

**FULL COMPLEMENT
NEEDLE BEARINGS**



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FULL COMPLEMENT NEEDLE BEARINGS



Full complement needle bearings have a through-hardened outer ring which results in high static and dynamic load capacities and an ability to withstand overloading, shocks and vibrations. They are particularly suitable for operations involving oscillating motion but may also accept high speed conditions where good alignment is necessary. This can more easily be achieved using a convex inner ring raceway.

The retention of the needles in the outer ring enables the bearing to be installed easily during assembly. These bearings are available with or without an inner ring from 12 mm bore size. Standard complete bearings type NA (and special types NA...BIR) have an inner ring with convex raceway form. If extra wide inner rings or rings with lubrication hole are required, they should be ordered separately for use with the corresponding RNA series.

STANDARD TYPES

Bearing without inner ring	Inner ring with cylindrical raceway		
	Same width as bearing (with lubrication hole)	Extra wide inner rings	
		with lubrication hole	without lubrication hole
RNA series 1 000, 2 000, 22 000, 3 000	BIC series 1 000, 2 000, 22 000, 3 000	BICG	BIP, BIG, BIK
Complete bearing with convex inner raceway			
NA Series 1 000, 2 000, 22 000, 3 000			

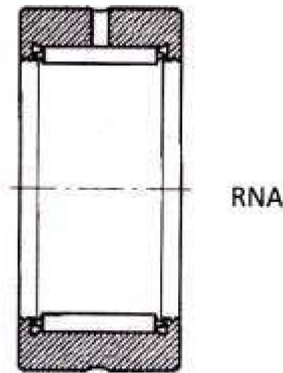
1) Old designation Na...s/Bi

2) Widths quoted on request

SPECIAL TYPES

RNA...DER / SGT	Bearings without inner ring. Convex outer ring without lubrication hole or grease groove. Cylindrical inner rings available separately
NA...BIR	Complete bearing with convex inner raceway for misalignment greater than 1 in 1000.

FULL COMPLEMENT BEARINGS WITHOUT INNER RING



Standard type RNA (old designation Na...s/Bi)

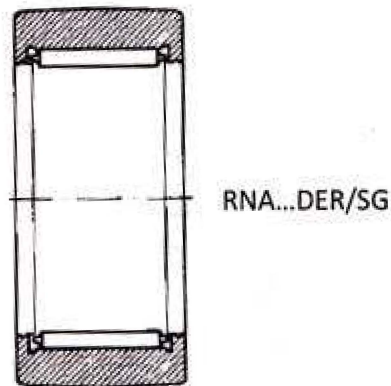
Series 1 000, 2 000, 22 000, 3 000

The shaft journal which is used directly as the inner ring raceway of the bearing should have adequate hardness and satisfactory surface finish. A hardness of 58 – 64 HRC will ensure full load capacity for the bearing. Lower hardness figures will entail a reduction in both static and dynamic capacities as shown in the table of dimensions according to the following table:

Hardness	HRC	60	58	56	54	52	50	48	45	40	35	30	25
	HV	697	653	613	577	545	512	485	447	392	346	302	267
Capacity reduction coefficients	Dyn.	1	1	0.93	0.84	0.73	0.63	0.52	0.43	0.31	0.23	0.15	0.11
	Stat.	1	1	1	1	0.96	0.86	0.77	0.65	0.50	0.39	0.30	0.25

In case of misalignment, a convex inner ring raceway can be machined directly at the shaft journal position by grinding, using a concave profile and inclining the diamond impregnated grinding wheel. A convex inner raceway calculated to permit misalignment of 1 in 1000 does not affect bearing load capacity. A large convex radius is necessary for a greater degree of misalignment but this will reduce the effective bearing load capacity. Further information is available on request.

SPECIAL TYPES RNA...DER/SGT



These bearings have a convex outer ring which can swivel in the housing and must be used with a cylindrical bearing raceway. They are manufactured specially on request in the same dimensions as the standard RNA series 1 000, 2 000, 22 000 and 3 000. The convex outer ring radius is normally designed for a maximum misalignment of 10 in 1 000. In special cases a specific radius can be provided on request.

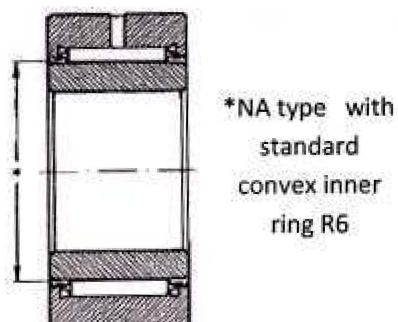
For these bearings the swivelling contact of the outer ring in the housing is improved by the elimination of the lubrication groove and hole (designated by the suffix ...SGT)

If the outer ring is to move freely in the cylindrical housing, the latter must be machine to F7 (or F8) tolerance, though the fit is only suitable for operation under a load fixed in relation to the housing to prevent the outer ring slipping. The shoulders at the outer rings (snap rings or abutments) must leave sufficient lateral clearance to permit the ring to move. These bearings must be assembled with a cylindrical inner ring raceway with or without a lubrication hole.

Please consult NIBL Technical Department on each application.

INNER RINGS

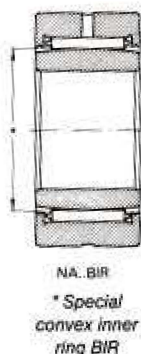
Inner rings made from high quality bearing steel heat treated and through-hardened avoid any necessity for heat treatment of the shaft and enable the bearings to operate within their full load capacity (with the exception of special convex inner rings).



Inner Rings with cover raceway R6

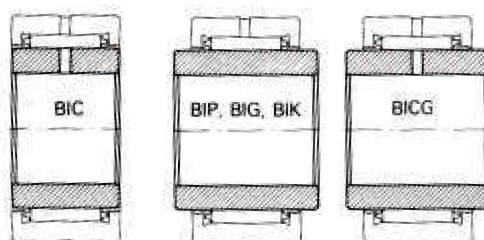
These inner rings without lubrication hole are of the same width as the outer ring and are supplied with series NA complete, types 1 000, 2 000, 22 000 and 3 000. They can accept a misalignment of 1 in 1 000 in continuous operation and up to 2 in 1000 temporarily, as in the case of sudden deflection due to overload conditions. The inner and outer rings may be displaced axially from one to the other by up to 5% of the inner ring width.

Inner Rings with convex raceway type BIR



For those applications where the acceptable misalignment required is beyond the limit of convex inner rings R6, the complete NA bearing can be supplied under the designation NA...BIR, with an inner ring possessing a larger radius of convexity. However, the load capacity for these bearings is then reduced. Please consult NIBL Technical Department if these types are to be specified.

Inner Rings with cylindrical raceway



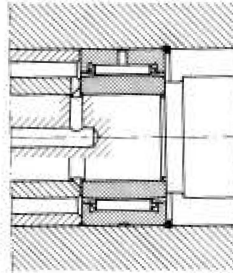
Cylindrical inner rings of the same bore as those with convex raceway may be supplied on request

:

- ▶ With oil hole permitting lubrication through the shaft.
- ▶ Wider than corresponding outer ring to enable a displacement in position of one ring relative to the other (e.g. expansion of the shaft) or lateral movement. Please consult NIBL Technical Department. The widths of these inner rings can be supplied on request.

Important

The use of cylindrical inner rings with standard bearings type RNA series 1 000, 2 000, 22 000 and 3 000 requires that the housing and shaft be correctly aligned at assembly with due regard to the application under load. If it is not essential to use these inner rings, it is always preferable to use complete bearings type NA with convex inner rings type R6, without oil hole, of the same widths as the outer ring. In particular cases where lubrication is provided through the shaft, the inner ring with oil hole may be replaced by a lubrication hole at the face of the inner ring. (see figure)



Cylindrical inner rings are recommended for use with special bearings type NA...DE R with convex outer ring, since using a convex inner ring with these types could create an indeterminate system of alignment.

RING TOLERANCES

Inner and outer rings for full complements standard needle bearings are manufactured in accordance with the tolerance class of ISO R 492 (class zero according to DIN 620). Closer tolerances corresponding to classes 6, 5 and 4 may be necessary for special high precision applications (symbols P6, P5, P4).

Manufacturing tolerances of bearing rings

Standard tolerance class ¹⁾

Inner rings

Bore nominal		Di _m		Out of round	Width		
Di		(Di min + Di max) / 2			Tolerance		Max variation on a ring
mm		µm		µm	µm		µm
from	to	max	min	max	max	min	max
2.5	10	0	-8	10	0	-120	15
10	18	0	-8	10	0	-120	15
18	30	0	-10	13	0	-120	20
30	50	0	-12	15	0	-120	20
50	50	0	-15	20	0	-150	25
80	120	0	-20	25	0	-200	25
120	180	0	-25	30	0	-250	30
180	250	0	-30	40	0	-300	30
250	315	0	-35	50	0	-350	35
315	400	0	-40	60	0	-400	40

Outer rings :

External diameter nominal		De _m		Out of round	Width
De		(De min + De max) / 2			
mm		µm		µm	
from	to	max	min	max	
6	18	0	-8	15	Tolerance variation on a ring are identical to those of the inner ring for the corresponding bearing
18	30	0	-9	15	
30	50	0	-11	20	
50	80	0	-13	25	
80	120	0	-15	35	
120	150	0	-18	40	
150	180	0	-25	45	
180	250	0	-30	50	
250	315	0	-35	60	
315	400	0	-40	70	

¹⁾According to ISO Norm 3097 or ISO/R492 (DIN 620 Class zero)

SHAFT AND HOUSING TOLERANCES

Type of operation	Load Direction	SHAFT					HOUSING ²⁾ Dim. De
		Bearing without inner ring Dim. Ci	Bearing With inner ring ¹⁾				
			Dim. Di				
			≤80	85 - 130	140 - 220	≥230	
Shaft rotating Housing fixed	Fixed	h5	k5	m5	n6	p6	J6 (J7)
	Rotating with shaft	g5	h5	h5	h6	h6	M6 (M7)
	Unknown	g5	k5*	m5*	n6	p6	M6 (M7)
Shaft fixed Housing rotating	Fixed	g5	h5	h5	h6	h6	M6 (M7)
	Rotating with shaft	h5	k5	m5	n6	p6	J6 (J7)
	Unknown	g5	k5*	m5*	n6	p6	M6 (M7)
Shaft and Housing rotating	Any direction	g5	k5*	m5*	n6	p6	M6 (M7)
Oscillating motion	Any direction	h5	k5*	k5*	m6	m6	M6 (M7)

* To be used with bearings with selected TC clearance.

Cylindrical tolerance, defined as the difference in radii of two coaxial cylinders (ISO R 1101) must normally be less than a quarter of the manufacturing tolerance. In the case of precision applications or high speed operation it is recommended to reduce this tolerance to one eighth of the manufacturing tolerance.

1) Tolerances applicable for solid shafts in steel or cast iron. The fit of the inner ring should be controlled to closer limits for hollow shafts or shafts of non-ferrous metals.

2) Tolerances applicable for housings in steel or cast iron of rigid wall section. Housing fit at outer ring should be controlled to closer limits for thin wall sections in non-ferrous metals.

If the housing or shaft are manufactured from light alloys and can reach temperatures greatly in excess or below 20°C, it is necessary to allow for differential expansion or contraction with respect to the accompanying bearing and make the necessary adjustments.

RADIAL PLAY (RADIAL INTERNAL CLEARANCE)

Bearings without inner ring

The radial play of bearing without inner result from the difference in diameter beneath the needles and the size of the shaft. The standard diameter beneath the needles for RNA bearings with the recommended shaft tolerances should provide suitable radial play for most normal applications.

For special applications (high precision, close fits, etc.), NIBL can offer the diameter beneath the needles selected as follows:

- ▶ In the bottom half of the normal tolerance (RNA...TB)
- ▶ In the upper half of the normal tolerance (RNA...TC)

Bearings without inner ring tolerance Class TB mounted on a shaft with k5 tolerance will have a reduced radial play suitable for certain applications.

Nominal dimension		Tolerance of diameter under needles					
Ci		Normal F6		Selected TB		Selected TC	
mm		µm		µm		µm	
above	to	Min.	Max.	Min.	Max.	Min.	Max.
5	15	+20	+40	+20	+31	+29	+40
15	25	+20	+43	+20	+33	+30	+43
25	30	+25	+48	+25	+38	+35	+48
30	35	+30	+53	+30	+43	+40	+53
35	60	+35	+58	+35	+48	+45	+58
60	80	+45	+73	+45	+60	+58	+73
80	115	+50	+78	+50	+65	+63	+78
115	180	+60	+88	+60	+75	+73	+88
180	220	+70	+103	+70	+88	+85	+103
220	270	+80	+113	+80	+98	+95	+113
270	350	+90	+128	+90	+110	+108	+128
Example		RNA 1020		RNA 1020 TB		RNA 1020 TC	

A nominal diameter under the needles further reduced and having a tolerance of 10, 15, or 20 microns according to size, may be required for certain precision applications (Type RNA...TA)

Should a larger clearance than normal be necessary, the shaft diameter must be controlled nearer to the nominal size than the tolerances h5 or g5 would normally provide.

Standard complete bearings with inner ring

Complete bearings type NA are offered with a radial play that is suitable for the majority of applications.

They can be supplied if required:

- ▶ With the radial play selected from the bottom half of the normal tolerance (NA...TB)
- ▶ With the radial play selected from the upper half of the normal tolerance (NA...TC)

For bore dimensions $D_i > 130$ mm bearings NA...TB or NA...TC are supplied only on special request.

Radial play of full complement bearings with convex inner ring "R6"

Series 1 000, 2 000, 22 000							
Inner ring bore		Standard play		Selected TB		Selected TC	
D_i		μm		μm		μm	
above	to	Min.	Max.	Min.	Max.	Min.	Max.
12	20	20	50	20	35	35	50
20	25	25	60	25	43	42	60
25	30	30	65	30	48	47	65
30	50	35	70	35	53	52	70
50	55	45	85	45	65	65	85
55	65	45	90	45	68	67	90
65	70	45	95	45	70	70	95
70	105	50	100	50	75	75	100
105	120	60	115	60	88	87	115
120	140	80	145	80	113	112	145
140	170	100	165				
170	190	120	185				
190	210	130	200				
210	230	130	205				
230	260	160	235				
260	290	180	260				
290	310	180	265				

Series 3 000							
Inner ring bore		Standard play		Selected TB		Selected TC	
Di							
mm		µm		µm		µm	
above	to	Min.	Max.	Min.	Max.	Min.	Max.
30	45	35	70	35	53	52	70
45	55	45	85	45	65	65	85
55	65	45	90	45	68	67	90
65	70	50	95	50	73	72	95
70	100	50	100	50	75	75	100
100	105	60	110	60	85	85	110
105	130	60	115	60	88	87	115
130	140	80	145	80	113	112	145
140	170	100	165				
170	190	120	185				
190	210	130	200				
210	230	130	205				
230	260	160	235				
260	290	180	260				
290	310	180	265				

Radial play of full complement bearing with cylindrical inner ring

Series 1 000, 22 000							
Inner ring bore		Standard play		Selected TB		Selected TC	
Di							
mm		µm		µm		µm	
above	to	Min.	Max.	Min.	Max.	Min.	Max.
12	17	20	50	20	35	35	50
17	20	30	60	30	45	45	60
20	25	35	70	35	53	53	70
25	30	40	75	40	58	58	75
30	35	45	80	45	63	63	80
35	50	50	85	50	68	68	85
50	55	60	100	60	80	80	100
55	65	60	105	60	83	83	105
65	70	60	110	60	85	85	110
70	90	65	115	65	90	90	115
Series 2 000							
above	to	Min.	Max.	Min.	Max.	Min.	Max.
15	20	30	60	30	45	45	60
20	25	35	70	35	53	53	70
25	30	40	75	40	58	58	75
30	35	45	80	45	63	63	80
35	50	50	85	50	68	68	85
50	55	60	100	60	80	80	100
55	65	60	105	60	83	83	105
65	70	60	110	60	85	85	110
70	105	65	115	65	90	90	115
105	125	75	130	75	103	102	130
125	140	95	160	95	128	127	160
140	170	125	190				
170	190	145	210				
190	210	160	230				
210	230	160	235				

Series 3 000							
Inner ring bore		Standard play		Selected TB		Selected TC	
Di							
mm		µm		µm		µm	
above	to	Min.	Max.	Min.	Max.	Min.	Max.
30	45	50	85	50	68	67	85
45	55	60	100	60	80	80	100
55	65	60	105	60	83	82	105
65	70	65	110	65	88	87	110
70	100	65	115	65	90	90	115
100	105	75	125	75	100	100	125
105	130	75	130	75	103	102	130
130	140	95	160	95	128	127	160
140	170	125	190				
170	190	145	210				
190	210	160	230				
210	230	160	235				
230	260	190	265				
260	290	210	290				
290	310	210	295				

A reduced radial play, in the 10, 15 or 20 micron groups, can be supplied for special precision applications (NA...TA...).

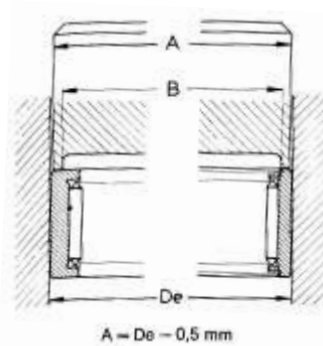
A radial play larger than normal may be necessary for certain applications, for example an inner ring subject to expansion mounted on a shaft running at high temperature (NA...TS...)

INSTALLATION OF RINGS

Outer Rings

The force applied to the face of the ring must be exerted only on the area bounded by outer diameter D_e and the inner diameter B . The area of a ring with shoulders must not be subjected to loads or shocks.

It is recommended to use a mandrel with which to tap small outer rings lightly into position. Alternately, a press may be used, providing the load exerted is on the centre line of the ring.



De	B	De	B	De	B	De	B	De	B	De	B
mm		mm		mm		mm		mm		mm	
16	13.5	52	46.5	100	90	145	135	205	190	300	280
19	16	58	52	105	95	150	138	215	200	315	295
22	18.5	62	55	110	100	155	143	220	205	325	305
24	21	65	58	115	105	160	148	230	215	340	315
28	24	72	64	120	110	165	153	245	225	350	325
32	27.5	80	71	125	115	170	158	255	235	365	340
35	30.5	85	76	130	120	180	168	265	245	375	350
42	37	90	81	135	125	190	175	280	260	385	360
47	41.5	95	85	140	130	195	180	290	270	395	370

Inner Rings

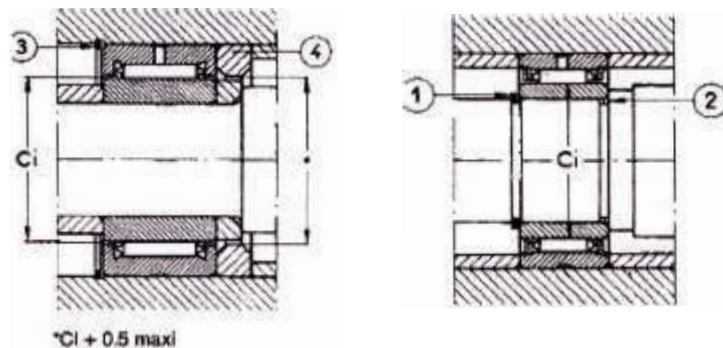
For inner rings of small dimensions one can proceed in the manner described above. For larger sizes where tight fits are required, the rings should first be immersed in an oil bath at a temperature of 70°C to 80°C to enable them to expand and slide more easily up to their correct position on the shaft.

LATERAL RETENTION OF RINGS

Inner and outer rings for NA bearings must be positioned laterally:

- ▶ each lateral abutment for the outer rings must have an inner diameter greater than dimension C_i
- ▶ each lateral abutment for the inner rings must have an outer diameter smaller than dimension C_i .

In this way correct fitting is ensured and fretting at the face of the bearing is avoided.



Fitting of outer rings

- 1.Snap Ring
- 2.Groove for extraction tool
- 3.Snap Ring
- 4.Guidance ring for inserting shaft

Whenever possible outer rings should be installed in through bored housings, which are easier to manufacture in cylindrical form without taper than housings with shoulders. Lateral retention of rings can then be assured by snap rings, etc.

If the housing cannot be through bored, its base must possess grooves for engaging a bearing extraction tool.

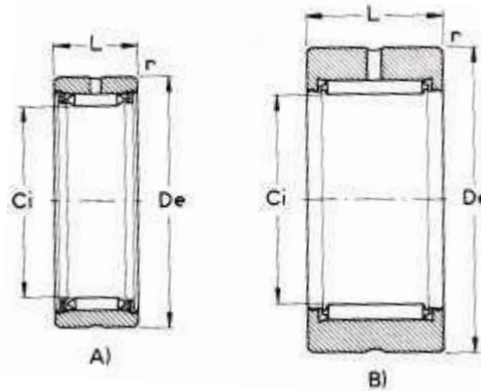
For those installations using large components and where bearings are inaccessible or difficult to observe, it is advisable to protect the face of the outer ring on the mounting side by a ring having an internal diameter slightly larger than dimension C_i and possessing a chamfer to help guide the shaft into position during installation.

Fitting of inner rings

Inner rings may be positioned laterally by snap rings. They may also be supported by a shoulder on the shaft providing that the shoulder radius is smaller than the chamfer on the ring – shown in the table of dimensions. Whenever possible, it is preferable to provide a groove for a bearing extraction tool on the shaft. If it is necessary to provide a large shoulder radius in order to retain the shaft strength, then a ring incorporating a large chamfer may be placed between the shoulder and the inner ring.

FULL COMPLEMENT NEEDLE BEARINGS WITHOUT INNER RING

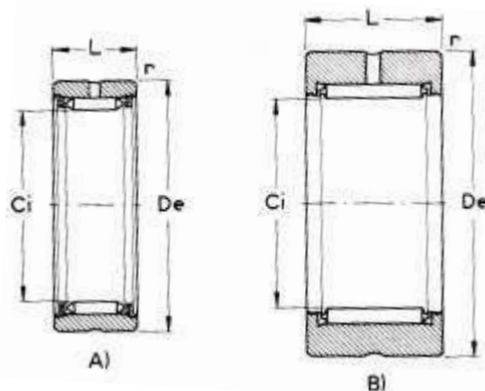
RNA 1 000, 2 000, 22 000, 3 000 SERIES



Shaft diameter	Designation		Dimensions				Basic capacities		Speed limit	Weight approx.
	Series 1 000, 2 000, 22 000	Series 3 000	Ci	De	L	r min	Dynamic Cr	Static. cor		
mm	fig. A	fig. B	mm	mm	mm	mm	N	N	rpm	g
7.3	RNA 1 005		7.3	16	12	0.35	3 950	4 450	52 000	10
9.7	RNA 1 007		9.7	19	12	0.35	4 800	5 900	39 000	13
12.1	RNA 1 009		12.1	22	12	0.35	5 600	7 400	31 000	18
14.4	RNA 1 010		14.4	24	12	0.35	6 350	8 900	26 000	20
17.6	RNA 1 012		17.6	28	15	0.35	11 000	16 500	21 600	34
20.8	RNA 1 015		20.8	32	15	0.65	12 400	19 500	18 300	44
22.1	RNA 2 015		22.1	35	22	0.65	23 500	37 500	17 200	82
23.9	RNA 1 017		23.9	35	15	0.65	13 700	22 500	15 900	47
28.7	RNA 1 020		28.7	42	18	0.65	19 300	33 500	13 200	84
	RNA 2 020		28.7	42	22	0.65	28 500	49 000	13 200	104
33.5	RNA 1 025		33.5	47	18	0.65	21 500	39 000	11 100	97
	RNA 2 025		33.5	47	22	0.65	33 000	60 000	11 100	122
	RNA 22 025		33.5	47	30	0.65	52 000	94 000	11 100	170
38.2	RNA 1 030		38.2	52	18	0.65	23 500	44 500	10 000	107
	RNA 2 030		38.2	52	22	0.65	34 500	66 000	10 000	139
	RNA 22 030		38.2	52	30	0.65	57 000	108 000	10 000	193
44	RNA 1 035		44	58	18	0.65	26 000	51 000	8 600	127
	RNA 2 035		44	58	22	0.65	38 000	75 000	8 600	160
	RNA 22 035		44	58	30	0.65	63 000	124 000	8 600	225
		RNA 3 030	44	62	30	0.65	64 000	125 000	8 600	309
49.7	RNA 1 040		49.7	65	18	0.85	28 500	58 000	7 600	160
	RNA 2 040		49.7	65	22	0.85	41 500	85 000	7 600	200
	RNA 22 040		49.7	65	30	0.85	68 000	140 000	7 600	278
		RNA 3 035	49.7	72	36	0.65	90 000	183 000	7 600	545
55.4	RNA 1 045		55.4	72	18	0.85	30 500	65 000	6 900	193
	RNA 2 045		55.4	72	22	0.85	45 000	95 000	6 900	242
		RNA 3 040	55.4	80	36	0.85	97 000	204 000	6 900	672
62.1	RNA 1 050		62.1	80	20	0.85	33 000	73 000	6 100	225
	RNA 2 050		62.1	80	28	0.85	64 000	142 000	6 100	375
		RNA 3 045	62.1	85	38	0.85	105 000	230 000	6 100	710
68.8	RNA 1 055		68.8	85	20	0.85	35 500	80 000	5 500	248

FULL COMPLEMENT NEEDLE BEARINGS WITHOUT INNER RING

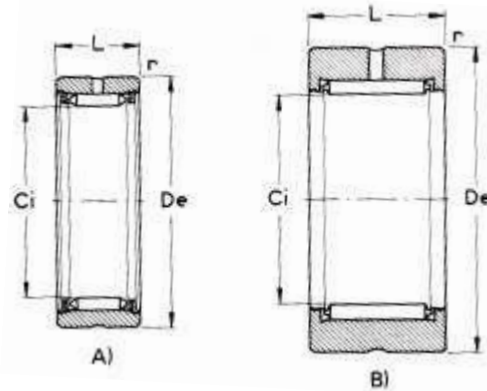
RNA 1 000, 2 000, 22 000, 3 000 SERIES



Shaft diameter	Designation		Dimensions				Basic capacities		Speed limit	Weight approx.
	Series 1 000, 2 000, 22 000	Series 3 000	Ci	De	L	r min	Dynamic Cr	Static. cor		
mm	fig. A	fig. B	mm	mm	mm	mm	N	N	rpm	g
68.8	RNA 2 055		68.8	85	28	0.85	69 000	157 000	5 500	361
		RNA 3 050	68.8	90	38	0.85	113 000	255 000	5 500	705
72.6	RNA 1 060		72.6	90	20	0.85	37 000	85 000	5 200	283
	RNA 2 060		72.6	90	28	0.85	72 000	165 000	5 200	413
78.3		RNA 3 055	72.6	95	38	0.85	117 000	268 000	5 200	782
	RNA 1 065		78.3	95	20	0.85	41 500	97 000	4 900	306
	RNA 2 065		78.3	95	28	0.85	78 000	184 000	4 900	433
83.1		RNA 3 060	78.3	100	38	0.85	123 000	290 000	4 900	810
	RNA 1 070		83.1	100	20	0.85	43 000	103 000	4 500	322
	RNA 2 070		83.1	100	28	0.85	81 000	195 000	4 500	470
88		RNA 3 065	83.1	105	38	0.85	129 000	308 000	4 500	865
	RNA 1 075		88	110	24	0.85	64 000	155 000	4 300	577
	RNA 2 075		88	110	32	0.85	104 000	253 000	4 300	767
96		RNA 3 070	88	110	38	0.85	134 000	325 000	4 300	906
	RNA 1 080		96	115	24	0.85	68 000	170 000	4 000	510
	RNA 2 080		96	115	32	0.85	110 000	275 000	4 000	694
95.5		RNA 3 075	96	120	38	0.85	142 000	355 000	4 000	1 098
	RNA 2 085		99.5	120	32	1.35	113 000	285 000	3 800	787
		RNA 3 080	99.5	125	38	0.85	145 000	365 000	3 800	1 220
104.7	RNA 2 090		104.7	125	32	1.35	117 000	300 000	3 600	837
		RNA 3 085	104.7	130	38	1.35	150 000	390 000	3 600	1 252
109.1	RNA 2 095		109.1	130	32	1.35	120 000	315 000	3 500	882
		RNA 3 090	109.1	135	43	1.35	185 000	480 000	3 500	1 522
114.7	RNA 2 100		114.7	135	32	1.35	125 000	330 000	3 300	877
		RNA 3 095	114.7	140	43	1.35	190 000	505 000	3 300	1 551
119.2	RNA 2 105		119.2	140	32	1.35	129 000	340 000	3 200	941
		RNA 3 100	119.2	145	43	1.35	195 000	520 000	3 200	1 645
124.7	RNA 2 110		124.7	145	34	1.35	133 000	360 000	3 000	1 015
		RNA 3 105	124.7	150	45	1.35	203 000	550 000	3 000	1 762
132.5	RNA 2 115		132.5	155	34	1.35	139 000	380 000	2 900	1 205
		RNA 3 110	132.5	160	45	1.35	210 000	580 000	2 900	2 037

FULL COMPLEMENT NEEDLE BEARINGS WITHOUT INNER RING

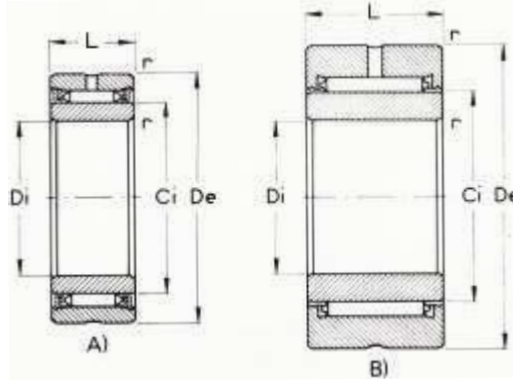
RNA 1 000, 2 000, 22 000, 3 000 SERIES



Shaft diameter	Designation		Dimensions				Basic capacities		Speed limit	Weight approx.
	Series 1 000, 2 000, 22 000	Series 3 000	Ci	De	L	r min	Dynamic Cr	Static. cor		
mm	fig. A	fig. B	mm	mm	mm	mm	N	N	rpm	g
137	RNA 2 120		137	160	34	1.35	142 000	395 000	2 800	1 265
		RNA 3 115	137	165	45	1.35	215 000	600 000	2 800	2 140
143.5	RNA 2 125		143.5	165	34	1.35	145 000	410 000	2 700	1 218
		RNA 3 120	143.5	170	45	1.35	224 000	630 000	2 700	2 107
148	RNA 2 130		148	170	34	1.35	150 000	425 000	2 600	1 292
158	RNA 2 140		158	180	36	1.35	157 000	455 000	2 400	1 478
		RNA 3 130	158	190	52	1.35	275 000	790 000	2 400	3 285
170.5	RNA 2 150		170.5	195	36	1.35	165 000	490 000	2 200	1 790
		RNA 3 140	170.5	205	52	1.35	290 000	860 000	2 200	3 840
179.3	RNA 2 160		179.3	205	36	1.35	170 000	515 000	2 100	1 970
		RNA 3 150	179.3	215	52	1.35	300 000	900 000	2 100	4 185
193.8	RNA 2 170		193.8	220	42	1.85	233 000	720 000	2 000	2 570
		RNA 3 160	193.8	230	57	1.35	360 000	1 110 000	2 000	4 955
202.6	RNA 2 180		202.6	230	42	1.85	240 000	750 000	1 900	2 835
		RNA 3 170	202.6	245	57	1.85	370 000	1 150 000	1 900	6 235
216	RNA 2 190		216	245	42	1.85	250 000	800 000	1 800	3 210

FULL COMPLEMENT NEEDLE BEARINGS WITH INNER RING

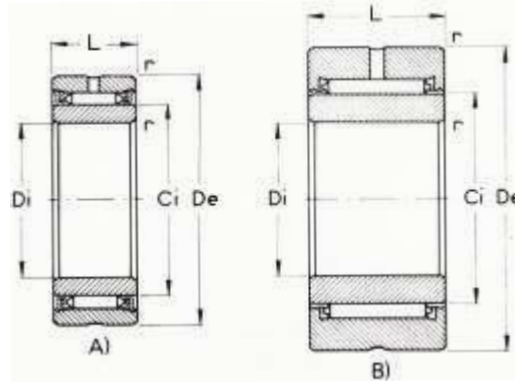
NA 1000, 2000 , NA 22000 , NA 3000 SERIES



Shaft diameter	Designation		Dimensions					Basic capacities		Speed limit	Weight approx.
	Series 1 000, 2 000, 22 000	Series 3 000	Di	De	L	Ci	r min	Dynamic Cr	Static. cor		
mm	fig. A	fig. B	mm	mm	mm	mm	mm	N	N	rpm	g
12	NA 1 012		12	28	15	17.6	0.35	11 000	16 500	21 600	50
15	NA 1 015		15	32	15	20.8	0.65	12 400	19 500	18 300	62
	NA 2 015		15	35	22	22.1	0.65	23 500	37 500	17 200	117
17	NA 1 017		17	35	15	23.9	0.65	13 700	22 500	15 900	73
20	NA 1 020		20	42	18	28.7	0.65	19 300	33 500	13 200	130
	NA 2 020		20	42	22	28.7	0.65	28 500	49 000	13 200	160
25	NA 1 025		25	47	18	33.5	0.65	21 500	39 000	11 100	151
	NA 2 025		25	47	22	33.5	0.65	33 000	60 000	11 100	187
	NA 22 025		25	47	30	33.5	0.65	52 000	94 000	11 100	259
30	NA 1 030		30	52	18	38.2	0.65	23 500	44 500	10 000	167
	NA 2 030		30	52	22	38.2	0.65	34 500	66 000	10 000	213
	NA 22 030	NA 3 030	30	52	30	38.2	0.65	57 000	108 000	10 000	293
			30	62	30	44	0.65	64 000	125 000	8 600	497
35	NA 1 035		35	58	18	44	0.65	2 6000	51 000	8 600	204
	NA 2 035		35	58	22	44	0.65	38 000	75 000	8 600	253
	NA 22 035	NA 3 035	35	58	30	44	0.65	63 000	124 000	8 600	352
			35	72	36	49.7	0.65	90 000	183 000	7 600	815
40	NA 1 040		40	65	18	49.7	0.85	28 500	58 000	7 600	254
	NA 2 040		40	65	22	49.7	0.85	41 500	85000	7 600	315
	NA 22 040	NA 3 040	40	65	30	49.7	0.85	68 000	140 000	7 600	434
45			40	80	36	55.4	0.85	97 000	204 000	6 900	993
	NA 1 045		45	72	18	55.4	0.85	30 500	65 000	6 900	306
	NA 2 045	NA 3 045	45	72	22	55.4	0.85	45 000	95 000	6 900	381
			45	85	38	62.1	0.85	105 000	230 000	6 100	1 132
50	NA 1 050		50	80	20	62.1	0.85	33 000	73 000	6 100	418
	NA 2 050	NA 3 050	50	80	28	62.1	0.85	64 000	142 000	6 100	603
			50	90	38	68.8	0.85	113 000	255 000	5 500	1 220
55	NA 1 055		55	85	20	68.8	0.85	35 500	80 000	5 500	453
	NA 2 055		55	85	28	68.8	0.85	69 000	157 000	5 500	649
		NA3055	55	95	38	72.6	0.85	117 000	268 000	5 200	1 307

FULL COMPLEMENT NEEDLE BEARINGS WITH INNER RING

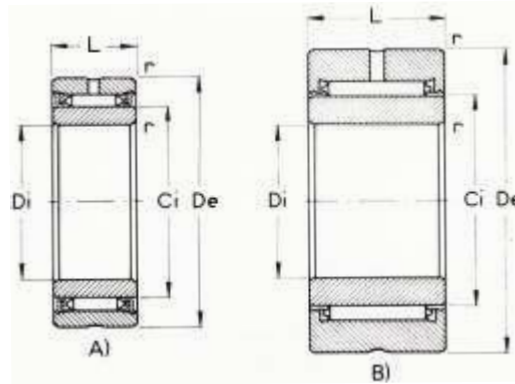
NA 1000, 2000 , NA 22000 , NA 3000 SERIES



Shaft diameter	Designation		Dimensions					Basic capacities		Speed limit	Weight approx.
	Series 1 000, 2 000, 22 000	Series 3 000	Di	De	L	Ci	r min	Dynamic Cr	Static. cor		
mm	fig. A	fig. B	mm	mm	mm	mm	mm	N	N	rpm	g
60	NA 1 060		60	90	20	72.6	0.85	37 000	85 000	5 200	485
	NA 2 060		60	90	28	72.6	0.85	72 000	165 000	5 200	695
		NA 3 060		60	100	38	78.3	0.85	123 000	290 000	4 900
65	NA 1 065		65	95	20	78.3	0.85	41 500	97 000	4 900	536
	NA 2 065		65	95	28	78.3	0.85	78 000	184 000	4 900	757
		NA 3 065		65	105	38	83.1	0.85	129 000	308 000	4 500
70	NA 1 070		70	100	20	83.1	0.85	43 000	103 000	4 500	567
	NA 2 070		70	100	28	83.1	0.85	81 000	195 000	4 500	805
		NA 3 070		70	110	38	88	0.85	134 000	325 000	4 300
75	NA 1 075		75	110	24	88	0.85	64 000	155 000	4 300	882
	NA 2 075		75	110	32	88	0.85	104 000	253 000	4 300	1.177
		NA 3 075		75	120	38	96	0.85	142 000	355 000	4 000
80	NA 1 080		80	115	24	96	0.85	68 000	170 000	4 000	920
	NA 2 080		80	115	32	96	0.85	110 000	275 000	4 000	1 239
		NA 3 080		80	125	38	99.5	0.85	145 000	365 000	3 800
85	NA 2 085		85	120	32	99.5	1.35	113 000	285 000	3 800	1 302
		NA 3 085		85	130	38	104.7	1.35	150 000	390 000	3 600
90	NA 2 090		90	125	32	104.7	1.35	117 000	300 000	3 600	1 368
		NA 3 090		90	135	43	109.1	1.35	185 000	480 000	3 500
95	NA 2 095		95	130	32	109.1	1.35	120 000	315 000	3 500	1 430
		NA 3 095		95	140	43	114.7	1.35	190 000	505 000	3 300
100	NA 2 100		100	135	32	114.7	1.35	125 000	303 000	3 300	1 497
		NA 3 100		100	145	43	119.2	1.35	195 000	520 000	3 200
105	NA 2 105		105	140	32	119.2	1.35	129 000	340 000	3 200	1 556
		NA 3 105		105	150	45	124.7	1.35	203 000	550 000	3 000
110	NA 2 110		110	145	34	124.7	1.35	133 000	360 000	3 000	1 720
		NA 3 110		110	160	45	132.5	1.35	210 000	580 000	2 900
115	NA 2 115		115	155	34	132.5	1.35	139 000	380 000	2 900	2 100
		NA 3 115		115	165	45	137	1.35	215 000	600 000	2 800
120	NA 2 120		120	160	34	137	1.35	142 000	395 000	2 800	2 167
		NA 3 120		120	170	45	143.5	1.35	224 000	630 000	2 700

FULL COMPLEMENT NEEDLE BEARINGS WITH INNER RING

NA 1000, 2000 , NA 22000 , NA 3000 SERIES



Shaft diameter	Designation		Dimensions					Basic capacities		Speed limit	Weight approx.
	Series 1 000, 2 000, 22 000	Series 3 000	Di	De	L	Ci	r min	Dynamic Cr	Static. cor		
mm	fig. A	fig. B	mm	mm	mm	mm	mm	N	N	rpm	g
125	NA 2 125		125	165	34	143.5	1.35	145 000	410 000	2 700	2 240
		NA 3 125	125	185	52	152.8	1.35	266 000	790 000	2 500	5 620
130	NA 2 130		130	170	34	148	1.35	150 000	425 000	2 600	2 325
		NA 3 130	130	190	52	158	1.35	275 000	790 000	2 400	5 815
140	NA 2 140		140	180	36	158	1.35	157 000	455 000	2 400	2 643
		NA 3 140	140	205	52	170.5	1.35	290 000	860 000	2 200	6 840
150	NA 2 150		150	195	36	170.5	1.35	165 000	490 000	2 200	3 230
		NA 3 150	150	215	52	179.3	1.35	300 000	900 000	2 100	7 230
160	NA 2 160		160	205	36	179.3	1.35	170 000	515 000	2 100	3 400
		NA 3 160	160	230	57	193.8	1.35	360 000	1 100 000	2 000	9 070
170	NA 2 170		170	220	42	193.8	1.85	233 000	720 000	2 000	4 770
		NA 3 170	170	245	57	202.6	1.85	370 000	1 150 000	1 900	10 420
180	NA 2 180		180	230	42	202.6	1.85	240 000	750 000	1 900	5 010
190	NA 2 190		190	245	42	216	1.85	250 000	800 000	1 800	5 890



N R B I N D U S T R I A L B E A R I N G S L T D .

REGD. OFFICE : DHANNUR, 2ND FLOOR, 15, SIR P. M. RAOD, FORT, MUMBAI - 400 001. INDIA
TEL: (022) 2270 4206 FAX: (022) 2270 4207

PLANT:

PLOT NO. B -18, FIVE STAR M.I.D.C AREA, SHENDRA, AURANGABAD - 431201

TEL: 0240 - 2622180

[www: nrbindustrialbearings.com](http://www.nrbindustrialbearings.com)