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

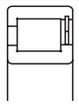
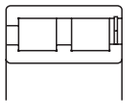
Figure	Type	Design and Features
	NCF	The outer and inner rings and rollers are non-separable since a retaining snap ring is installed at the side opposite the outer ring rib. They can sustain axial loads in only one direction.
	NNCF	NNCF is a double-row version of NCF. They can sustain heavy radial loads.

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
Outer Ring Rotation	Thin walled housings and heavy loads	g6 or h6	P7	C 3
	Normal to heavy loads	g6 or h6	N7	C 3
	Light or fluctuating loads	g6 or h6	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 on 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	RS-48E4 RS-49E4	RSF-48E4 RSF-49E4
Shielded Type	Without Snap Ring With Snap Ring	RS-50 RS-50NR	—

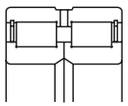
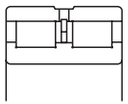
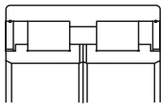
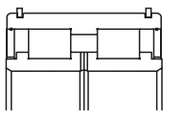
Since all are non-separable type bearings, the inner and outer rings cannot be separated, but the RSF type can be used as a free-end bearing. In this case, the permissible axial displacement is listed in the bearing tables.

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-48E4 RS-49E4	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 suntain an axial load in either direction so they can be used as fixed-end bearings. An oil groove and holes are provided at the center of the outer ring.
	RSF-48E4 RSF-49E4	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 prelubricated, 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, this 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 CLEARANGES

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
Outer Ring Rotation	Thin 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.

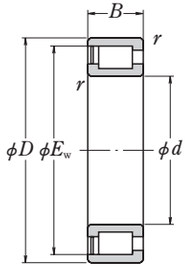
Table 4

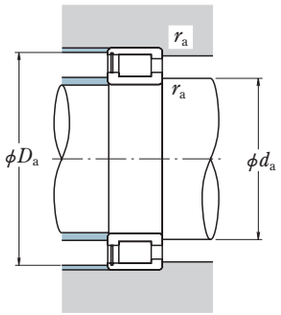
Units : μm

Nominal Bore Dia. d (mm)		Clearances			
		CN		C3	
over	incl.	min.	max.	min.	max.
30	**40**	15	50	35	70
40	**50**	20	55	40	75
50	**65**	20	65	45	90
65	**80**	25	75	55	105
80	**100**	30	80	65	115
100	**120**	35	90	80	135
120	**140**	40	105	90	155
140	**160**	50	115	100	165
160	**180**	60	125	110	175
180	**200**	65	135	125	195
200	**225**	75	150	140	215
225	**250**	90	165	155	230
250	**280**	100	180	175	255
280	**315**	110	195	195	280
315	**355**	125	215	215	305
355	**400**	140	235	245	340
400	**450**	155	275	270	390
450	**500**	180	300	300	420

FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS

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





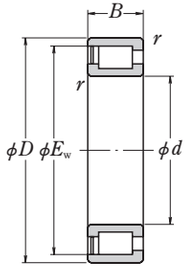
Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Numbers
d	D	B	r min.	E_W	C_r	C_{0r}	
100	140	24	1.1	130.5	132	209	**NCF2920V**
	150	37	1.5	139.7	209	310	**NCF3020V**
110	150	24	1.1	141	138	229	**NCF2922V**
	170	45	2	156.3	278	405	**NCF3022V**
120	165	27	1.1	154	177	305	**NCF2924V**
	180	46	2	167.58	293	440	**NCF3024V**
130	180	30	1.5	166.5	210	370	**NCF2926V**
	200	52	2	183.81	415	615	NCF3026V
140	190	30	1.5	179.4	227	395	**NCF2928V**
	210	53	2	197.82	435	680	**NCF3028V**
150	210	36	2	195	289	505	**NCF2930V**
	225	56	2.1	206.82	460	710	**NCF3030V**
160	220	36	2	207	310	535	**NCF2932V**
	240	60	2.1	224.8	520	810	**NCF3032V**
170	215	22	1.5	203.5	149	272	**NCF1834V**
	230	36	2	218	320	570	**NCF2934V**
	260	67	2.1	242.87	675	1 070	**NCF3034V**
180	225	22	1.5	215	154	290	**NCF1836V**
	250	42	2	231.5	390	695	**NCF2936V**
	280	74	2.1	260.3	785	1 260	**NCF3036V**
190	240	24	1.5	228.7	178	335	NCF1838V
	260	42	2	243.6	435	785	**NCF2938V**
	290	75	2.1	269.9	805	1 320	**NCF3038V**
200	250	24	1.5	237	182	350	**NCF1840V**
	280	48	2.1	261	530	955	**NCF2940V**
	310	82	2.1	287.8	910	1 510	**NCF3040V**
220	270	24	2	257.7	191	385	**NCF1844V**
	300	48	2.1	282	555	1 050	**NCF2944V**
	340	90	3	312.3	1 100	1 820	**NCF3044V**
240	300	28	2	283	236	470	**NCF1848V**
	320	48	2.1	303	580	1 140	**NCF2948V**
	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**

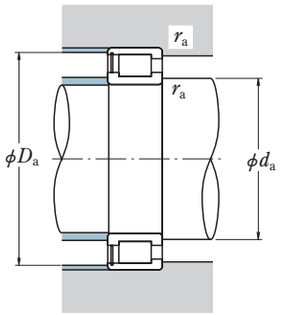
Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a	D_a	r_a max.	approx.
109	131	1	1.0
111	140	1.5	2.1
119	142	1	1.1
122	157	2	3.3
130	155	1	1.7
132	168	2	3.6
141	168	1.5	2.2
142	187	2	5.6
151	180	1.5	2.3
152	198	2	5.9
163	196	2	3.7
165	209	2	7.1
173	208	2	3.8
175	225	2	8.6
182	204	1.5	1.8
183	219	2	4.1
185	244	2	11.9
192	216	1.5	1.8
193	236	2	6.0
195	263	2	15.8
202	229	1.5	2.4
203	245	2	6.5
206	273	2	16.7
213	238	1.5	2.5
216	263	2	8.9
216	293	2	21.4
234	258	2	2.7
236	283	2	9.6
238	320	2.5	28.2
254	285	2	4.2
257	304	2	10.4
259	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





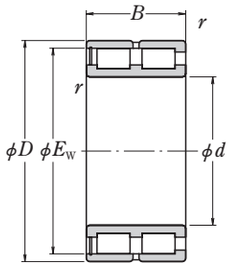
Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Numbers
d	D	B	r min.	E_W	C_r	C_{0r}	
300	380	38	2.5	359	445	870	**NCF1860V**
	420	72	3	389.6	1 120	2 200	**NCF2960V**
	460	118	4	431.7	1 980	3 500	**NCF3060V**
320	400	38	2.1	380	460	925	**NCF1864V**
	440	72	3	410	1 150	2 340	**NCF2964V**
	480	121	4	449.6	2 170	3 900	NCF3064V
340	420	38	2.1	401	475	985	**NCF1868V**
	460	72	3	430.3	1 190	2 470	**NCF2968V**
	520	133	5	485.8	2 480	4 350	NCF3068V
360	440	38	2.5	422	490	1 040	**NCF1872V**
	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**
	520	82	4	486.7	1 600	3 350	**NCF2976V**
	560	135	5	521.4	2 610	4 800	NCF3076V
400	500	46	2.5	475.7	590	1 300	**NCF1880V**
	540	82	4	511	1 650	3 550	**NCF2980V**
	600	148	5	558.7	3 050	5 750	**NCF3080AV**
420	520	46	2.1	491	600	1 340	**NCF1884V**
	560	82	4	523.2	1 680	3 650	**NCF2984V**
	620	150	5	577.7	3 000	5 650	NCF3084V
440	540	46	2.1	514	615	1 410	**NCF1888V**
	600	95	4	562	2 070	4 300	**NCF2988V**
460	580	56	3	552.7	920	1 950	**NCF1892V**
	620	95	4	576.5	2 100	4 450	NCF2992V
480	600	56	3	573	940	2 040	**NCF1896V**
	650	100	5	615	2 380	5 100	**NCF2996V**
500	620	56	3	593.5	960	2 120	**NCF18/500V**
	670	100	5	630.2	2 420	5 250	NCF29/500V
530	650	56	3	624	990	2 240	**NCF18/530V**
560	680	56	3	654.7	1 020	2 360	**NCF18/560V**
	820	195	6	770	5 600	11 300	**NCF30/560V**
600	730	60	3	695.5	1 140	2 680	NCF18/600V
	800	118	5	752	3 050	7 300	**NCF29/600V**
630	780	69	4	742	1 470	3 400	**NCF18/630V**
670	820	69	4	780	1 520	3 550	NCF18/670V
710	870	74	4	832.5	1 650	3 900	**NCF18/710V**
750	920	78	5	882.3	1 930	4 600	**NCF18/750V**
800	980	82	5	936	2 110	5 100	**NCF18/800V**

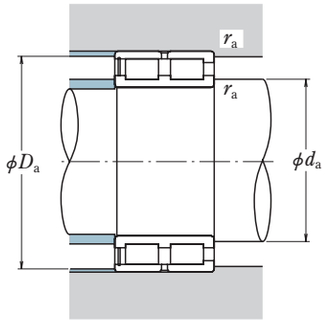
Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a	D_a	r_a max.	approx.
319	360	2	9.7
320	398	2.5	30.7
323	435	3	67.6
338	381	2	10.3
340	418	2.5	33
343	454	3	73
359	402	2	10.7
361	438	2.5	34.1
368	490	4	97
380	423	2	11.5
381	457	2.5	36
388	509	4	102
400	458	2	18.6
404	493	3	52
408	529	4	108
421	478	2	19.5
425	513	3	53.4
429	568	4	139
440	498	2	20.5
445	533	3	55.7
449	588	4	147
461	518	2	21.3
466	572	3	78.2
483	555	2.5	32.5
486	591	3	81.2
503	575	2.5	33.8
510	617	4	95.1
524	594	2.5	35
531	637	4	98.4
554	625	2.5	36.9
585	655	2.5	39.3
598	778	5	332.5
626	702	2.5	48.9
633	764	4	164.9
659	748	3	68.8
700	787	3	72.7
741	836	3	87.6
786	883	4	103.3
832	950	4	123.1

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

FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS

NNCF Type, Double-Row
Bore Diameter 100 – 260 mm





Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Numbers
d	D	B	r min.	E_W	C_r	C_{0r}	
100	140	40	1.1	129.8	194	400	NNCF4920V
	150	67	1.5	139.7	360	615	**NNCF5020V**
110	150	40	1.1	138.4	202	430	NNCF4922V
	170	80	2	156.3	490	840	**NNCF5022V**
120	165	45	1.1	153.8	226	480	NNCF4924V
	180	80	2	167.58	500	885	**NNCF5024V**
130	180	50	1.5	165.7	262	555	NNCF4926V
	200	95	2	183.81	710	1 230	NNCF5026V
140	190	50	1.5	176.2	272	595	NNCF4928V
	210	95	2	197.82	750	1 360	**NNCF5028V**
150	210	60	2	191.6	390	865	NNCF4930V
	225	100	2.1	206.82	785	1 420	**NNCF5030V**
160	220	60	2	204.1	410	930	NNCF4932V
	240	109	2.1	224.8	895	1 620	**NNCF5032V**
170	230	60	2	212.4	415	975	**NNCF4934V**
	260	122	2.1	242.87	1 160	2 140	**NNCF5034V**
180	250	69	2	230.5	550	1 230	**NNCF4936V**
	280	136	2.1	260.3	1 340	2 510	**NNCF5036V**
190	260	69	2	240.7	565	1 290	**NNCF4938V**
	290	136	2.1	269.9	1 380	2 630	NNCF5038V
200	250	50	1.5	235.9	320	825	NNCF4840V
	280	80	2.1	259.5	665	1 500	NNCF4940V
	310	150	2.1	287.75	1 560	3 000	NNCF5040V
220	270	50	1.5	256.9	340	905	NNCF4844V
	300	80	2.1	277	695	1 620	NNCF4944V
	340	160	3	312.3	1 890	3 650	**NNCF5044V**
240	300	60	2	282.6	495	1 340	NNCF4848V
	320	80	2.1	300	725	1 770	NNCF4948V
	360	160	3	335.25	1 990	4 000	**NNCF5048V**
260	320	60	2	303.6	515	1 450	NNCF4852V
	360	100	2.1	331.5	1 050	2 530	NNCF4952V
	400	190	4	376.1	2 690	5 200	NNCF5052V

Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a	D_a	r_a max.	approx.
109	130	1	2.0
111	140	1.5	3.8
119	140	1	2.1
122	157	2	6.1
130	155	1	2.9
132	168	2	6.5
141	168	1.5	3.9
142	187	2	10.3
151	178	1.5	4.2
152	198	2	10.8
163	196	2	6.6
165	209	2	13
173	206	2	7.0
175	225	2	15.8
183	216	2	7.3
185	244	2	22.1
193	236	2	10.7
195	263	2	29.4
203	245	2	11.1
206	273	2	30.8
213	237	1.5	5.9
216	263	2	15.7
216	293	2	39.7
233	257	1.5	6.4
236	283	2	17
238	320	2.5	50.7
254	285	2	10.3
257	302	2	18.4
259	340	2.5	54.3
275	304	2	11
277	342	2	32
282	377	3	82.7

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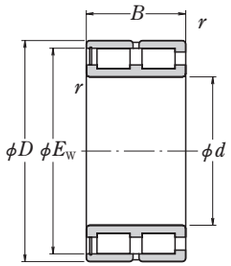
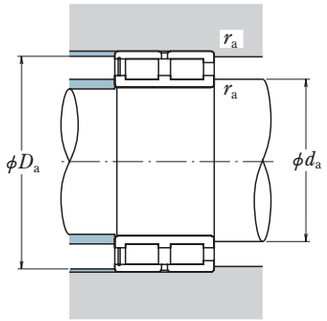
FULL-COMPLEMENT CYLINDRICAL ROLLER BEARINGS

NNCF Type, Double-Row
Bore Diameter 280 – 500 mm





Boundary Dimensions (mm)					Basic Load Ratings (kN)		Bearing Numbers
d	D	B	r min.	E_W	C_r	C_{0r}	
280	350	69	2	332.5	685	1 860	NNCF4856V
	380	100	2.1	352.5	1 090	2 720	NNCF4956V
	420	190	4	390.5	2 770	5 450	NNCF5056V
300	380	80	2.1	357.2	805	2 160	NNCF4860V
	420	118	3	386.5	1 580	3 800	NNCF4960V
	460	218	4	431.7	3 400	7 000	NNCF5060V
320	400	80	2.1	380.2	835	2 310	NNCF4864V
	440	118	3	404.5	1 620	4 000	NNCF4964V
	480	218	4	446.9	3 500	7 350	NNCF5064V
340	420	80	2.1	397.4	855	2 430	NNCF4868V
	460	118	3	431	1 690	4 300	NNCF4968V
	520	243	5	485.8	4 250	8 750	NNCF5068V
360	440	80	2.1	420.4	885	2 580	NNCF4872V
	480	118	3	449	1 730	4 500	NNCF4972V
	540	243	5	503.6	4 350	9 150	NNCF5072V
380	480	100	2.1	450.6	1 260	3 600	NNCF4876V
	520	140	4	482.5	2 180	5 650	NNCF4976V
	560	243	5	521.4	4 500	9 600	NNCF5076V
400	500	100	2.1	471.7	1 290	3 750	NNCF4880V
	540	140	4	503	2 240	5 900	NNCF4980V
	600	272	5	558.7	5 050	10 900	NNCF5080V
420	520	100	2.1	492	1 320	3 950	NNCF4884V
	560	140	4	523	2 290	6 200	NNCF4984V
	620	272	5	577.7	5 150	11 300	**NNCF5084V**
440	540	100	2.1	513	1 350	4 150	NNCF4888V
	600	160	4	560.5	3 000	7 850	NNCF4988V
460	580	118	3	549.2	1 730	5 150	NNCF4892V
	620	160	4	573	3 050	8 050	NNCF4992V
480	600	118	3	565.8	1 760	5 300	NNCF4896V
	650	170	5	603	3 350	8 900	NNCF4996V
500	620	118	3	590.7	1 810	5 600	NNCF48/500V
	670	170	5	629	3 400	9 350	NNCF49/500V

Abutment and Fillet Dimensions (mm)			Mass (kg)
d_a	D_a	r_a max.	approx.
295	334	2	16
297	361	2	34
302	395	3	87.7
318	361	2	23
320	398	2.5	52
323	435	3	125
338	381	2	24.3
340	418	2.5	55
343	454	3	131
359	400	2	25.6
361	438	2.5	58
368	490	4	177
379	421	2	27
381	457	2.5	61
388	509	4	186
399	459	2	45.5
404	493	3	90.5
408	529	4	194
420	479	2	47.5
425	513	3	94.5
429	568	4	256
440	498	2	49.5
445	533	3	98.5
449	588	4	267
461	518	2	51.5
466	572	3	136
483	555	2.5	77.5
486	591	3	142
503	575	2.5	80.5
510	617	4	167
524	594	2.5	83.5
531	637	4	173

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