78	9,03	37 000	0,024
10	10	22	13	0,3	14	1	**NA4900**	7,00	9,39	10,3	33 000	0,025
	10	22	16	0,3	14	1,5	**NKJ10/16A**	9,24	12,4	14,8	33 000	0,032
	10	22	20	0,3	14	1,5	**NKJ10/20A**	11,0	14,7	18,4	33 000	0,04
12	12	24	13	0,3	16	1	**NA4901**	7,83	10,5	12,3	28 000	0,028
	12	24	16	0,3	16	1,5	**NKJ12/16A**	9,69	13,0	16,2	28 000	0,036
	12	24	20	0,3	16	1,5	**NKJ12/20A**	11,5	15,4	20,2	28 000	0,046
	12	24	22	0,3	16	1	**NA6901A**	12,0	16,1	21,3	28 000	0,051
15	15	27	16	0,3	19	1,5	**NKJ15/16A**	10,5	14,1	19,0	24 000	0,042
	15	27	20	0,3	19	1,5	**NKJ15/20A**	12,5	16,8	23,6	24 000	0,054
	15	28	13	0,3	20	1	**NA4902**	8,80	11,8	15,3	22 000	0,037
	15	28	23	0,3	20	1,5	**NA6902A**	13,7	18,4	26,9	22 000	0,067
17	17	29	16	0,3	21	2	**NKJ17/16A**	11,4	15,3	21,6	21 000	0,047
	17	29	20	0,3	21	1,5	**NKJ17/20A**	13,5	18,1	26,9	21 000	0,059
	17	30	13	0,3	22	1	**NA4903**	9,09	12,2	16,4	20 000	0,04
	17	30	23	0,3	22	1,5	**NA6903A**	14,8	19,8	30,6	20 000	0,084
	17	37	20	0,6	24	1	**NKJS17A**	21,7	29,1	32,8	20 000	0,108
20	20	32	16	0,3	24	1,5	**NKJ20/16A**	12,1	16,2	24,3	18 000	0,053
	20	32	20	0,3	24	1,5	**NKJ20/20A**	14,4	19,3	30,3	18 000	0,067
	20	37	17	0,3	25	1,5	**NA4904**	15,9	21,3	25,5	18 000	0,084
	20	37	30	0,3	25	1,5	**NA6904A**	27,3	36,6	51,0	18 000	0,133
	20	42	20	0,6	28	1	**NKJS20A**	22,6	30,3	38,4	16 000	0,13
22	22	34	16	0,3	26	1,5	**NKJ22/16A**	12,4	16,6	25,7	17 000	0,058
	22	34	20	0,3	26	2	**NKJ22/20A**	14,7	19,7	32,0	17 000	0,071
	22	39	17	0,3	28	1,5	**NA49/22**	17,4	23,3	29,6	16 000	0,089
	22	39	30	0,3	28	1	**NA69/22*)**	22,8	30,6	50,7	16 000	0,163

† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.

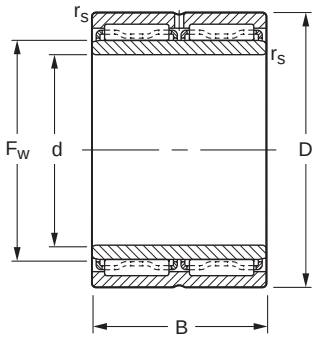
*) With two needle roller and cage assemblies and one lubricating hole in the outer ring.



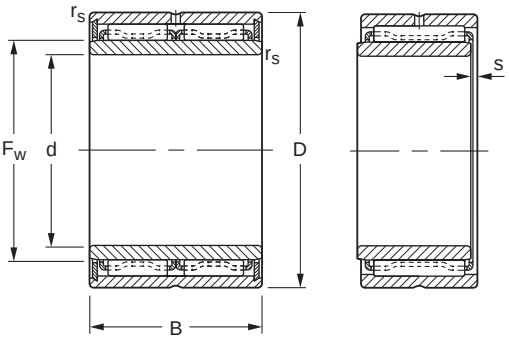
NAK



NKJ.A, NKJS.A
NA49
NA69A (d ≦ 30 mm)



NA69A
(d ≧ 32 mm)



NA69

DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions						Bearing Designation	Load ratings			Limiting speed	Mass
	d	D	B	r_s min	F	s		Basic Dynamic C_r (T) kN	Basic Dynamic C_r ISO281 kN	Basic static C_0 ISO76 kN	Oil † RPM	kg
	mm											
25	25	38	20	0,3	29	2	NKJ25/20A	17,4	23,4	36,4	15 000	0,086
	25	38	30	0,3	29	2	NKJ25/30A	22,2	29,8	56,4	15 000	0,13
	25	42	17	0,3	30	1,5	NA4905	18,1	24,3	31,7	15 000	0,099
	25	42	30	0,3	30	1,5	NA6905A	29,6	39,7	59,6	15 000	0,178
	25	47	22	0,6	32	1,5	NKJS25A	26,8	36,0	46,2	14 000	0,174
28	28	42	20	0,3	32	2	NKJ28/20A	18,5	24,8	40,4	14 000	0,104
	28	42	30	0,3	32	2	NKJ28/30A	26,5	35,6	64,3	14 000	0,156
	28	45	17	0,3	32	1,5	NA49/28	18,7	25,1	33,8	14 000	0,108
	28	45	30	0,3	32	1,5	NA69/28A	32,2	43,2	62,5	14 000	0,19
30	30	45	20	0,3	35	1,5	NKJ30/20A	19,4	26,1	44,4	12 000	0,12
	30	45	30	0,3	35	1,5	NKJ30/30A	27,9	37,4	70,6	12 000	0,179
	30	47	17	0,3	35	1,5	NA4906	19,3	25,9	36,0	13 000	0,114
	30	47	30	0,3	35	1	NA6906A	31,8	42,6	68,2	13 000	0,205
	30	52	22	0,6	37	1,5	NKJS30A	29,1	39,0	53,4	12 000	0,198
32	32	47	20	0,3	37	2	NKJ32/20A	19,3	26,6	46,4	12 000	0,127
	32	47	30	0,3	37	1,5	NKJ32/30A	28,5	38,2	73,9	12 000	0,192
	32	52	20	0,6	40	1,5	NA49/32	23,8	32,0	49,3	11 000	0,169
	32	52	36	0,6	40	1	NA69/32A	36,2	48,6	84,5	11 000	0,313
35	35	50	20	0,3	40	2	NKJ35/20A	20,7	27,8	50,4	11 000	0,135
	35	50	30	0,3	40	1,5	NKJ35/30A	29,8	40,0	80,2	11 000	0,208
	35	55	20	0,6	42	1,5	NA4907	24,4	32,8	51,7	10 000	0,179
	35	55	36	0,6	42	1	NA6907A	37,2	49,9	88,7	10 000	0,34
	35	58	22	0,6	43	1	NKJS35A	31,0	41,6	60,7	10 000	0,235
38	38	53	20	0,3	43	2	NKJ38/20A	21,6	29,0	54,4	9 900	0,146
	38	53	30	0,3	43	1,5	NKJ38/30A	31,0	41,6	86,6	9 900	0,196
40	40	55	20	0,3	45	2	NKJ40/20A	22,0	29,5	56,4	9 400	0,152
	40	55	30	0,3	45	1,5	NKJ40/30A	31,6	42,3	89,8	9 400	0,229
	40	62	22	0,6	48	2	NA4908	32,9	44,2	67,8	9 100	0,248
	40	62	40	0,6	48	1,5	NA6908A	52,8	70,8	124	9 100	0,473
	40	65	22	1	50	1	NKJS40A	33,9	45,5	71,3	8 700	0,292
42	42	57	20	0,3	47	2	NKJ42/20A	22,3	30,0	58,5	9 000	0,159
	42	57	30	0,3	47	1,5	NKJ42/30A	29,7	39,9	84,1	9 000	0,241
45	45	62	25	0,6	50	3	NKJ45/25A	30,3	40,7	79,3	8 500	0,244
	45	62	35	0,6	50	3	NKJ45/35A	41,0	55,0	117	8 500	0,345

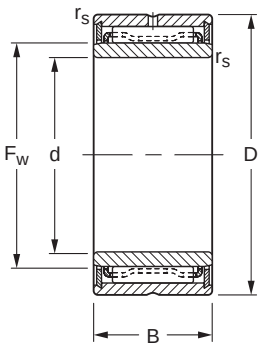
† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.

Needle roller bearings with inner rings

DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions						Bearing Designation	Load ratings			Limiting speed	Mass
	d	D	B	r_s min	F_w	s		Basic Dynamic C_r Ⓣ kN	ISO281 kN	Basic static C_0 ISO76 kN	Oil † RPM	kg
	mm											
45	45	68	22	0,6	52	2	**NA4909**	34.9	46.8	74.8	8 400	0,291
	45	68	40	0,6	52	1,5	**NA6909A**	55.7	74.7	137	8 400	0,559
	45	72	22	1	55	1	**NKJS45A**	35.7	47.9	78.4	7 900	0,36
50	50	68	25	0,6	55	3	**NKJ50/25A**	34.4	46.1	87.3	7 800	0,288
	50	68	35	0,6	55	3	**NKJ50/35A**	46.4	62.3	129	7 800	0,406
	50	72	22	0,6	58	2	**NA4910**	36.5	48.9	82.0	7 400	0,296
	50	72	40	0,6	58	1,5	**NA6910A**	56.4	75.7	144	7 400	0,577
	50	80	28	1,1	60	1,5	**NKJS50A**	49.9	66.9	103	7 300	0,523
55	55	72	25	0,6	60	3	**NKJ55/25A**	33.0	44.3	94.0	7 000	0,29
	55	72	35	0,6	60	3	**NKJ55/35A**	44.7	59.9	139	7 000	0,41
	55	80	25	1	63	2,5	**NA4911**	46.2	62.0	107	6 900	0,426
	55	80	45	1	63	2,5	**NA6911A**	70.2	94.2	172	6 900	0,8
	55	85	28	1,1	65	1,5	**NKJS55A**	52.9	71.0	114	6 700	0,569
60	60	82	25	0,6	68	2	**NKJ60/25A**	36.5	49.0	101	6 200	0,44
	60	82	35	0,6	68	2,5	**NKJ60/35A**	49.3	66.2	149	6 200	0,52
	60	85	25	1	68	1,5	**NA4912**	48.3	64.8	116	6 300	0,457
	60	85	45	1	68	2	**NA6912A**	74.0	99.3	189	6 400	0,829
	60	90	28	1,1	70	1,5	**NKJS60A**	54.1	72.6	120	6 200	0,607
65	65	90	25	0,6	73	2	**NKJ65/25A**	45.8	61.5	119	5 800	0,5
	65	90	25	1	72	1,5	**NA4913**	49.2	66.0	121	5 900	0,489
	65	90	35	0,6	73	2	**NKJ65/35A**	61.5	82.5	173	5 800	0,69
	65	90	45	1	72	2	**NA6913A**	79.8	107	213	6 000	0,945
	65	95	28	1,1	75	1,5	**NKJS65A**	57.0	76.5	132	5 800	0,655
70	70	95	25	1	80	2	**NKJ70/25A**	48.5	65.0	131	5 300	0,561
	70	95	35	1	80	3,5	**NKJ70/35A**	59.4	79.7	184	5 300	0,7
	70	100	28	1,1	80	1,5	**NKJS70A**	59.7	80.1	143	5 400	0,68
	70	100	30	1	80	2,5	**NA4914**	64.3	86.3	157	5 400	0,772
	70	100	54	1	80	2	**NA6914A**	102	137	286	5 400	1,45
75	75	105	25	1	85	2	**NKJ75/25A**	57.0	76.4	137	5 000	0,64
	75	105	30	1	85	2,5	**NA4915**	68.9	92.4	175	5 000	0,817
	75	105	35	1	85	2	**NKJ75/35A**	80.5	108	214	5 000	1,05
	75	105	54	1	85	2	**NA6915A**	107	143	308	5 000	1,55
80	80	110	25	1	90	2	**NKJ80/25A**	59.3	79.5	147	4 700	0,79
	80	110	30	1	90	2,5	**NA4916**	68.2	91.5	176	4 700	0,862
	80	110	35	1	90	2	**NKJ80/35A**	84.2	113	230	4 700	0,98
	80	110	54	1	90	2	**NA6916**	93.9	126	320	4 700	1,62

† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.



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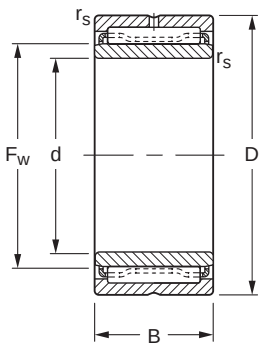
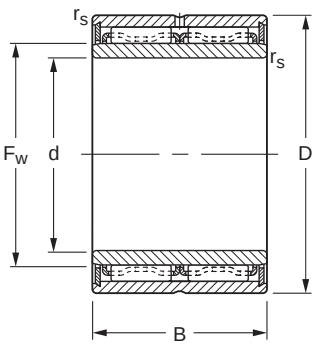


NKJ.A
NA48, NA48A
NA49



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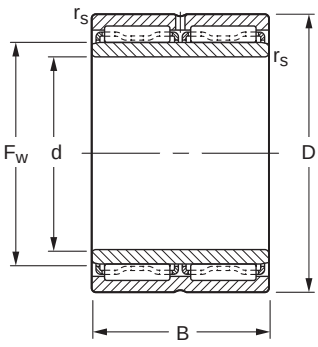

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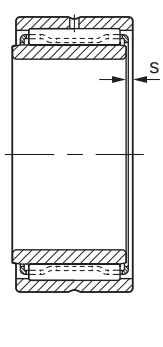
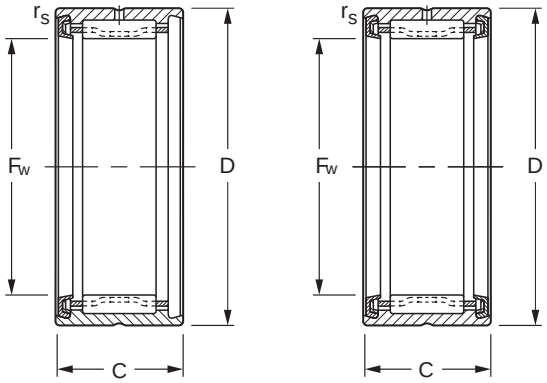


DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions						Bearing Designation	Load ratings			Limiting speed	Mass
	d	D	B	r_s min	F_w	s		Basic Dynamic C_r Ⓣ ISO281		Basic static C_0 ISO76	Oil †	
	mm							kN	kN	kN	RPM	kg
85	85	115	26	1	95	3	NKJ85/26ASR1	36.8	49.3	114	4 400	0,862
	85	115	36	1	95	2	NKJ85/36A	85.0	114	238	4 500	1,04
	85	120	35	1,1	100	2,5	NA4917	82.0	110	230	4 200	1,31
	85	120	63	1,1	100	2	NA6917	112	149	417	4 200	2,43
90	90	120	26	1	100	3	NKJ90/26A	62.3	83.6	163	4 200	0,78
	90	120	36	1	100	2,5	NKJ90/36A	88.0	118	254	4 200	1,08
	90	125	35	1,1	105	2,5	NA4918	85.0	114	245	4 000	1,37
	90	125	63	1,1	105	2	NA6918A	130	175	427	4 000	2,64
95	95	125	26	1	105	2,5	NKJ95/26ASR1	38.9	52.2	127	3 900	0,935
	95	125	36	1	105	3,5	NKJ95/36ASR1	54.3	72.8	195	3 900	1,3
	95	130	35	1,1	110	2,5	NA4919	85.7	115	253	3 800	1,43
	95	130	63	1,1	110	2	NA6919	118	158	458	3 800	2,67
100	100	130	30	1,1	110	2	NKJ100/30A	76.8	103	220	3 800	0,984
	100	130	40	1,1	110	3	NKJ100/40A	98.4	132	301	3 800	1,41
	100	135	32	1,1	115	2	NKJS100A	77.5	104	226	3 700	1,34
	100	140	40	1,1	115	3,5	NA4920	104	139	296	3 700	2,01
110	110	140	30	1	120	0,5	NA4822	67.3	90.3	230	3 500	1,21
	110	150	40	1,1	125	3,5	NA4922	110	147	325	3 400	2,19
120	120	150	30	1	130	0,5	NA4824	70.2	94.2	249	3 200	1,31
	120	165	45	1,1	135	3,5	NA4924	132	177	407	3 100	3,04
130	130	165	35	1,1	145	1	NA4826	83.5	112	323	2 900	1,99
	130	180	50	1,5	150	3	NA4926	150	201	495	2 800	4,14
140	140	175	35	1,1	155	1	NA4828	86.5	116	346	2 700	2,12
	140	190	50	1,5	160	3	NA4928	160	214	549	2 600	4,41
150	150	190	40	1,1	165	2	NA4830A	106	142	402	2 500	2,7
160	160	200	40	1,1	175	2	NA4832A	109	146	425	2 400	3,15

† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.

Sealed needle roller bearings without inner rings

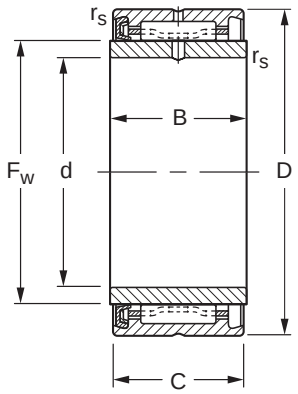


RNA49ARS RNA49A.2RS

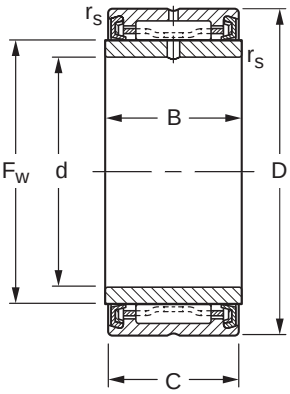
DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions				Bearing Designation	Load ratings			Limiting speed	Mass
						Basic Dynamic C_r		Basic Static C_0	Grease	
	F_w	D	C	r_s min		Ⓣ	ISO281	ISO76		
	mm					kN	kN	kN	RPM	kg
14	14	22	13	0,3	RNA4900ARS	5,78	7,76	8,06	10 000	0,019
	14	22	13	0,3	RNA4900A.2RS	5,78	7,76	8,06	10 000	0,019
16	16	24	13	0,3	RNA4901ARS	6,44	8,64	9,59	10 000	0,021
	16	24	13	0,3	RNA4901A.2RS	6,44	8,64	9,59	10 000	0,021
20	20	28	13	0,3	RNA4902ARS	7,28	9,77	12,0	8 500	0,026
	20	28	13	0,3	RNA4902A.2RS	7,28	9,77	12,0	8 500	0,026
22	22	30	13	0,3	RNA4903ARS	7,53	10,1	12,8	7 500	0,027
	22	30	13	0,3	RNA4903A.2RS	7,53	10,1	12,8	7 500	0,027
25	25	37	17	0,3	RNA4904ARS	13,8	18,5	21,2	6 700	0,062
	25	37	17	0,3	RNA4904A.2RS	13,8	18,5	21,2	6 700	0,062
30	30	42	17	0,3	RNA4905ARS	15,7	21,0	26,4	5 600	0,075
	30	42	17	0,3	RNA4905A.2RS	15,7	21,0	26,4	5 600	0,075
35	35	47	17	0,3	RNA4906ARS	16,8	22,5	30,0	4 800	0,083
	35	47	17	0,3	RNA4906A.2RS	16,8	22,5	30,0	4 800	0,083
42	42	55	20	0,6	RNA4907ARS	21,7	29,1	44,4	4 000	0,13
	42	55	20	0,6	RNA4907A.2RS	21,7	29,1	44,4	4 000	0,13
48	48	62	22	0,6	RNA4908ARS	28,8	38,6	57,0	3 400	0,163
	48	62	22	0,6	RNA4908A.2RS	28,8	38,6	57,0	3 400	0,163
52	52	68	22	0,6	RNA4909ARS	29,4	39,4	60,0	3 200	0,207
	52	68	22	0,6	RNA4909A.2RS	29,4	39,4	60,0	3 200	0,207
58	58	72	22	0,6	RNA4910ARS	30,7	41,2	65,8	2 800	0,187
	58	72	22	0,6	RNA4910A.2RS	30,7	41,2	65,8	2 800	0,187

Sealed needle roller bearings with inner rings



NA49ARS

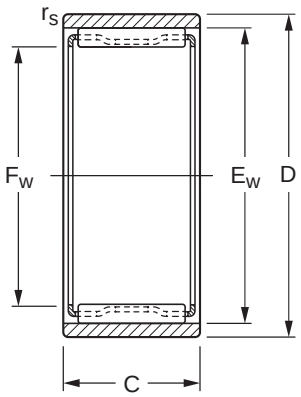


NA49A.2RS

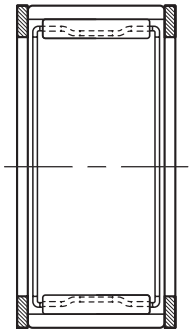
DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions							Load ratings			Limiting speed	Mass
	d	D	C	B	r_s min	F_w	Bearing Designation	Basic Dynamic C_r Ⓣ	ISO281	Basic static C_0 ISO76		
	mm							kN	kN	kN	RPM	kg
10	10	22	13	14	0,3	14	NA4900ARS	5,78	7,76	8,06	10 000	0,027
	10	22	13	14	0,3	14	NA4900A.2S	5,78	7,76	8,06	10 000	0,027
12	12	24	13	14	0,3	16	NA4901ARS	6,44	8,64	9,59	10 000	0,031
	12	24	13	14	0,3	16	NA4901A.2RS	6,44	8,64	9,59	10 000	0,031
15	15	28	13	14	0,3	20	NA4902ARS	7,28	9,77	12,0	8 500	0,041
	15	28	13	14	0,3	20	NA4902A.2RS	7,28	9,77	12,0	8 500	0,041
17	17	30	13	14	0,3	22	NA4903ARS	7,53	10,1	12,8	7 500	0,044
	17	30	13	14	0,3	22	NA4903A.2RS	7,53	10,1	12,8	7 500	0,044
20	20	37	17	18	0,3	25	NA4904ARS	13,8	18,5	21,2	6 700	0,087
	20	37	17	18	0,3	25	NA4904A.2RS	13,8	18,5	21,2	6 700	0,087
25	25	42	17	18	0,3	30	NA4905ARS	15,7	21,0	26,4	5 600	0,106
	25	42	17	18	0,3	30	NA4905A.2RS	15,7	21,0	26,4	5 600	0,106
30	30	47	17	18	0,3	35	NA4906ARS	16,8	22,5	30,0	4 800	0,119
	30	47	17	18	0,3	35	NA4906A.2RS	16,8	22,5	30,0	4 800	0,119
35	35	55	20	21	0,6	42	NA4907ARS	21,7	29,1	44,4	4 000	0,198
	35	55	20	21	0,6	42	NAA907A.2RS	21,7	29,1	44,4	4 000	0,198
40	40	62	22	23	0,6	48	NA4908ARS	28,8	38,6	57,0	3 400	0,263
	40	62	22	23	0,6	48	NA4908A.2RS	28,8	38,6	57,0	3 400	0,263
45	45	68	22	23	0,6	52	NA4909ARS	29,4	39,4	60,0	3 200	0,303
	45	68	22	23	0,6	52	NA4909A.2RS	29,4	39,4	60,0	3 200	0,303
50	50	72	22	23	0,6	58	NA4910ARS	30,7	41,2	65,8	2 800	0,309
	50	72	22	23	0,6	58	NA4910A.2RS	30,7	41,2	65,8	2 800	0,309

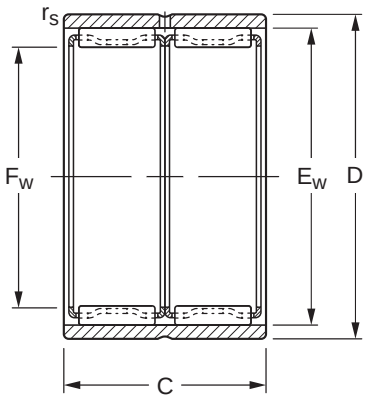
Needle roller bearings without flanges, without inner rings



RNAO



SNSH
End washer



RNAO with two needle roller and cage assemblies and one lubricating hole

DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions					Bearing Designation	End Washer
	F_w	D mm	C	r_s min	E_w		
10	10	17	10	0,3	13	**RNAO10x17x10**	SNSH10,5x17x0,5
12	12	19	10	0,3	15	**RNAO12x19x10**	SNSH12,5x19x0,5
14	14	22	13	0,3	18	**RNAO14x22x13**	SNSH14,5x22x0,5
	14	22	20	0,3	18	**RNAO14x22x20*)**	SNSH14,5x22x0,5
	14	26	12	0,3	20	**RNAO14x26x12**	SNSH14,5x26x0,5
16	16	24	13	0,3	20	**RNAO16x24x13**	SNSH16,5x24x0,5
	16	24	20	0,3	20	**RNAO16x24x20*)**	SNSH16,5x24x0,5
	16	28	12	0,3	22	**RNAO16x28x12**	SNSH16,5x28x0,5
20	20	28	13	0,3	24	**RNAO20x28x13**	SNSH20,5x28x0,5
	20	28	26	0,3	24	**RNAO20x28x26*)**	SNSH20,5x28x0,5
	20	32	12	0,3	26	**RNAO20x32x12**	SNSH20,5x32x0,5
22	22	30	13	0,3	26	**RNAO22x30x13**	SNSH22,5x30x0,5
	22	30	26	0,3	26	**RNAO22x30x26*)**	SNSH22,5x30x0,5
	22	35	16	0,3	29	**RNAO22x35x16**	SNSH22,5x35x0,5
	22	35	32	0,3	29	**RNAO22x35x32*)**	SNSH22,5x35x0,5
25	25	35	17	0,3	30	**RNAO25x35x17**	SNSH25,5x35x0,5
	25	35	26	0,3	30	**RNAO25x35x26*)**	SNSH25,5x35x0,5
	25	37	16	0,3	32	**RNAO25x37x16**	SNSH25,5x37x0,5
	25	37	32	0,3	32	**RNAO25x37x32*)**	SNSH25,5x37x0,5
30	30	40	17	0,3	35	**RNAO30x40x17**	SNSH30,5x40x0,5
	30	40	26	0,3	35	**RNAO30x40x26*)**	SNSH30,5x40x0,5
	30	42	16	0,3	37	**RNAO30x42x16**	SNSH30,5x42x0,5
	30	42	32	0,3	37	**RNAO30x42x32*)**	SNSH30,5x42x0,5
35	35	45	17	0,3	40	**RNAO35x45x17**	SNSH35,5x45x0,5
	35	45	26	0,3	40	**RNAO35x45x26*)**	SNSH35,5x45x0,5
	35	47	16	0,3	42	**RNAO35x47x16**	SNSH35,5x47x0,5
	35	47	32	0,3	42	**RNAO35x47x32*)**	SNSH35,5x47x0,5
40	40	50	17	0,3	45	**RNAO40x50x17**	SNSH40,5x50x0,5
	40	50	34	0,3	45	**RNAO40x50x34*)**	SNSH40,5x50x0,5
	40	55	20	0,3	48	**RNAO40x55x20**	SNSH41x55x1
	40	55	40	0,3	48	**RNAO40x55x40*)**	SNSH41x55x1

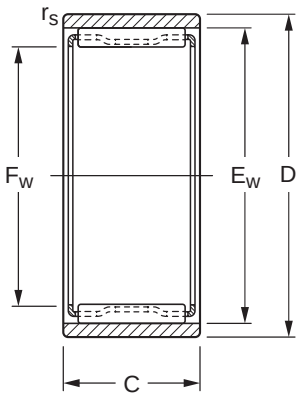
*) With two needle roller and cage assemblies and one lubricating hole in the outer ring.

DIMENSIONS AND LOAD RATINGS

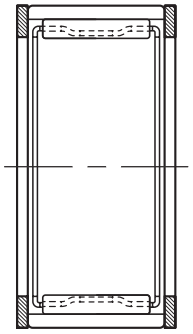
Load ratings			Limiting speed	Mass	
Basic dynamic C_r		Basic static C_0	Oil †		End washer
Ⓣ kN	ISO281 kN	ISO76 kN	RPM	kg	g
4,03	5,40	6,43	45 000	0,01	0,6
4,36	5,85	7,57	37 000	0,012	0,6
7,25	9,73	12,5	32 000	0,018	0,8
9,17	12,3	16,8	32 000	0,029	0,8
7,83	10,5	10,6	34 000	0,029	1,4
7,53	10,1	13,5	28 000	0,022	0,9
9,99	13,4	19,5	28 000	0,032	0,9
8,35	11,2	11,9	29 000	0,033	1,6
8,57	11,5	17,3	22 000	0,025	1,1
14,8	19,8	34,6	22 000	0,05	1,1
9,69	13,0	15,3	23 000	0,038	1,9
8,80	11,8	18,3	20 000	0,028	1,2
15,1	20,2	36,6	20 000	0,053	1,2
14,2	19,1	23,3	21 000	0,059	2,2
24,4	32,7	46,5	21 000	0,116	2,2
14,0	18,8	29,8	17 000	0,05	1,8
18,6	25,0	42,8	17 000	0,076	1,8
14,8	19,8	25,3	18 000	0,058	2,2
25,3	34,0	50,7	18 000	0,118	2,2
15,1	20,2	34,6	14 000	0,06	2,1
20,0	26,8	49,7	14 000	0,088	2,1
16,6	22,3	31,0	15 000	0,069	2,5
28,5	38,2	62,1	15 000	0,131	2,5
16,5	22,1	40,8	12 000	0,069	2,3
20,6	27,7	54,5	12 000	0,091	2,3
18,3	24,5	36,8	12 000	0,075	2,9
31,3	42,0	73,5	12 000	0,156	2,9
17,7	23,8	47,0	11 000	0,086	2,7
30,5	40,9	94,1	11 000	0,152	2,7
26,5	35,5	56,3	11 000	0,139	8
45,3	60,8	113	11 000	0,276	8

† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.

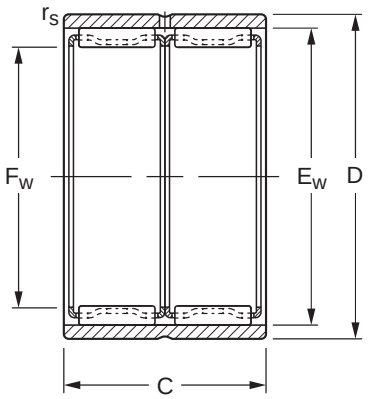
Needle roller bearings without flanges, without inner rings



RNAO



SNSH
End washer



RNAO with two needle roller and cage assemblies and one lubricating hole

DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions F_w	D mm	C	r_s min	E_w	Bearing Designation	End Washer
45	45	55	17	0,3	50	**RNAO45x55x17**	SNSH45,5x55x0,5
	45	55	34	0.3	50	**RNAO45x55x34*)**	SNSH45,5x55x0,5
	45	62	20	0,3	53	**RNAO45x62x20**	SNSH46x62x1
	45	62	40	0,3	53	**RNAO45x62x40*)**	SNSH46x62x1
50	50	62	20	0,3	55	**RNAO50x62x20**	
	50	62	40	0,3	55	**RNAO50x62x40*)**	
55	55	68	20	0,3	60	**RNAO55x68x20**	
	55	68	40	0,3	60	**RNAO55x68x40*)**	
	55	72	20	1	63	**RNAO55x72x20**	SNSH56x72x1
	55	72	40	1	63	**RNAO55x72x40*)**	SNSH56x72x1
60	60	78	20	1	68	**RNAO60x78x20**	SNSH61x78x1
	60	78	40	1	68	**RNAO60x78x40*)**	SNSH61x78x1
65	65	85	30	1	73	**RNAO65x85x30**	SNSH66x85x1
	65	85	60	1	73	**RNAO65x85x60*)**	SNSH66x85x1
70	70	90	30	1	78	**RNAO70x90x30**	
	70	90	60	1	78	**RNAO70x90x60*)**	
75	75	95	30	1	83	**RNAO75x95x30**	
	75	95	60	1	83	**RNAO75x95x60*)**	
80	80	100	30	1	88	**RNAO80x100x30**	
	80	100	60	1	88	**RNAO80x100x60*)**	
85	85	105	30	1	93	**RNAO85x105x30**	
90	90	110	30	1	98	**RNAO90x110x30**	
95	95	115	30	1	103	**RNAO95x115x30**	
100	100	120	30	1	108	**RNAO100x120x30**	

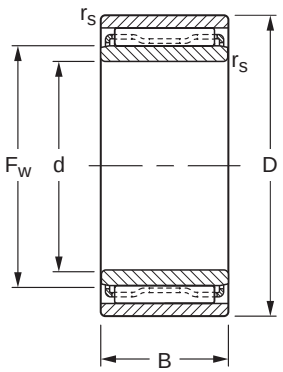
*) With two needle roller and cage assemblies and one lubricating hole in the outer ring.

DIMENSIONS AND LOAD RATINGS

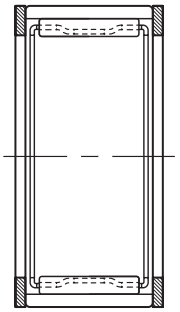
Load ratings			Limiting speed	Mass	
Basic dynamic C_r Ⓣ kN	Basic dynamic C_r ISO281 kN	Basic static C_0 ISO76 kN	Oil † RPM	kg	End washer g
18,6	24,9	51,8	9400	0,089	3,3
31,8	42,7	104	9400	0,168	3,3
23,0	30,8	68,1	9400	0,163	11
46,0	61,7	119	9600	0,325	11
22,5	30,2	68,5	8400	0,142	
38,5	51,7	137	8400	0,269	
22,9	30,7	72,4	7600	0,165	
39,3	52,7	145	7600	0,32	
30,0	40,3	73,5	7800	0,212	13
51,5	69,1	147	7800	0,433	13
31,2	41,8	79,2	7100	0,23	15
53,4	71,7	158	7100	0,436	15
44,8	60,1	129	6500	0,468	18
76,8	103	259	6500	0,876	18
46,4	62,2	139	6000	0,505	
79,8	107	277	6000	0,925	
45,4	60,9	138	5600	0,51	
77,5	104	277	5600	0,98	
50,3	67,5	161	5200	0,58	
86,5	116	322	5200	1,04	
51,7	69,4	170	4900	0,586	
47,4	63,6	155	4600	0,614	
52,9	71,0	183	4400	0,651	
54,0	72,4	191	4200	0,66	

† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.

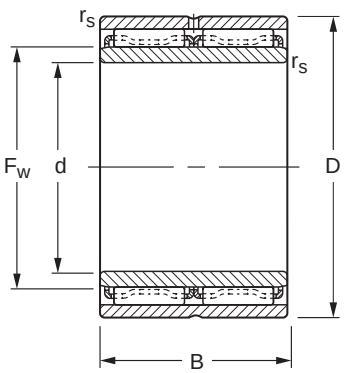
Needle roller bearings without flanges, with inner rings



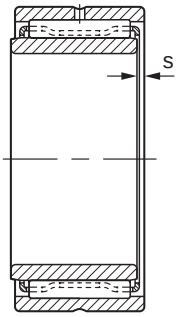
NAO



SNSH
End washer



NAO with two needle roller and cage assemblies and one lubricating hole



DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions d mm	D	B	r_s min	F_w	E_w	s	Bearing Designation	End Washer
6	6	17	10	0,3	10	13	0,5	**NAO6x17x10**	SNSH10,5x17x0,5
8	8	19	10	0,3	12	15	0,5	**NAO8x19x10**	SNSH12,5x19x0,5
10	10	22	13	0,3	14	18	1	**NAO10x22x13**	SNSH14,5x22x0,5
	10	22	20	0,3	14	18	0,5	**NAO10x22x20*)**	SNSH14,5x22x0,5
	10	26	12	0,3	14	20	0,7	**NAO10x26x12**	SNSH14,5x26x0,5
12	12	24	13	0,3	16	20	1	**NAO12x24x13**	SNSH16,5x24x0,5
	12	24	20	0,3	16	20	0,5	**NAO12x24x20*)**	SNSH16,5x24x0,5
	12	28	12	0,3	16	22	0,7	**NAO12x28x12**	SNSH16,5x28x0,5
15	15	28	13	0,3	20	24	1	**NAO15x28x13**	SNSH20,5x28x0,5
	15	28	26	0,3	20	24	1	**NAO15x28x26*)**	SNSH20,5x28x0,5
	15	32	12	0,3	20	26	0,7	**NAO15x32x12**	SNSH20,5x32x0,5
17	17	30	13	0,3	22	26	1	**NAO17x30x13**	SNSH22,5x30x0,5
	17	30	26	0,3	22	26	1	**NAO17x30x26*)**	SNSH22,5x30x0,5
	17	35	16	0,3	22	29	1,5	**NAO17x35x16**	SNSH22,5x35x0,5
	17	35	32	0,3	22	29	1,5	**NAO17x35x32*)**	SNSH22,5x35x0,5
20	20	35	17	0,3	25	30	1,2	**NAO20x35x17**	SNSH25,5x35x0,5
	20	35	26	0,3	25	30	1,2	**NAO20x35x26*)**	SNSH25,5x35x0,5
	20	37	16	0,3	25	32	1,5	**NAO20x37x16**	SNSH25,5x37x0,5
	20	37	32	0,3	25	32	1,5	**NAO20x37x32*)**	SNSH25,5x37x0,5
25	25	40	17	0,3	30	35	1,2	**NAO25x40x17**	SNSH30,5x40x0,5
	25	40	26	0,3	30	35	1,2	**NAO25x40x26**	SNSH30,5x40x0,5
	25	42	16	0,3	30	37	1,5	**NAO25x42x16**	SNSH30,5x42x0,5
	25	42	32	0,3	30	37	1,5	**NAO25x42x32*)**	SNSH30,5x42x0,5
30	30	45	17	0,3	35	40	1,2	**NAO30x45x17**	SNSH35,5x45x0,5
	30	45	26	0,3	35	40	1,2	**NAO30x45x26*)**	SNSH35,5x45x0,5
	30	47	16	0,3	35	42	1,5	**NAO30x47x16**	SNSH35,5x47x0,5
	30	47	32	0,3	35	42	1,5	**NAO30x47x32*)**	SNSH35,5x47x0,5
35	35	50	17	0,3	40	45	1,2	**NAO35x50x17**	SNSH40,5x50x0,5
	35	50	34	0,3	40	45	0,7	**NAO35x50x34*)**	SNSH40,5x50x0,5
	35	55	20	0,3	40	48	1,5	**NAO35x55x20**	SNSH41x55xl
	35	55	40	0,3	40	48	1,7	**NAO35x55x40*)**	SNSH41x55x1

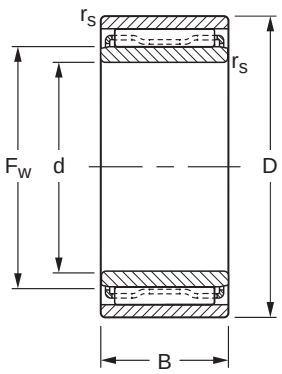
*) With two needle roller and cage assemblies and one lubricating hole in the outer ring.

DIMENSIONS AND LOAD RATINGS

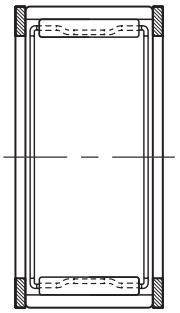
Load ratings			Limiting speed	Mass	
Basic dynamic C_r Ⓣ kN	Basic dynamic C_r ISO281 kN	Basic static C_0 ISO76 kN	Oil † RPM	kg	End washer g
4,03	5,4	6,43	45 000	0,014	0,6
4,36	5,85	7,51	37 000	0,017	0,6
7,25	9,73	12,5	32 000	0,026	0,8
9,17	12,3	16,8	32 000	0,041	0,8
7,83	10,5	10,6	34 000	0,036	1,4
7,53	10,1	13,5	28 000	0,03	0,9
9,99	13,4	19,5	28 000	0,046	0,9
8,35	11,2	11,9	29 000	0,041	1,6
8,57	11,5	17,3	22 000	0,039	1,1
14,8	19,8	34,6	22 000	0,078	1,1
9,69	13,0	15,3	23 000	0,05	1,9
8,80	11,8	18,3	20 000	0,043	1,2
15,1	20,2	36,6	20 000	0,084	1,2
14,2	19,1	23,3	21 000	0,078	2,2
24,4	32,7	46,5	21 000	0,154	2,2
14,0	18,8	29,8	17 000	0,073	1,8
18,6	25,0	42,8	17 000	0,112	1,8
14,8	19,8	25,3	18 000	0,08	2,2
25,3	34,0	50,7	18 000	0,162	2,2
15,1	20,2	34,6	14 000	0,088	2,1
20,0	26,8	49,7	14 000	0,132	2,1
16,6	22,3	31,0	15 000	0,096	2,5
28,5	38,2	62,1	15 000	0,185	2,5
16,5	22,1	40,8	12 000	0,102	2,3
20,6	27,7	54,5	12 000	0,155	2,3
18,3	24,5	36,8	12 000	0,106	2,9
31,3	42,0	73,5	12 000	0,218	2,9
17,7	23,8	47,0	11 000	0,126	2,7
30,5	40,9	94,1	11 000	0,232	2,7
26,5	35,5	56,3	11 000	0,185	8
45,3	60,8	113	11 000	0,37	8

† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.

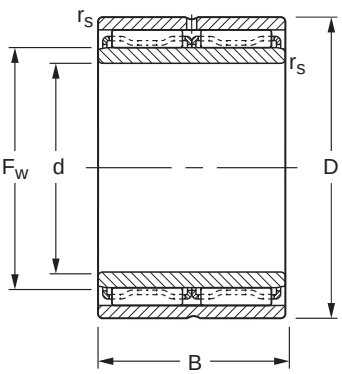
Needle roller bearings without flanges, with inner rings



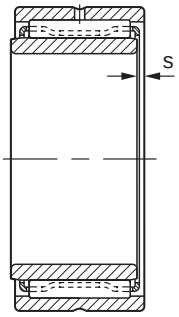
NAO



SNSH
End washer



NAO with two needle roller and cage assemblies and one lubricating hole



DIMENSIONS AND LOAD RATINGS

Shaft Dia.	Dimensions d mm	D	B	r_s min	F_w	E_w	s	Bearing Designation	End Washer
40	40	55	17	0,3	45	50	0,7	**NAO40x55x17**	SNSH45,5x55x0,5
	40	55	34	0,3	45	50	0,7	**NAO40x55x34*)**	SNSH45,5x55x0,5
	40	62	20	0,3	45	53	1,5	**NAO40x62x20**	SNSH46x62x1
	40	62	40	0,3	45	53	1,7	**NAO40x62x40*)**	SNSH46x62x1
45	45	62	20	0,3	50	55	0,7	**NAO45x62x20**	
	45	62	40	0,3	50	55	0,5	**NAO45x62x40*)**	
	45	72	20	1	55	63	1,5	**NAO45x72x20**	SNSH56x72x1
	45	72	40	1	55	63	1,7	**NAO45x72x40*)**	SNSH56x72x1
50	50	68	20	0,3	55	60	0,7	**NAO50x68x20**	
	50	68	40	0,3	55	60	0,5	**NAO50x68x40*)**	
	50	78	20	1	60	68	1,5	**NAO50x78x20**	SNSH61x78x1
	50	78	40	1	60	68	1,7	**NA050x78x40*)**	SNSH61x78x1
55	55	85	30	1	65	73	2	**NAO55x85x30**	SNSH66x85x1
	55	85	60	1	65	73	1,5	**NAO55x85x60*)**	SNSH66x85x1
60	60	90	30	1	70	78	2	**NAO60x90x30**	
	60	90	60	1	70	78	1,7	**NAO60x90x60*)**	
65	65	95	30	1	75	83	2	**NAO65x95x30**	
	65	95	60	1	75	83	1,7	**NAO65x95x60*)**	
70	70	100	30	1	80	88	2	**NAO70x100x30**	
	70	100	60	1	80	88	1,7	**NAO70x100x60*)**	
75	75	105	30	1	85	93	2	**NAO75x105x30**	
80	80	110	30	1	90	98	2	**NAO80x110x30**	
85	85	115	30	1	95	103	2	**NAO85x115x30**	
90	90	120	30	1	100	108	2	**NAO90x120x30**	

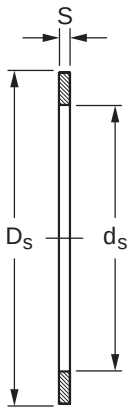
*) With two needle roller and cage assemblies and one lubricating hole in the outer ring.

DIMENSIONS AND LOAD RATINGS

Load ratings			Limiting speed	Mass	
Basic dynamic C_r		Basic static C_0	Oil †		End washer
Ⓣ kN	ISO281 kN	ISO76 kN	RPM	kg	g
18,6	24,9	51,8	9 400	0,133	3,3
31,8	42,7	104	9 400	0,257	3,3
26,8	36,0	59,5	9 600	0,215	11
46,0	61,7	119	9 600	0,44	11
22,5	30,2	68,5	8 400		0,2
38,5	51,7	137	8 400	0,386	
30,0	40,3	73,5	7 800	0,345	13
51,5	69,1	147	7 800	0,68	13
22,9	30,7	72,4	7 600	0,23	
39,3	52,7	145	7 600	0,45	
31,2	41,8	79,2	7 100	0,385	15
53,4	71,7	158	7 100	0,746	15
44,8	60,1	129	6 500	0,69	18
76,8	103	259	6 500	1,32	18
46,4	62,2	139	6 000	0,745	
79,8	107	277	6 000	1,41	
45,4	60,9	138	5 600	0,77	
77,5	104	277	5 600	1,5	
50,3	67,5	161	5 200	0,85	
86,5	116	322	5 200	1,6	
51,7	69,4	170	4 900	0,875	
47,4	63,6	155	4 600	0,92	
52,9	71,0	183	4 400	0,985	
54,0	72,4	191	4 200	1,01	

† When lubricating with a good quality general purpose rolling bearing grease, multiply the speed values given in the table by 0.65.

Torrington End Washers



Dimensions d_s	D_s	S	End Washer Designation	Mass
mm				g
10,5	17	0,5	**SNSH10,5x17x0,5**	0,6
10,5	20	0,5	**SNSH10,5x20x0,5**	0,9
12,5	19	0,5	**SNSH12,5x19x0,5**	0,6
12,5	22	0,5	**SNSH12,5x22x0,5**	1
14,5	22	0,5	**SNSH14,5x22x0,5**	0,8
14,5	26	0,5	**SNSH14,5x26x0,5**	1,4
15,5	23	0,5	**SNSH15,5x23x0,5**	0,9
16,5	24	0,5	**SNSH16,5x24x0,5**	0,9
16,5	28	0,5	**SNSH16,5x28x0,5**	1,6
17,5	25	0,5	**SNSH17,5x25x0,5**	1
18,5	26	0,5	**SNSH18,5x26x0,5**	1
18,5	30	0,5	**SNSH18,5x30x0,5**	1,7
20,5	28	0,5	**SNSH20,5x28x0,5**	1,1
20,5	32	0,5	**SNSH20,5x32x0,5**	1,9
22,5	30	0,5	**SNSH22,5x30x0,5**	1,2
22,5	35	0,5	**SNSH22,5x35x0,5**	2,2
25,5	35	0,5	**SNSH25,5x35x0,5**	1,8
25,5	37	0,5	**SNSH25,5x37x0,5**	2,2
28,5	40	0,5	**SNSH28,5x40x0,5**	2,4
30,5	40	0,5	**SNSH30,5x40x0,5**	2,1
30,5	42	0,5	**SNSH30,5x42x0,5**	2,5
35,5	45	0,5	**SNSH35,5x45x0,5**	2,3
35,5	47	0,5	**SNSH35,5x47x0,5**	2,9
40,5	50	0,5	**SNSH40,5x50x0,5**	2,7
41	55	1	**SNSH41x55x1**	8
45,5	55	0,5	**SNSH45,5x55x0,5**	3,3
46	62	1	**SNSH46x62x1**	11
51	65	1	**SNSH51x65x1**	10
56	72	1	**SNSH56x72x1**	13
61	78	1	**SNSH61x78x1**	15
66	85	1	**SNSH66x85x1**	18