

### FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS SINGLE-ROW(NCF), DOUBLE-ROW(NNCF)

#### Design, Types, and Features

Cageless, full-complement cylindrical roller bearings have the maximum possible number of rollers and can sustain much heavier loads than cylindrical roller bearings of the same size with cages. On the other hand, high-speed capability is inferior to the bearings with cages. The open-type single- and double-row bearings are mostly used in general industrial applications at low speed and under heavy load, and the shielded-type double-row bearings are often used in crane sheaves.

Table 1 Features of Various Types

Figure	Type	Design and Features
	NCF	The outer and inner rings and rollers are non-separable since a retaining snap ring is installed at the side opposite the outer ring rib. They can sustain axial loads in only one direction.
	NNCF	NNCF is a double-row version of NCF. They can sustain heavy radial loads.

Tolerances and Running Accuracy ..... Table 7.2 (Pages A128 to A131)

Single-Row  
Double-Row

#### Recommended Fits

Single-Row  
Double-Row

Inner Ring Rotation ..... Table 8.3 (Page A164)

Outer Ring Rotation ..... Table 8.5 (Page A165)

..... Table 2 below

Table 2 Fits and Internal Clearances for Full-Complement Cylindrical Roller Bearings

Operating Conditions	Fitting between Inner Ring and Shaft		Fitting between Outer Ring and Housing Bore		Recommended Internal Clearance
	min.	max.	min.	max.	
Outer Ring Rotation	The walled housings and heavy loads	g6 or M6	P7		C3
	Normal to heavy loads	g6 or M6	N7		C3
	Light or fluctuating loads	g6 or M6	M7		CN

#### Permissible Misalignment

The permissible misalignment of full-complement single-row cylindrical roller bearings is generally 0.0006 radian (2') under normal load. For double-row bearings, nearly no misalignment is allowed.

### FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS FOR SHEAVES

#### DESIGN, TYPES, AND FEATURES

Cylindrical Roller Bearings for sheaves are specially designed thin-walled, broad-width, full-complement type double-row cylindrical roller bearings, but they are widely used also for general industrial machines running at low speed and under heavy loads. There are several series as shown in Table 1.

Table 1 Series of Cylindrical Roller Bearings for Sheaves

Bearing Type	Fixed End	Free End
Open Type	Without Snap Ring	With Snap Ring
Shielded Type	Without Snap Ring	With Snap Ring

Since all are non-separable type bearings, the inner and outer rings cannot be separated, but the RSF type can be used as a free-end bearing. In this case, the permissible axial displacement is listed in the bearing tables. Since cylindrical roller bearings for sheaves are a double-row, full-complement type, they can withstand heavy shock loads and moments and have sufficient axial load capacity for use in sheaves. Since the shielded type is a kind of bearing unit, the number of parts surrounding the bearing can be reduced, so it allows for a simple compact design. The surface of these bearings is treated for rust prevention.

Table 2 Features of Various Types

Figure	Type	Design and Features
	RS-4BE4 RS-4FE4	Double-row outer ring with center rib, two single-row inner rings with ribs. The outer and inner rings and rollers are non-separable since there are two retaining snap rings at the sides of the outer ring. They can sustain an axial load in either direction so they can be used as free-end bearings. An oil groove and holes are provided at the center of the outer ring.
	RSF-4BE4 RSF-4FE4	Double-row outer ring without ribs, double-row inner ring with three ribs. The outer and inner rings and rollers are non-separable since there is a retaining snap ring at the middle of the outer ring. They can be used as free-end bearings. The permissible axial movement is listed in the dimensional tables. An oil groove and holes are provided at the center of the outer ring.
	RS-50 RS-50NR	Both sides shielded, double-row outer ring with center rib, two inner rings with ribs. They can sustain an axial load in either direction. They are pre-lubricated, but it is possible to replenish the grease through an oil groove and holes in parts mating with the inner rings. If there are snap rings at the outside of the outer ring, the type becomes RS-50NR. They are surface-treated for rust prevention.

TOLERANCES AND RUNNING ACCURACY ..... Table 7.2 (Pages A128 to A131)

#### RECOMMENDED FITS AND INTERNAL CLEARANCES

When used with outer ring rotation for sheaves or wheels, the fit and radial internal clearance should conform to Table 3.

Table 3 Fits and Internal Clearances for Cylindrical Roller Bearings for Sheaves

Operating Conditions	Fitting between Inner Ring and Shaft		Fitting between Outer Ring and Housing Bore		Recommended Internal Clearance
	min.	max.	min.	max.	
Outer Ring Rotation	The walled housings and heavy loads	g6 or h6	P7		C3
	Normal to heavy loads	g6 or h6	N7		C3
	Light or fluctuating loads	g6 or h6	M7		CN

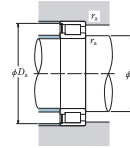
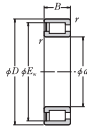
The fits listed in Tables 8.3 (Page A164) and 8.5 (Page A165) apply when they are used with inner ring rotation in general applications, and the internal clearance should conform to Table 4.

Table 4 Units:  $\mu\text{m}$

Nominal Size of Inner Ring	Clearances		
	CN	min.	max.
over 30			
40	15	50	35
50	20	60	40
65	20	65	45
80	25	75	55
100	30	85	65
120	35	90	70
140	40	105	80
160	50	115	100
180	60	125	110
200	75	150	140
225	90	165	155
250	100	180	175
280	110	195	195
315	125	215	215
355	140	235	245
400	155	270	290
450	180	300	320

■ FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS

NCF Type, Single-Row  
Bore Diameter 100 – 260 mm



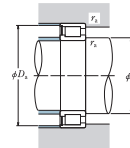
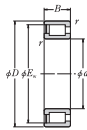
d	Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Numbers
	D	B	r min.	E <sub>w</sub>	C <sub>r</sub>	C <sub>0r</sub>		
100	140	24	1.1	130.5	132	209	NCF2920V	
	150	37	1.5	139.7	209	310	NCF3020V	
110	150	24	1.1	141	138	239	NCF2922V	
	170	45	2	156.3	278	405	NCF3022V	
120	165	27	1.1	156	177	305	NCF2924V	
	180	46	2	167.58	253	440	NCF3024V	
130	180	30	1.5	166.5	210	370	NCF2926V	
	200	52	2	193.81	415	616	NCF3026V	
140	190	30	1.5	179.4	227	395	NCF2928V	
	210	53	2	197.22	435	680	NCF3028V	
150	220	36	2	207	299	595	NCF2930V	
	225	56	2.1	206.82	460	710	NCF3030V	
160	240	40	2.1	224.8	310	535	NCF2932V	
	240	60	2.1	234.8	520	810	NCF3032V	
170	215	22	1.5	203.5	149	272	NCF1834V	
	230	36	2	218	220	370	NCF1834V	
	260	67	2.1	242.87	675	1 070	NCF3034V	
180	225	22	1.5	215	154	296	NCF1836V	
	250	42	2	221.5	330	495	NCF1836V	
	280	74	2.1	260.3	785	1 260	NCF3036V	
190	240	24	1.5	226.7	178	305	NCF1838V	
	260	42	2	243.6	435	785	NCF1838V	
	290	75	2.1	269.9	805	1 320	NCF3038V	
200	250	24	1.5	237	162	350	NCF1840V	
	280	48	2.1	261	350	695	NCF1840V	
	310	82	2.1	287.8	910	1 510	NCF3040V	
220	270	24	2	257.7	191	385	NCF1844V	
	300	48	2.1	282	355	700	NCF1844V	
	340	90	3	312.3	1 100	1 820	NCF3044V	
240	300	28	2	283	236	470	NCF1848V	
	330	48	2.1	303	380	740	NCF1848V	
	360	92	3	335.25	1 160	1 990	NCF3048V	
260	320	28	2	307	247	510	NCF1852V	
	360	60	2.1	333.2	750	1 460	NCF2952V	
	400	104	4	376.1	1 570	2 600	NCF3052V	

Abutment and Fillet Dimensions (mm)			Mass (kg)
d <sub>s</sub>	D <sub>s</sub>	r <sub>s</sub> max.	
109	131	1	1.0
111	143	1.5	2.1
119	142	1	1.1
122	157	2	3.3
130	155	1	1.7
132	168	2	3.6
141	168	1.5	2.2
142	187	2	5.6
151	180	1.5	2.3
152	198	2	5.9
163	196	2	3.7
165	209	2	7.1
173	208	2	3.8
175	225	2	6.8
182	204	1.5	1.8
183	219	2	4.1
185	244	2	11.9
192	218	1.5	1.8
192	238	2	6.0
195	263	2	15.8
202	229	1.5	2.4
203	245	2	6.5
206	272	2	16.7
213	238	1.5	2.5
216	263	2	8.9
216	285	2	21.4
224	258	2	2.7
228	286	2	7.8
238	320	2.5	28.2
254	285	2	4.2
257	305	2	10.4
269	340	2.5	31.2
275	308	2	4.5
277	342	2	18.1
282	377	3	45.3

Remark Full-complement cylindrical roller bearings are designed for specific applications, when using them, please contact NSK.

■ FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS

NCF Type, Single-Row  
Bore Diameter 300 – 800 mm



d	Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Numbers
	D	B	r min.	E <sub>w</sub>	C <sub>r</sub>	C <sub>0r</sub>		
300	380	38	2.5	356	445	870	NCF1860V	
	420	72	3	389.6	1 120	2 200	NCF2960V	
	460	115	4	431.7	1 380	3 900	NCF3060V	
320	400	38	2.1	380	460	925	NCF1864V	
	440	72	3	410	1 150	2 340	NCF2964V	
	480	121	4	449.5	2 170	3 900	NCF3064V	
340	420	38	2.1	401	475	985	NCF1868V	
	460	72	3	430.3	1 130	2 370	NCF2968V	
	520	133	5	485.8	2 480	4 350	NCF3068V	
360	440	38	2.5	422	460	1 040	NCF1870V	
	480	72	3	450.7	1 220	2 610	NCF2972V	
	540	134	5	503.6	2 550	4 600	NCF3072V	
380	480	46	2.5	452.8	575	1 230	NCF1876V	
	500	82	4	496.7	1 020	1 900	NCF2976V	
	560	135	5	521.4	2 810	4 800	NCF3076V	
400	500	46	2.5	475.7	580	1 300	NCF1880V	
	540	82	4	511	1 650	3 850	NCF2980V	
	600	148	5	568.7	3 050	5 750	NCF3080V	
420	520	46	2.1	481	600	1 340	NCF1884V	
	560	82	4	523.2	1 650	3 650	NCF2984V	
	620	150	5	577.7	3 000	5 600	NCF3084V	
440	540	46	2.1	514	615	1 410	NCF1888V	
	600	85	4	560	1 070	2 040	NCF2988V	
	660	152	5	615.2	2 070	3 600	NCF3088V	
460	580	56	3	552.7	820	1 950	NCF1892V	
	620	95	4	576.5	1 100	2 450	NCF2992V	
	680	160	5	631.7	2 100	3 900	NCF3092V	
480	600	56	3	573	840	2 040	NCF1896V	
	650	105	5	615	1 380	2 100	NCF2996V	
	700	165	5	668.5	2 380	4 200	NCF3096V	
500	620	56	3	583.5	860	2 120	NCF181000V	
	670	100	5	630.2	1 420	2 520	NCF291000V	
	720	160	5	684	2 620	4 500	NCF301000V	
520	680	56	3	654.7	1 020	2 380	NCF181050V	
	720	95	4	690	1 400	3 000	NCF291050V	
	780	155	5	745.7	2 600	4 500	NCF301050V	
540	720	60	3	695.5	1 140	2 680	NCF181100V	
	780	118	5	750	1 950	3 500	NCF291100V	
	830	160	5	805.2	3 050	5 000	NCF301100V	
560	730	69	4	742	1 470	3 400	NCF181150V	
	790	120	5	790	2 500	4 500	NCF291150V	
	850	180	5	845.2	3 500	6 000	NCF301150V	
570	800	69	4	790	1 520	3 560	NCF181200V	
	860	120	5	832.5	2 600	4 600	NCF291200V	
	920	180	5	887.3	3 600	6 100	NCF301200V	
580	820	82	5	828	2 110	5 100	NCF181250V	

Abutment and Fillet Dimensions (mm)			Mass (kg)
d <sub>s</sub>	D <sub>s</sub>	r <sub>s</sub> max.	
319	360	2	8.7
320	396	2.5	30.7
323	435	3	67.6
328	381	2	10.3
340	423	3	36.0
343	454	3.5	73
359	402	2	10.7
361	438	2.5	34.1
368	490	4	97
380	423	2	11.5
381	457	2.5	36
388	509	4	100
400	458	2	18.6
404	494	3	51.5
408	529	4	108
421	478	2	16.5
425	513	3	53.4
428	568	4	138
440	498	2	20.5
445	533	3	55.7
448	569	4	147
461	518	2	21.3
466	552	3	78.2
463	555	2.5	32.5
486	591	4	131
503	575	2.5	33.8
510	610	3	61.5
524	594	2.5	35
531	637	4	96.4
544	625	2.5	35.6
565	655	2.5	39.3
588	718	5	98.5
626	702	2.5	48.9
633	764	4	121.7
658	748	3	68.8
700	790	3	72.7
741	836	3	87.6
786	863	4	103.3
832	950	4	123.1

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