

21 Hybrid bearings

More information

General bearing knowledge	17
Bearing selection process	59
Lubrication	109
Bearing interfaces	139
Seat tolerances for standard conditions	148
Selecting internal clearance or preload	182
Sealing, mounting and dismounting	193

Mounting instructions for individual bearings → skf.com/mount

SKF bearing maintenance handbook ISBN 978-91-978966-4-1

Hybrid bearings have rings made of bearing steel and rolling elements made of bearing grade silicon nitride (Si_3N_4), which make the bearings electrically insulating.

Bearing features

Silicon nitride rolling elements can extend bearing service life by offering enhanced bearing performance, even under difficult operating conditions. When compared to same-sized bearings with steel rolling elements, the benefits of hybrid bearings include:

- **Protection from electric current damage**
Hybrid bearings are non-conductive and therefore suitable for applications such as AC and DC motors and generators, where electric currents are present.
- **Higher speed capability**
The density of a silicon nitride rolling element is 60% lower than a same-sized rolling element made of bearing steel. Lower weight and inertia translates into higher speed capability and superior behaviour during rapid starts and stops.
- **Long service life**
The lower frictional heat generated in hybrid bearings, especially at high speeds, contributes to extended bearing service life and extended relubrication intervals.
- **High wear-resistance**
Silicon nitride rolling elements have a higher degree of hardness making hybrid bearings suitable under difficult conditions and contaminated environments.
- **High bearing stiffness**
With a high modulus of elasticity, hybrid bearings offer increased bearing stiffness.

- **Reduced risk of smearing**
Even under inadequate lubrication conditions, such as high speeds and rapid accelerations, or where there is an insufficient hydrodynamic film, the risk of smearing is reduced between silicon nitride and steel surfaces. For conditions where $\kappa < 1$, it is common to apply $\kappa = 1$ for hybrid bearing life calculations (Lubrication condition – the viscosity ratio, κ , [page 102](#)).
- **Reduced risk of false brinelling**
When subjected to vibration, hybrid bearings are significantly less susceptible to false brinelling (formation of shallow depressions in the raceways) between the silicon nitride and steel surfaces.
- **Less sensitivity to temperature gradients**
Silicon nitride rolling elements have a lower coefficient of thermal expansion, which means they are more stable over temperature gradients within the bearing and provide more accurate preload/clearance control.

Assortment

The standard assortment of SKF hybrid bearings (fig. 1) comprises popular sizes for electric motors and generators. It includes:

- single row deep groove ball bearings
 - basic design
 - sealed design
 - XL hybrid design
- single row cylindrical roller bearings

Hybrid bearings provided in this catalogue constitute the basic SKF assortment and are only part of the total assortment. Other hybrid bearings include:

- hybrid super-precision bearings (skf.com/super-precision)
 - hybrid super-precision angular contact ball bearings
 - hybrid super-precision cylindrical roller bearings
 - hybrid super-precision angular contact thrust ball bearings, single and double direction
- hybrid angular contact ball bearings
- hybrid stainless steel deep groove ball bearings
- bearing units incorporating hybrid bearings

For availability and detailed information, contact SKF.

Designs and variants

Hybrid deep groove ball bearings

Deep groove ball bearings are the most widely used bearing type, especially in electric motors. SKF hybrid deep groove ball bearings (fig. 2):

- are non-separable
 - are suitable for high speeds
 - accommodate radial loads and axial loads in both directions because their uninterrupted raceway grooves have a close osculation with the balls
 - are manufactured to SKF Explorer bearing quality (page 7)
 - are available with a bore diameter ranging from 5 to 180 mm
 - with a bore diameter $d \leq 45$ mm, are most suitable for electric motors in the power range 0,15 to 15 kW as well as for power tools and high-speed drives
- SKF hybrid deep groove ball bearings in this size range are the most cost-effective solution against electrical erosion.

Basic design bearings

- are available with a bore diameter $d \geq 10$ mm

⚠ WARNING

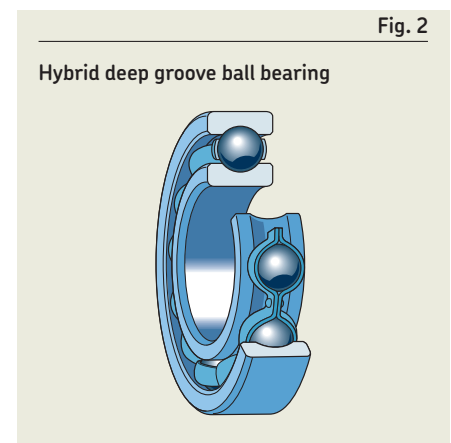
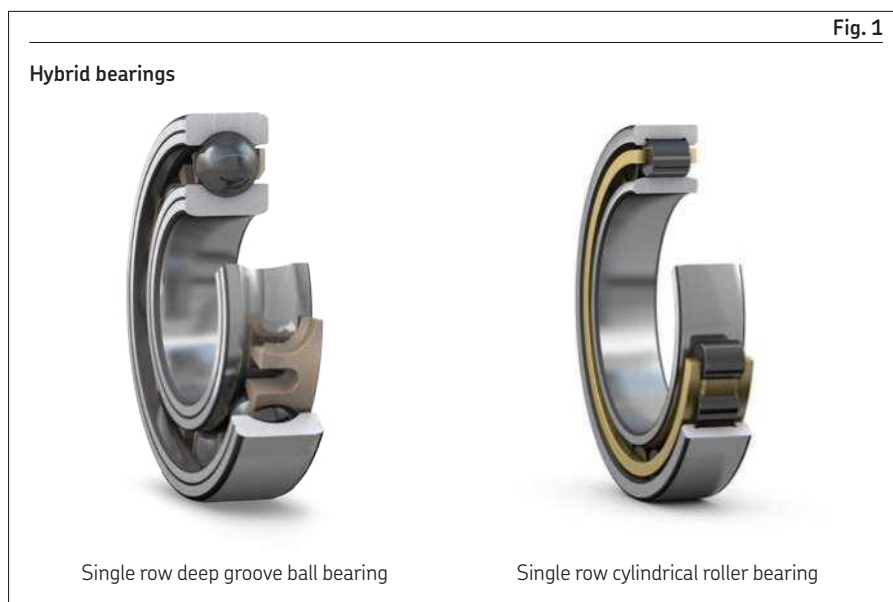
Seals made of FKM (fluoro rubber) exposed to an open flame or temperatures above 300 °C (570 °F) are a health and environmental hazard! They remain dangerous even after they have cooled.

Read and follow the safety precautions on [page 197](#).

Sealed bearings

- use the same seals as described under *Capped bearings*, [page 242](#)
- are lubricated for the life of the bearing and should not be washed or relubricated
- are virtually maintenance-free

When capped bearings must operate under certain conditions, such as very high speeds or high temperatures, grease may appear between the inner ring and capping device. For bearing arrangements where this would be detrimental, appropriate actions should be taken.



21 Hybrid bearings

Greases for sealed bearings

The standard grease, suitable for most common operating conditions of electric motors and generators, is indicated by the designation suffix WT ([table 3, page 245](#)).

For additional information about greases, refer to *Selecting a suitable grease*, [page 116](#).

Grease life

The estimated grease life is typically at least twice as long as for same-sized bearings with steel balls (*Grease life for capped bearings*, [page 246](#)).

XL hybrid bearings

- are identified by the designation suffix VA970
- are designed to meet the application requirements for electric generators in larger wind turbines
- are available for the most commonly used generator sizes ([product table, page 1050](#))

Hybrid cylindrical roller bearings

- are separable
- are suitable for high speeds
- accommodate heavy radial loads
- accommodate axial displacement ([fig. 4](#))
- are commonly used in electric motors, especially traction motors, and in applications running under severe operating conditions

Basic design bearings

The NU design cylindrical roller bearing, which has two integral flanges on the outer ring and no flanges on the inner ring, is the standard basic design for hybrid cylindrical roller bearings ([fig. 3](#)).

Hybrid bearings with special steel rings and coatings

For specific application requirements, hybrid bearings can be customized:

- bearing rings stabilized for temperatures $\leq 300\text{ °C}$ (570 °F)
- bearing rings made of through-hardened stainless steel for enhanced corrosion and wear-resistance and with good high-temperature properties
- bearing rings made of through-hardened stainless steel for cryogenic temperatures
- bearing rings made of high-temperature tool steel
- ring coating with zinc chromate or thin dense chromium for corrosion protection
- ring coating based on molybdenum for low friction, especially in vacuum or gas applications

For availability and detailed information, contact SKF.

Cages

SKF hybrid deep groove ball bearings are fitted with one of the following cages:

- a stamped steel cage, riveted, ball centred (no designation suffix)
- a glass fibre reinforced PA66 cage, snap-type, ball centred (designation suffix TN9)
- a glass fibre reinforced PEEK cage, snap-type, ball centred (designation suffix TNH)
- a machined brass cage, riveted, ball centred (designation suffix M)

For additional information, refer to *Cages*, [page 249](#).

SKF hybrid cylindrical roller bearings are fitted with one of the following cages:

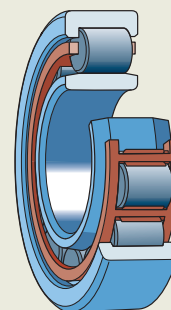
- a glass fibre reinforced PA66 cage, window-type, roller centred (designation suffix P)
- a glass fibre reinforced PEEK cage, window-type, roller centred (designation suffix PH)
- a machined brass cage, riveted, roller centred (designation suffix M)
- a machined brass cage, window-type, inner or outer ring centred (depending on bearing design) (designation suffix ML)

For additional information, refer to *Cages*, [page 502](#).

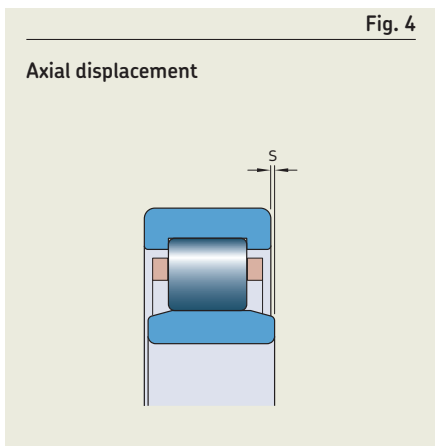
When used at high temperatures, some lubricants can have a detrimental effect on polyamide cages. For additional information about the suitability of cages, refer to *Cages*, [page 187](#).

Fig. 3

Hybrid cylindrical roller bearing



	Deep groove ball bearings	Cylindrical roller bearings
Dimension standards	Boundary dimensions: ISO 15	
Tolerances	Normal	Normal P6 geometrical tolerance
For additional information → page 35	ISO 492 (table 2, page 38 , and table 3, page 39)	
Internal clearance	C3 Check availability of other clearance classes	
For additional information → page 182	Values: ISO 5753-1 (table 6, page 252)	Values: ISO 5753-1 (table 3, page 506)
	Values are valid for unmounted bearings under zero measuring load.	
Permissible misalignment	Identical to standard bearings → page 250	Identical to standard bearings → page 504
Permissible axial displacement	–	s_{max} → product table, page 1056 NU design hybrid bearings can accommodate axial displacement (fig. 4). Displacement of the shaft relative to the housing occurs within these bearings. As a result, there is virtually no increase in friction.
Electrical properties	<ul style="list-style-type: none"> • Protection against AC and DC currents • High impedance, even for very high frequencies, providing good protection against high frequency current and voltage peaks • Voltage level before the first arcing occurs through the seal–bearing contact of small hybrid deep groove ball bearings (NBR contact seal): > 2,5 kV DC 	



Loads

For recommendations about minimum load, axial load carrying capacity and equivalent bearing loads, refer to *Loads* of the relevant standard bearing:

- *Deep groove ball bearings*, [page 254](#)
- *Cylindrical roller bearings*, [page 509](#)

The required hybrid bearing specific values and factors are listed in the relevant product tables:

- *Hybrid deep groove ball bearings*, [page 1050](#)
 - basic static load rating C_0
 - calculation factors f_0 and k_r
- *Hybrid cylindrical roller bearings*, [page 1056](#)
 - calculation factor k_r
 - reference speed

Axial preload

To provide low noise and high-speed operation, typically an axial preload to a bearing arrangement comprising two hybrid deep groove ball bearings is applied. Axial preload can be applied with spring washers, as described under *Preloading with springs*, [page 186](#).

Temperature limits

The permissible operating temperature for hybrid bearings can be limited by:

- the dimensional stability of the bearing rings
- the cage
- the seals
- the lubricant

Where temperatures outside the permissible range are expected, contact SKF.

Bearing rings

The rings of SKF hybrid bearings are heat stabilized up to at least:

- 120 °C (250 °F) for basic design hybrid deep groove ball bearings
- 150 °C (300 °F) for hybrid cylindrical roller bearings and XL hybrid deep groove ball bearings

On request, SKF can supply hybrid bearings with rings stabilized for operating temperatures up to 300 °C (570 °F).

Cages

Steel, brass or PEEK cages can be used at the same operating temperatures as the bearing rings of standard hybrid bearings. For temperature limits of other polymer cages, refer to *Polymer cages*, [page 188](#).

Seals

The permissible operating temperature for seals depends on the seal material:

- NBR: –40 to +100 °C (–40 to +210 °F)
Temperatures up to 120 °C (250 °F) can be tolerated for brief periods.
- FKM: –30 to +200 °C (–20 to +390 °F)
Temperatures up to 230 °C (445 °F) can be tolerated for brief periods.

Typically, temperature peaks are at the seal lip.

Lubricants

Temperature limits for the grease used in sealed SKF hybrid deep groove ball bearings are provided in [table 3, page 116](#). For temperature limits of other SKF greases, refer to *Selecting a suitable SKF grease*, [page 116](#).

When using lubricants not supplied by SKF, temperature limits should be evaluated according to the SKF traffic light concept ([page 117](#)).

Permissible speed

The speed ratings in the product tables (*Hybrid deep groove ball bearings*, [page 1050](#) and *Hybrid cylindrical roller bearings*, [page 1056](#)) indicate:

- the **reference speed**, which enables a quick assessment of the speed capabilities from a thermal frame of reference
- the **limiting speed**, which is a mechanical limit that should not be exceeded unless the bearing design and the application are adapted for higher speeds

For additional information, refer to *Operating temperature and speed*, [page 129](#).

SKF recommends oil lubrication for bearings with a ring centred cage (designation suffix ML). When these bearings are grease lubricated, the nd_m value is limited to $\leq 250\,000$ mm/min.

where

$$d_m = \text{bearing mean diameter [mm]} \\ = 0,5 (d + D)$$

$$n = \text{rotational speed [r/min]}$$



Designation system

Refer to *Designation system* of the relevant standard bearing:

- single row deep groove ball bearings, [page 258](#)
- single row cylindrical roller bearings, [page 514](#)

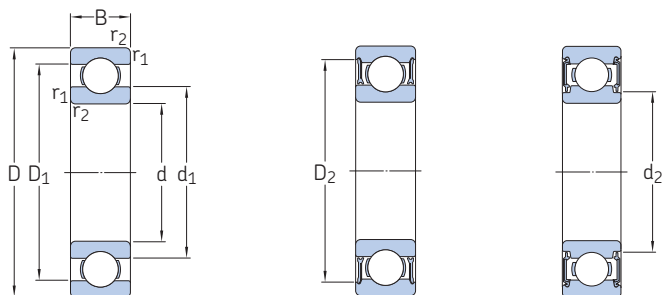
Additional designation suffixes used with SKF hybrid bearings are explained in the following.

- C3P** Displaced clearance range comprising the upper half of the C3 plus the lower half of the C4 clearance range
- F1** Grease fill 10–15% of the free space in the bearing
- HC5** Rolling elements made of silicon nitride
- S0** Bearing rings heat stabilized for operating temperatures ≤ 150 °C (300 °F)
- VA970** Special design deep groove ball bearing for wind turbine generators
- VC444** Bearing rings made of high nitrogen steel



21.1 Hybrid deep groove ball bearings

d 5 – 25 mm

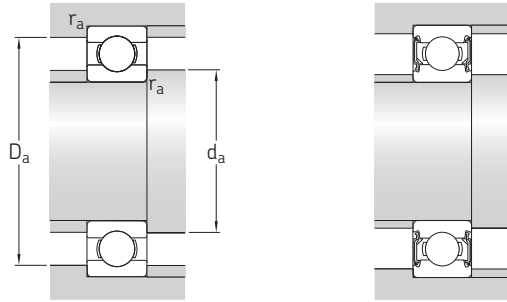


Sealed (2RZ)

Sealed (2RSL)

Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designation
d	D	B	dynamic	static		Reference speed	Limiting speed		
			C	C ₀	P _u				
mm			kN		kN	r/min	kg	–	
5	16	5	1,14	0,38	0,016	125 000	67 000	0,005	▶ 625-2RZTN9/HC5C3WTF1
6	19	6	2,34	0,95	0,04	100 000	45 000	0,008	626-2RSLTN9/HC5C3WTF1
7	19	6	2,34	0,95	0,04	100 000	45 000	0,007	▶ 607-2RSLTN9/HC5C3WTF1
	22	7	3,45	1,37	0,057	85 000	40 000	0,012	▶ 627-2RSLTN9/HC5C3WTF1
8	22	7	3,45	1,37	0,057	85 000	40 000	0,01	▶ 608-2RSLTN9/HC5C3WTF1
10	26	8	4,75	1,96	0,083	70 000	32 000	0,018	▶ 6000-2RSLTN9/HC5C3WT
	26	8	4,75	1,96	0,083	70 000	45 000	0,019	6000/HC5C3
	30	9	5,4	2,36	0,1	65 000	30 000	0,032	▶ 6200-2RSLTN9/HC5C3WT
	30	9	5,4	2,36	0,1	65 000	40 000	0,032	6200/HC5C3
12	28	8	5,4	2,36	0,1	65 000	30 000	0,022	▶ 6001-2RSLTN9/HC5C3WT
	28	8	5,4	2,36	0,1	65 000	40 000	0,021	6001/HC5C3
	32	10	7,28	3,1	0,132	60 000	26 000	0,037	▶ 6201-2RSLTN9/HC5C3WT
	32	10	7,28	3,1	0,132	60 000	36 000	0,037	6201/HC5C3
15	32	9	5,85	2,85	0,12	56 000	24 000	0,03	▶ 6002-2RSLTN9/HC5C3WT
	32	9	5,85	2,85	0,12	56 000	34 000	0,03	6002/HC5C3
	35	11	8,06	3,75	0,16	50 000	22 000	0,044	▶ 6202-2RSLTN9/HC5C3WT
	35	11	8,06	3,75	0,16	50 000	32 000	0,045	6202/HC5C3
17	35	10	6,37	3,25	0,137	50 000	22 000	0,038	▶ 6003-2RSLTN9/HC5C3WT
	35	10	6,37	3,25	0,137	50 000	30 000	0,038	6003/HC5C3
	40	12	9,95	4,75	0,2	45 000	20 000	0,059	▶ 6203-2RSLTN9/HC5C3WT
	40	12	9,95	4,75	0,2	45 000	28 000	0,065	6203/HC5C3
20	42	12	9,95	5	0,212	40 000	19 000	0,062	▶ 6004-2RSLTN9/HC5C3WT
	42	12	9,95	5	0,212	40 000	26 000	0,067	6004/HC5C3
	47	14	13,5	6,55	0,28	38 000	17 000	0,097	▶ 6204-2RSLTN9/HC5C3WT
	47	14	13,5	6,55	0,28	38 000	24 000	0,11	6204/HC5C3
25	47	12	11,9	6,55	0,275	36 000	16 000	0,073	▶ 6005-2RSLTN9/HC5C3WT
	47	12	11,9	6,55	0,275	36 000	22 000	0,078	6005/HC5C3
	52	15	14,8	7,8	0,335	32 000	15 000	0,13	▶ 6205-2RSLTN9/HC5C3WT
	52	15	14,8	7,8	0,335	32 000	20 000	0,13	6205/HC5C3

▶ Popular item

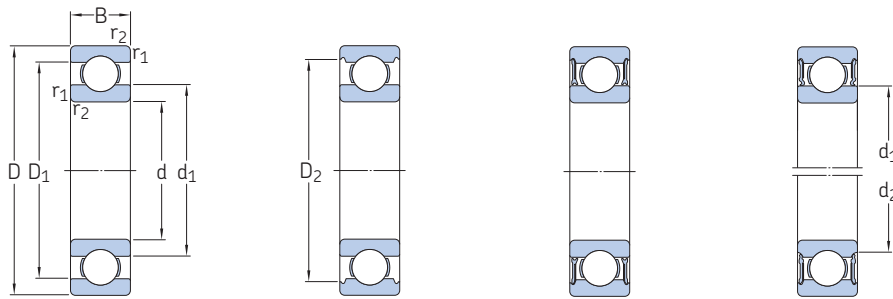


Dimensions					Abutment and fillet dimensions					Calculation factors	
d	d ₁ ≈	d ₂ ≈	D ₁ ≈	D ₂ ≈	r _{1,2} min.	d _a min.	d _a max.	D _a max.	r _a max.	k _r	f ₀
mm					mm					–	
5	8,4	–	–	13,3	0,3	7,4	8,3	13,6	0,3	0,025	8,4
6	–	9,5	–	16,5	0,3	7,4	9,4	16,6	0,3	0,025	13
7	–	9,5	–	16,5	0,3	9	9,4	17	0,3	0,025	13
	–	10,6	–	19,2	0,3	9,4	10,5	19,6	0,3	0,025	12
8	–	10,6	–	19,2	0,3	10	10,5	20	0,3	0,025	12
10	–	13	–	22,6	0,3	12	12,5	24	0,3	0,025	12
	14,8	–	21,2	–	0,3	12	–	24	0,3	0,025	12
	–	15,2	–	24,8	0,6	14,2	15	25,8	0,6	0,025	13
	17	–	23,2	–	0,6	14,2	–	25,8	0,6	0,025	13
12	–	15,2	–	24,8	0,3	14	15	26	0,3	0,025	13
	17	–	23,2	–	0,3	14	–	26	0,3	0,025	13
	–	16,6	–	27,4	0,6	16,2	16,5	27,8	0,6	0,025	12
	18,4	–	25,7	–	0,6	16,2	–	27,8	0,6	0,025	12
15	–	18,7	–	28,2	0,3	17	18,5	30	0,3	0,025	14
	20,5	–	26,7	–	0,3	17	–	30	0,3	0,025	14
	–	19,4	–	30,4	0,6	19,2	19,4	30,8	0,6	0,025	13
	21,7	–	29	–	0,6	19,2	–	30,8	0,6	0,025	13
17	–	20,7	–	31,4	0,3	19	20,5	33	0,3	0,025	14
	23	–	29,2	–	0,3	19	–	33	0,3	0,025	14
	–	22,2	–	35	0,6	21,2	22	35,8	0,6	0,025	13
	24,5	–	32,7	–	0,6	21,2	–	35,8	0,6	0,025	13
20	–	24,9	–	37,2	0,6	23,2	24,5	38,8	0,3	0,025	14
	27,2	–	34,8	–	0,6	23,2	–	38,8	0,3	0,025	14
	–	26,3	–	40,6	1	25,6	26	41,4	1	0,025	13
	28,8	–	38,5	–	1	25,6	–	41,4	1	0,025	13
25	–	29,7	–	42,2	0,6	28,2	29,5	43,8	0,3	0,025	14
	32	–	40	–	0,6	28,2	–	43,8	0,3	0,025	14
	–	31,8	–	46,3	1	30,6	31,5	46,4	1	0,025	14
	34,3	–	44	–	1	30,6	–	46,4	1	0,025	14



21.1 Hybrid deep groove ball bearings

d 30 – 65 mm

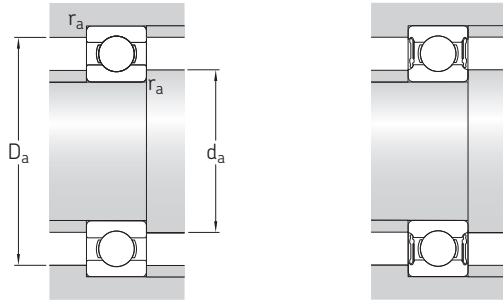


Sealed (2RZ)

Sealed (2RS1)

Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designation
d	D	B	dynamic	static		Reference speed	Limiting speed		
			C	C ₀	P _u				
mm			kN		kN	r/min		kg	–
30	55	13	13,8	8,3	0,355	30 000	16 000	0,11	▶ 6006-2RZTN9/HC5C3WT
	55	13	13,8	8,3	0,355	30 000	19 000	0,12	6006/HC5C3
	62	16	20,3	11,2	0,475	28 000	15 000	0,18	▶ 6206-2RZTN9/HC5C3WT
35	62	14	16,8	10,2	0,44	26 000	14 000	0,15	▶ 6007-2RZTN9/HC5C3WT
	62	14	16,8	10,2	0,44	26 000	17 000	0,15	6007/HC5C3
	72	17	27	15,3	0,655	24 000	13 000	0,26	▶ 6207-2RZTN9/HC5C3WT
	72	17	27	15,3	0,655	24 000	15 000	0,29	6207/HC5C3
40	68	15	17,8	11	0,49	24 000	12 000	0,19	▶ 6008-2RZTN9/HC5C3WT
	68	15	17,8	11	0,49	24 000	15 000	0,19	6008/HC5C3
	80	18	32,5	19	0,8	20 000	11 000	0,34	▶ 6208-2RZTN9/HC5C3WT
	80	18	32,5	19	0,8	20 000	13 000	0,37	6208/HC5C3
45	75	16	22,1	14,6	0,64	20 000	13 000	0,24	6009/HC5C3
	85	19	35,1	21,6	0,915	20 000	10 000	0,42	▶ 6209-2RZTN9/HC5C3WT
	85	19	35,1	21,6	0,915	20 000	12 000	0,37	6209/HC5C3
	100	25	55,3	31,5	1,34	–	4 500	0,15	▶ 6309-2RS1TN9/HC5C3WT
50	90	20	37,1	23,2	0,98	–	4 800	0,44	▶ 6210-2RS1/HC5C3WT
	90	20	37,1	23,2	0,98	18 000	11 000	0,45	6210/HC5C3
	110	27	65	38	1,6	–	4 300	0,99	▶ 6310-2RS1/HC5C3WT
	110	27	65	38	1,6	16 000	10 000	1,1	6310/HC5C3
55	100	21	46,2	29	1,25	–	4 300	0,59	▶ 6211-2RS1/HC5C3WT
	100	21	46,2	29	1,25	16 000	10 000	0,61	6211/HC5C3
	120	29	74,1	45	1,9	–	3 800	1,4	▶ 6311-2RS1/HC5C3WT
	120	29	74,1	45	1,9	14 000	9 000	1,35	6311/HC5C3
60	110	22	55,3	36	1,53	–	4 000	0,71	▶ 6212-2RS1/HC5C3WT
	110	22	55,3	36	1,53	15 000	9 500	0,78	6212/HC5C3
	130	31	81,9	52	2,2	–	3 400	1,75	▶ 6312-2RS1/HC5C3WT
	130	31	85,2	52	2,2	13 000	8 500	1,7	6312/HC5C3
65	120	23	58,5	40,5	1,73	–	3 600	0,92	▶ 6213-2RS1/HC5C3WT
	120	23	58,5	40,5	1,73	14 000	8 500	1	6213/HC5C3
	140	33	97,5	60	2,5	–	3 200	2,15	▶ 6313-2RS1/HC5C3WT

▶ Popular item

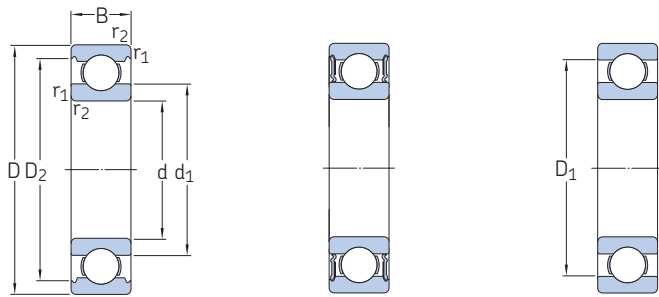


Dimensions					Abutment and fillet dimensions					Calculation factors	
d	d ₁ ≈	d ₂ ≈	D ₁ ≈	D ₂ ≈	r _{1,2} min.	d _a min.	d _a max.	D _a max.	r _a max.	k _r	f ₀
mm						mm				-	
30	38,2	-	-	49	1	34,6	38,1	50,4	0,3	0,025	15
	38,2	-	46,8	-	1	34,6	-	50,4	0,3	0,025	15
	40,3	-	-	54,1	1	35,6	40,3	56,4	1	0,025	14
35	43,7	-	-	55,6	1	39,6	43,7	57,4	0,3	0,025	15
	43,7	-	53,3	-	1	39,6	-	57,4	0,3	0,025	15
	46,9	-	-	62,7	1,1	42	46,8	65	1	0,025	14
	46,9	-	60	-	1,1	42	-	65	1	0,025	14
40	49,2	-	-	61,1	1	44,6	49,2	63,4	0,3	0,025	15
	49,2	-	58,8	-	1	44,6	-	63,4	0,3	0,025	15
	52,6	-	-	69,8	1,1	47	52,5	73	1	0,025	14
	52,6	-	67,4	-	1,1	47	-	73	1	0,025	14
45	54,7	-	65,3	-	1	50	-	70	0,3	0,025	15
	57,6	-	-	75,2	1,1	52	57,5	78	1	0,025	14
	56,6	-	72,4	-	1	52	-	78	1	0,025	14
	-	54	-	86,7	1,5	54	62,1	91	1,5	0,025	13
50	62,5	-	-	81,6	1,1	57	62,4	83	1	0,025	14
	62,5	-	-	81,6	1,1	57	-	83	1	0,025	14
	68,7	-	-	95,2	2	61	-	99	1,5	0,025	13
	68,7	-	-	95,2	2	61	-	99	2	0,025	13
55	69	-	-	89,4	1,5	64	69	91	1,5	0,025	14
	69	-	-	89,4	1,5	64	-	91	1,5	0,025	14
	75,3	-	-	104	2	66	-	109	2	0,025	13
	75,3	-	-	104	2	66	-	109	2	0,025	13
60	75,5	-	-	98	1,5	69	75,4	101	1,5	0,025	14
	75,5	-	-	98	1,5	69	-	101	1,5	0,025	14
	81,8	-	-	112	2,1	72	-	118	2	0,025	13
	81,8	-	-	112	2,1	72	-	118	2	0,025	13
65	83,3	-	-	106	1,5	74	83,2	111	1,5	0,025	15
	83,3	-	-	106	1,5	74	-	111	1,5	0,025	15
	88,3	-	-	121	2,1	77	88,3	128	2	0,025	13



21.1 Hybrid deep groove ball bearings

d 70 – 180 mm

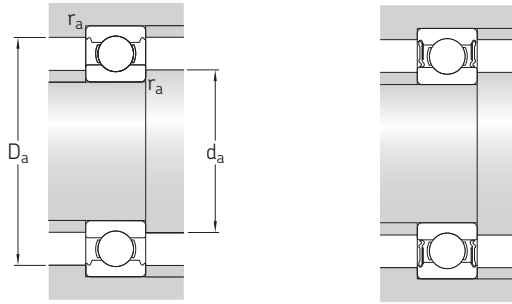


Sealed (2RS1)

VA970

Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designation
d	D	B	dynamic	static		Reference speed	Limiting speed		
mm			kN		kN	r/min		kg	–
70	125	24	63,7	45	1,9	–	3 400	1	▶ 6214-2RS1/HC5C3WT 6214/HC5C3 6314/HC5C3
	125	24	63,7	45	1,9	13 000	8 500	1,1	
	150	35	111	68	2,75	11 000	7 000	2,55	
75	130	25	68,9	49	2,04	–	3 200	1,05	▶ 6215-2RS1/HC5C3WT 6215/HC5C3 6315/HC5C3
	130	25	68,9	49	2,04	12 000	8 000	1,2	
	160	37	119	76,5	3	11 000	7 000	3,05	
80	140	26	72,8	55	2,2	11 000	7 000	1,3	6216/HC5C3 6316/HC5C3
	170	39	130	86,5	3,25	10 000	6 300	3,65	
85	150	28	87,1	64	2,5	11 000	70 000	1,8	6217/HC5C3 6317/HC5C3
	180	41	140	96,5	3,55	9 500	6 000	4,25	
90	160	30	101	73,5	2,8	10 000	6 300	1,95	6218/HC5C3 6318/HC5C3
	190	43	151	108	3,8	9 000	5 600	4,95	
95	170	32	114	81,5	3	9 500	6 000	2,65	6219/HC5C3 6319/HC5C3
	200	45	159	118	4,15	8 500	5 600	5,75	
100	180	34	127	93	3,35	9 000	5 600	3,2	6220/HC5C3 6320/HC5C3
	215	47	182	140	4,75	9 000	5 000	6,15	
110	240	50	197,291	175,334	4,15	8 000	4 300	9,1	▶ 6322/HC5C3S0VA970
120	260	55	210,618	199,897	4,55	7 000	4 000	12,5	▶ 6324/HC5C3S0VA970
130	280	58	223,245	223,442	4,9	6 700	3 800	15,5	▶ 6326/HC5C3S0VA970
140	300	62	279,21	265,927	7,1	6 300	3 600	15,5	▶ 6328/HC5C3S0VA970
150	320	65	303,174	306,454	7,8	6 000	3 200	20,5	▶ 6330/HC5C3S0VA970
160	340	68	347,528	391,111	7,65	5 300	2 800	24	▶ 6332/HC5C3S0VA970
170	360	72	347,528	391,111	7,65	5 300	2 800	30	▶ 6334/HC5C3S0VA970
180	380	75	330,979	391,111	7,65	5 300	2 800	36,5	▶ 6336/HC5C3PS0VA970

▶ Popular item

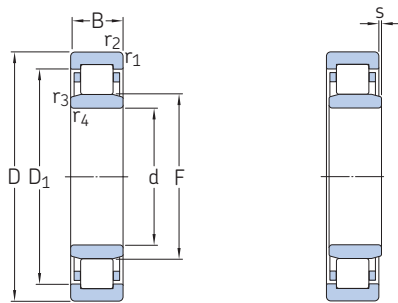


Dimensions					Abutment and fillet dimensions					Calculation factors		
d	d ₁ ≈	d ₂ ≈	D ₁ ≈	D ₂ ≈	r _{1,2} min.	d _a min.	d _a max.	D _a max.	r _a max.	k _r	f ₀	
mm	mm										-	
70	87	-	-	111	1,5	79	87	116	1,5	0,025	15	
	87	-	-	111	1,5	79	-	116	1,5	0,025	15	
	94,9	-	-	130	2,1	82	-	138	2	0,025	13	
75	92	-	-	117	1,5	84	92	121	1,5	0,025	15	
	92	-	-	117	1,5	84	-	121	1,5	0,025	15	
	101	-	-	138	2,1	87	-	148	2	0,025	13	
80	101	-	-	127	2	91	-	129	2	0,025	15	
	108	-	-	147	2,1	92	-	158	2	0,03	13	
85	106	-	-	135	2	96	-	139	2	0,025	15	
	114	-	-	155	3	99	-	166	2,5	0,03	13	
90	112	-	-	143	2	101	-	149	2	0,025	15	
	121	-	-	164	3	104	-	176	2,5	0,03	13	
95	118	-	-	151	2,1	107	-	158	2	0,025	14	
	127	-	-	172	3	109	-	186	2,5	0,03	13	
100	124	-	-	160	2,1	112	-	168	2	0,025	14	
	135	-	-	184	3	114	-	201	2,5	0,03	13	
110	160	-	198	-	3	124	-	226	2,5	0,03	15	
120	175	-	216	-	3	134	-	246	2,5	0,03	15	
130	189	-	228	-	4	147	-	263	3	0,03	15	
140	189	-	250	-	4	157	-	283	3	0,03	14	
150	205	-	264	-	4	167	-	303	3	0,03	14	
160	236	-	295	-	4	177	-	323	3	0,03	14	
170	236	-	295	-	4	187	-	343	3	0,03	14	
180	236	-	295	-	4	197	-	363	3	0,03	14	



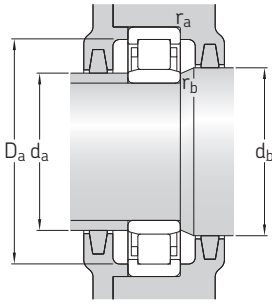
21.2 Hybrid cylindrical roller bearings

d 40 – 100 mm



Principal dimensions			Basic load ratings		Fatigue load limit	Speed ratings		Mass	Designation
d	D	B	dynamic C	static C ₀		Reference speed	Limiting speed		
mm			kN		kN	r/min		kg	–
40	68	15	25,1	26	3	13 000	22 000	0,21	▶ NU 1008 ML/HC5C3
45	75	16	44,6	52	6,3	12 000	13 000	0,19	▶ NU 1009 ECP/HC5C3
50	80	16	46,8	56	6,7	11 000	12 000	0,23	▶ NU 1010 ECP/HC5C3
	90	20	64,4	69,5	7,5	9 000	11 000	0,49	▶ NU 210 ECM/HC5C3
	110	27	110	112	15	7 000	10 000	0,93	▶ NU 310 ECM/HC5C3
55	90	18	57,2	69,5	8,3	10 000	11 000	0,4	▶ NU 1011 ECM/HC5C3
	100	21	84,2	95	12,2	8 000	10 000	0,54	▶ NU 211 ECM/HC5C3
	120	29	138	143	18,6	6 700	9 000	1,15	▶ NU 311 ECM/HC5C3
60	95	18	37,4	44	5,3	9 500	10 000	0,44	▶ NU 1012 M/HC5C3
	110	22	93,5	102	13,4	7 500	9 000	0,64	▶ NU 212 ECM/HC5C3
	130	31	173	160	21,2	6 000	8 000	1,45	▶ NU 312 ECM/HC5C3
65	100	18	62,7	81,5	9,8	9 000	9 500	0,38	▶ NU 1013 ECP/HC5C3
	120	23	106	118	15,6	6 700	8 500	0,83	▶ NU 213 ECM/HC5C3
	140	33	183	196	7,1	5 600	7 500	1,75	▶ NU 313 ECM/HC5C3
70	110	20	76,5	93	12	8 000	8 500	0,53	▶ NU 1014 ECP/HC5C3
	125	24	119	137	18	6 300	8 000	1,1	▶ NU 214 ECM/HC5C3
	150	35	205	228	7,1	5 300	7 000	2,15	▶ NU 314 ECM/HC5C3
75	115	20	58,3	71	8,5	7 500	8 500	0,61	▶ NU 1015 M/HC5C3
	130	25	130	156	20,4	6 000	7 500	1,2	▶ NU 215 ECM/HC5C3
80	125	22	99	127	16,3	7 000	7 500	0,88	▶ NU 1016 ECM/HC5C3
	140	26	138	166	21,2	5 600	7 000	1,5	▶ NU 216 ECM/HC5C3
85	130	22	68,2	86,5	10,8	6 700	7 500	0,95	▶ NU 1017 M/HC5C3
	150	28	165	200	5,5	5 300	6 700	1,75	▶ NU 217 ECM/HC5C3
90	140	24	80,9	104	12,7	6 300	7 000	1,2	▶ NU 1018 M/HC5C3
	160	30	183	220	27	5 000	6 300	2,1	▶ NU 218 ECM/HC5C3
95	145	24	84,2	110	13,2	6 000	10 000	1,3	▶ NU 1019 ML/HC5C3
100	150	24	85,8	114	13,7	6 000	6 300	1,3	▶ NU 1020 M/HC5C3

▶ Popular item



Dimensions						Abutment and fillet dimensions						Calculation factor
d	D ₁ ≈	F	r _{1,2} min.	r _{3,4} min.	s max.	d _a min.	d _a max.	d _b min.	D _a max.	r _a max.	r _b max.	k _r
mm						mm						–
40	57,6	47	1	0,6	2,4	43,2	45	49	63	1	1	0,15
45	65,3	52,5	1	0,6	0,9	48,2	51	54	70	1	0,6	0,1
50	70	57,5	1	0,6	1	53,2	56	60	75	1	1	0,1
	78	59,5	1,1	1,1	1,5	57	57	62	83	1	1	0,15
	92,1	65	2	2	1,9	61	63	67	99	2	2	0,15
55	79	64,5	1,1	1	0,5	59,6	63	67	84	1	1	0,1
	86,3	66	1,5	1,1	1	62	64	68	91	1,5	1,5	0,15
	101	70,5	2	2	2	66	68	73	109	2	2	0,15
60	81,6	69,5	1,1	1	2,9	64,6	68	72	89	1	1	0,1
	95,7	72	1,5	1,5	1,4	69	70	74	101	1,5	1,5	0,15
	110	77	2,1	2,1	2,1	72	74	79	118	2	2	0,15
65	88,5	74	1,1	1	1	69,6	72	77	94	1	1	0,1
	104	78,5	1,5	1,5	1,4	74	76	81	111	1,5	1,5	0,15
	119	82,5	2,1	2,1	2,2	77	80	85	127	2	2	0,15
70	97,5	79,5	1,1	1	1,3	74,6	78	82	104	1	1	0,1
	109	83,5	1,5	1,5	1,2	79	81	86	116	1,5	1,5	0,15
	127	89	2,1	2,1	1,8	82	86	92	137	2	2	0,15
75	101	85	1,1	1	3	79,6	83	87	109	1	1	0,1
	114	88,5	1,5	1,5	1,2	84	86	91	121	1,5	1,5	0,15
80	109	91,5	1,1	1	3,3	86	90	94	119	1	1	0,1
	123	95,3	2	2	1,4	91	93	98	129	2	2	0,15
85	114	96,5	1,1	1	3,3	89,6	95	99	124	1	1	0,1
	131	100,5	2	2	1,5	96	98	103	139	2	2	0,15
90	122	103	1,5	1,1	3,5	96	101	106	133	1,5	1	0,1
	140	107	2	2	1,8	101	104	110	149	2	2	0,15
95	127	108	1,5	1,1	3,5	101	106	111	138	1,5	1	0,15
100	132	113	1,5	1,1	3,5	106	111	116	143	1,5	1	0,1

