Everything you always wanted to know about

SKF deep groove ball bearings

Contents








Chapter 1

SKF deep groove ball bearing range

SKF Explorer deep groove ball bearings

SKF Explorer performance class bearings

Combining their expertise in bearing design, tribology, metallurgy, lubrication and manufacturing, SKF engineers spent years maximizing SKF Explorer bearing service life. The result is a new standard of excellence in both bearing performance and precision manufacturing – one that is still unmatched in the marketplace.

Features

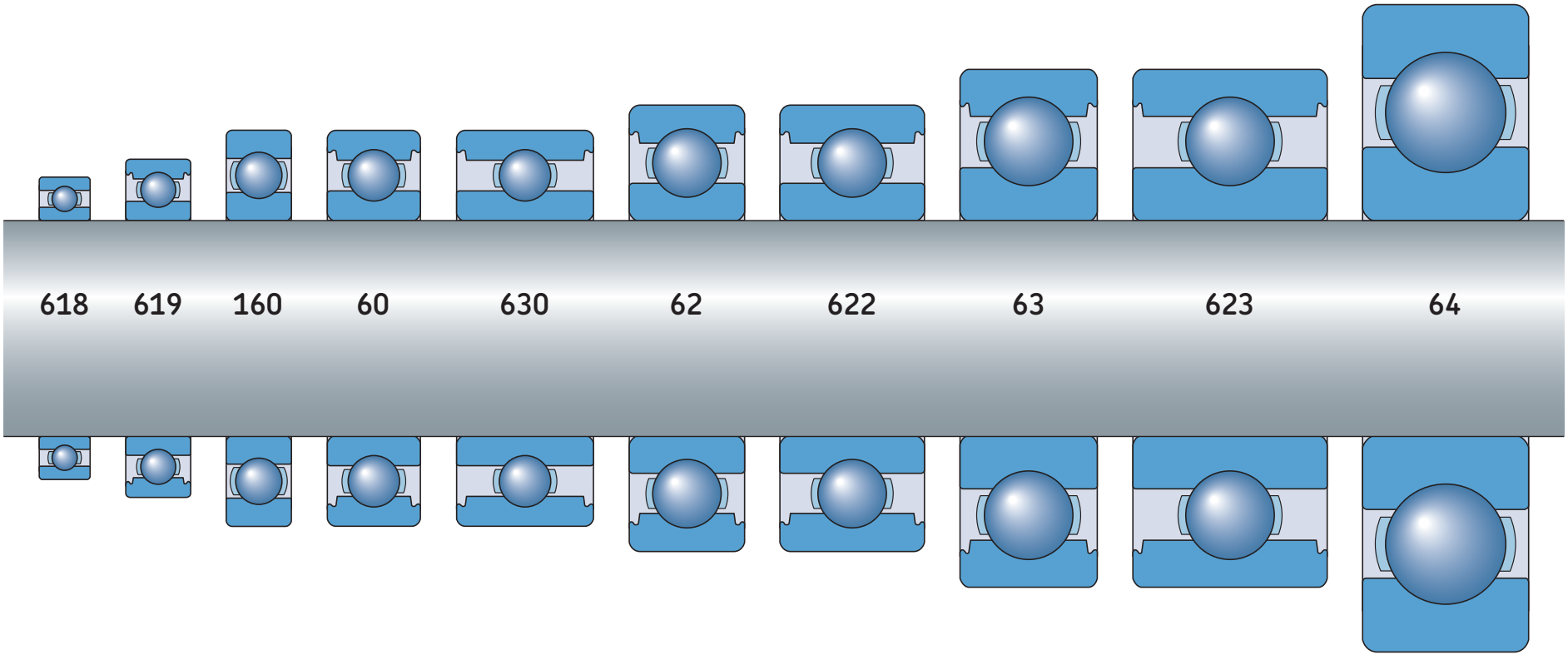
- Maximized rating life
- Higher accuracy than ISO standard
- Sealing optimized for highly contaminated environments
- Made of super-clean and tough steel
- Wide range of greases, cages and capping options

Benefits

- Increased bearing service life, uptime and productivity due to robust design
- Reduced noise and vibration levels
- Customization options to fit specific requirements

SKF deep groove ball bearings

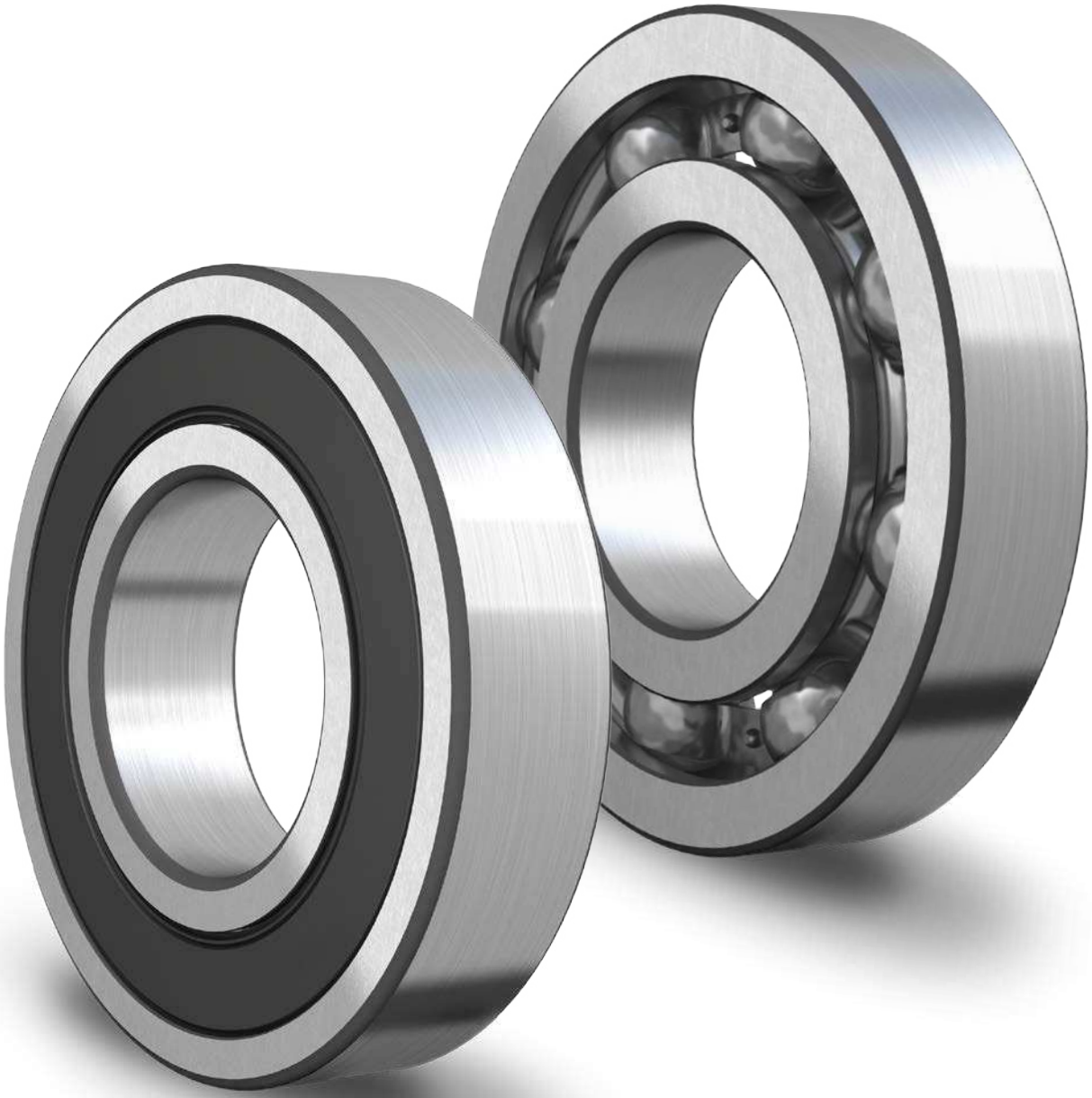
This is the most widely used bearing type. They are particularly versatile, simple in design, non-separable, suitable for high and very high speeds and are robust in operation, requiring little maintenance.



SKF deep groove ball bearings are available in a wide assortment

The boundary dimensions of standard metric deep groove ball bearings are standardised according to the general plan as specified in ISO 15. Shown here are all of the different series (cross sections) contained in the ISO dimension plan for single row deep groove ball bearings, with the same bore diameter. SKF deep groove ball bearings are also available in a wide size range, with bore diameters ranging from 3 to 1 700 mm.

SKF Explorer deep groove ball bearing range



Series 160

16002	**to**	**16026**
d = 15 mm		d = 130 mm
D = 32 mm		D = 200 mm

Series 60

607	**to**	**6026**
d = 7 mm		d = 130 mm
D = 19 mm		D = 200 mm

Series 62

625	**to**	**6222**
d = 5 mm		d = 110 mm
D = 16 mm		D = 200 mm

Series 63

635	**to**	**6319**
d = 5 mm		d = 95 mm
D = 19 mm		D = 200 mm

SKF Explorer bearings are shown with an asterisk in the product tables of the *SKF Rolling bearing catalogue* (**PUB 10000 EN**).

SKF Explorer bearings are available open, capped with a seal or shield on one side or lubricated and capped with seals or shields on both sides.

SKF thin section ball bearing range

Series 618

618/4	**to**	**618/1700**
d = 4 mm		d = 1 700 mm
D = 9 mm		D = 2 060 mm

Series 619

619/4	**to**	**619/1700**
d = 4 mm	to	d = 1 700 mm
D = 11 mm	to	D = 2 180 mm

SKF thin section ball bearings are available open, or lubricated and capped with seals or shields on both sides. Their compact design saves space in the application.

Specific solutions

SKF Quiet Running deep groove ball bearings

Solution for reduced noise levels and structural resonance in wind turbine generators and large-size electric motors

- Bearing specification suffix VQ658
- Available with steel or brass cage
- Bore sizes from 110 to 190 mm for 63 series
- Available as standard, INSOCOAT or hybrid bearings

Insulated deep groove ball bearings

Solutions to protect from electrical arcing and current leakage

- Hybrid bearings with silicone nitride ceramic balls. Suffix HC5
- INSOCOAT bearings are plasma-sprayed with a ceramic coating (aluminium oxide) on the inner or outer ring
  - VL0241 coated outer ring outside diameter and side faces
  - VL2071 coated inner ring bore and side faces

Chapter 2

Product options

Product options: cages, seals and greases

Different combinations of components provide the right solution for the application

Components

Outer rings | Balls | Cages | Seals and shields | Inner rings | Greases

SKF deep groove ball bearing cage designs and materials

Main cage types

Type		Suffix in part number	Features and benefits
	**Steel cage**	No suffix in part number Pressed steel cage is standard	• Not temperature sensitive • Lightweight • Cost-effective
	**Brass cage**	**M**: Machined brass cage, ball guided **MA**: Machined brass cage, outer ring guided **MB**: Machined brass cage, inner ring guided	• Robust design • Heavier cage with higher speed limits than other cages

Non-standard cage types

Type		Suffix in part number	Features and benefits
	**Polyamide cage PA66 GF25**	**TN9**	• High speed • Low density • High elasticity • Low friction • Corrosion-resistant
	**PEEK cage PEEK GF15**	**TNH**	• Better aging resistance • Higher temperature limits compared to other polymer cages
	**High-speed polyamide cage PA46 GF30**	**TN2**	• Low friction • High speed • Low density • High elasticity • Corrosion-resistant

SKF deep groove ball bearing component options: shields and seals

Standard capping solutions for deep groove ball bearings

Shields

Protection from dirt and debris without additional friction from the shields.

Non-contact seals

Protection from dirt and debris without additional friction from the seals.

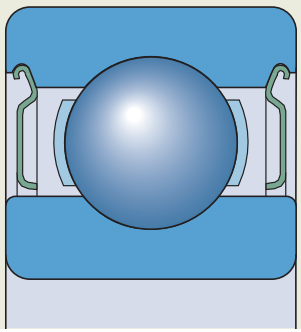
Low-friction seals

Improved sealing when compared to shields and non-contact seals with moderate friction.

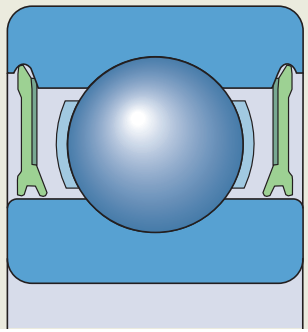
Contact seals

Maximum sealing efficiency against dirt, debris and liquid ingress with continuous friction.

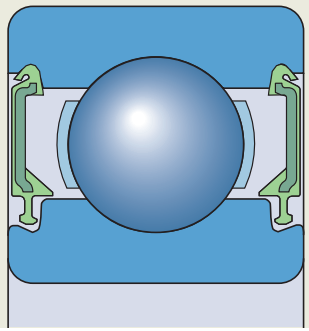
2Z



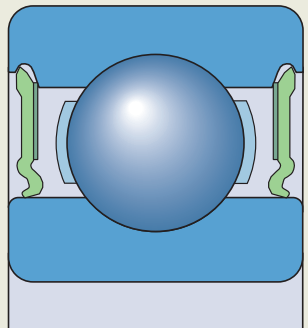
2RZ



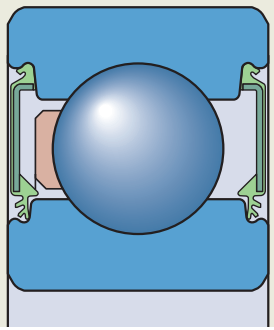
2RSL



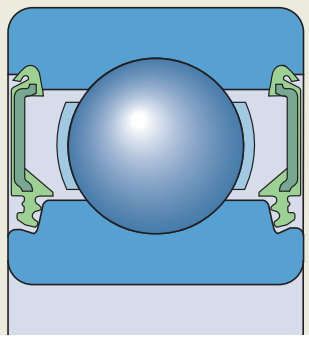
2RS1



2RST



2RSH



SKF deep groove ball bearing component options: greases

Technical specifications	Standard grease		Low friction	High temperature grease		Low temperature grease	Wide temperature grease	Wide temperature and silent running grease	Food compatible grease
Grease suffix in bearing designation	–	–	GE2	GJN	HT	LT	WT	LHT23	VT378
Grease code	MT47	MT33	GE2	GJN	GXN	LT20	GWB	LHT23	VT378
Bearing range	D ≤ 62 mm	D > 62 mm	All	All	All	All	All	All	Stainless steel
Consistency class (according to NLGI)	2	3	2	2	2	2	2-3	2	2
Thickener	Lithium soap	Lithium soap	Lithium soap	Polyurea soap	Diurea	Lithium soap	Polyurea soap	Lithium soap	Aluminium complex soap
Base oil	Mineral oil	Mineral oil	Synthetic	Mineral oil	Mineral oil	Diester oil	Ester oil	Ester oil	PAO
Temperature range (°C)	–30 to +110	–30 to +120	–50 to +150	–30 to +150	–40 to +150	–55 to +110	–40 to +160	–50 to +140	–20 to +120

SKF deep groove ball bearing variants

Series 60	2Z	2RZ	2RSL	2RSH	2RS1
607	2Z	–	2RSL	2RSH	–
608	2Z	2RZ	2RSL	2RSH	2RS1
609	2Z	2RZ	2RSL	2RSH	–
6000	2Z	2RZ	2RSL	2RSH	2RS1
6001	2Z	2RZ	2RSL	2RSH	2RS1
6002	2Z	2RZ	2RSL	2RSH	–
6003	2Z	2RZ	2RSL	2RSH	2RS1
6004	2Z	2RZ	2RSL	2RSH	2RS1
6005	2Z	2RZ	2RSL	2RSH	2RS1
6006	2Z	2RZ	–	–	2RS1
6007	2Z	2RZ	–	–	2RS1
6008	2Z	2RZ	–	–	2RS1
6009	2Z	–	–	–	2RS1
6010	2Z	–	–	–	2RS1
6011	2Z	–	–	–	2RS1
6012	2Z	–	–	–	2RS1
6013	2Z	–	–	–	2RS1
6014	2Z	–	–	–	2RS1
6015	2Z	–	–	–	2RS1
6016	2Z	–	–	–	2RS1
6017	2Z	–	–	–	2RS1
6018	2Z	–	–	–	2RS1
6019	2Z	–	–	–	2RS1
6020	2Z	–	–	–	2RS1
6021	2Z	–	–	–	2RS1
6022	2Z	–	–	–	2RS1
6024	2Z	–	–	–	2RS1
6026	2Z	–	–	–	2RS1
6028	2Z	–	–	–	2RS1
6030	2Z	–	–	–	2RS1
6032	2Z	–	–	–	2RS1
6034	–	–	–	–	–
6036	–	–	–	–	–
6038	–	–	–	–	–
6040	–	–	–	–	–
6044	–	–	–	–	–
6048	–	–	–	–	–
6052	–	–	–	–	–
6056	–	–	–	–	–

Series 62	2Z	2RZ	2RSL	2RSH	2RS1	2RST
623	2Z	–	–	–	2RS1	–
624	2Z	–	–	–	2RS1	–
625	2Z	2RZ	–	–	2RS1	–
626	2Z	–	2RSL	2RSH	–	–
627	2Z	–	2RSL	2RSH	–	–
628	2Z	2RZ	–	–	–	–
629	2Z	2RZ	2RSL	2RSH	2RS1	–
6200	2Z	–	2RSL	2RSH	2RS1	–
6201	2Z	2RZ	2RSL	2RSH	2RS1	–
6202	2Z	2RZ	2RSL	2RSH	2RS1	–
6203	2Z	2RZ	2RSL	2RSH	2RS1	–
6204	2Z	2RZ	2RSL	2RSH	2RS1	–
6205	2Z	2RZ	2RSL	2RSH	2RS1	–
6206	2Z	2RZ	–	–	2RS1	–
6207	2Z	2RZ		2RSH	2RS1	2RST
6208	2Z	2RZ	–	–	2RS1	2RST
6209	2Z	2RZ	–	–	2RS1	2RST
6210	2Z	–	–	–	2RS1	–
6211	2Z	–	–	–	2RS1	2RST
6212	2Z	–	–	–	2RS1	–
6213	2Z	–	–	–	2RS1	–
6214	2Z	–	–	–	2RS1	–
6215	2Z	–	–	–	2RS1	–
6216	2Z	–	–	–	2RS1	–
6217	2Z	–	–	–	2RS1	–
6218	2Z	–	–	–	2RS1	–
6219	2Z	–	–	–	2RS1	–
6220	2Z	–	–	–	2RS1	–
6221	2Z	–	–	–	2RS1	–
6222	2Z	–	–	–	2RS1	–
6224	–	2RZ	–	–	2RS1	–
6226	2Z	–	–	–	2RS1	–
6228	–	–	–	–	–	–
6230	–	–	–	–	–	–
6232	–	–	–	–	–	–
6234	–	–	–	–	–	–
6236	–	–	–	–	–	–
6238	–	–	–	–	–	–
6240	–	–	–	–	–	–
6244	–	–	–	–	–	–

SKF deep groove ball bearing variants

Series 63	2Z	2RZ	2RSL	2RSH	2RS1	2RST
634	2Z	–	–	–	–	–
635	2Z	–	–	–	–	–
6300	2Z	–	–	2RSH	–	–
6301	2Z	–	–	2RSH	2RS1	–
6302	2Z	–	–	2RSH	2RS1	–
6303	2Z	–	–	2RSH	2RS1	–
6304	2Z	–	–	2RSH		–
6305	2Z	2RZ	–	–	2RS1	–
6306	2Z	2RZ	–	–	2RS1	–
6307	2Z	2RZ	–	–	2RS1	–
6308	2Z	2RZ	–	–	2RS1	–
6309	2Z	–	–	–	2RS1	–
6310	2Z	–	–	–	2RS1	–
6311	2Z	–	–	–	2RS1	2RST
6312	2Z	–	–	–	2RS1	2RST
6313	2Z	–	–	–	2RS1	–
6314	2Z	–	–	–	2RS1	–
6315	2Z	–	–	–	2RS1	–
6316	2Z	–	–	–	2RS1	–
6317	2Z	–	–	–	2RS1	–
6318	2Z	–	–	–	2RS1	–
6319	2Z	–	–	–	2RS1	–
6320	2Z	–	–	–	2RS1	–
6321	–	–	–	–	–	–
6322	–	–	–	–	–	–
6324	–	–	–	–	2RS1	–
6326	–	–	–	–	–	–
6328	–	–	–	–	–	–
6330	–	–	–	–	–	–
6332	–	–	–	–	–	–
6334	–	–	–	–	–	–
6336	–	–	–	–	–	–
6338	–	–	–	–	–	–

Series 630	2Z	2RS1
63000	–	2RS1
63001	2Z	2RS1
63002	–	2RS1
63003	–	2RS1
63004	–	2RS1
63005	–	2RS1
63006	–	2RS1
63007	–	2RS1
63008	–	2RS1
63009	–	2RS1
63010	–	2RS1

Series 622	2RS1
62200	2RS1
62201	2RS1
62202	2RS1
62203	2RS1
62204	2RS1
62205	2RS1
62206	2RS1
62207	2RS1
62208	2RS1
62209	2RS1
62210	2RS1
62211	2RS1
62212	2RS1
62213	2RS1
62214	2RS1

Series 623	2RS1
62300	2RS1
62301	2RS1
62302	2RS1
62303	2RS1
62304	2RS1
62305	2RS1
62306	2RS1
62307	2RS1
62308	2RS1
62309	2RS1
62310	2RS1
62311	2RS1
62312	2RS1
62314	2RS1

Series 64	2RS1
6403	2RS1
6404	–
6405	–
6406	–
6407	–
6408	–
6409	–
6410	–
6411	–
6412	–
6413	–
6414	–
6415	–
6416	–
6417	–
6418	–

SKF deep groove ball bearing variants

Series 618	2Z	2RZ	2RS1
618/4	–	–	–
618/5	–	–	–
618/6	–	–	–
618/7	–	–	–
618/8	–	–	–
618/9	–	–	–
61800	2Z	–	2RS1
61801	2Z	–	2RS1
61802	2Z	–	2RS1
61803	2Z	2RZ	2RS1
61804	–	2RZ	2RS1
61805	2Z	2RZ	2RS1
61806	–	2RZ	2RS1
61807	–	2RZ	2RS1
61808	–	2RZ	2RS1
61809	–	2RZ	2RS1
61810	–	2RZ	2RS1
61811	–	2RZ	2RS1
61812	–	2RZ	2RS1
61813	–	2RZ	2RS1
61814	–	2RZ	2RS1
61815	–	2RZ	2RS1
61816	–	2RZ	2RS1
61817	–	2RZ	2RS1
61818	–	2RZ	2RS1
61819	–	–	2RS1
61820	–	2RZ	2RS1
61821	–	2RZ	2RS1
61822	–	2RZ	2RS1
61824	–	2RZ	2RS1
61826	–	2RZ	2RS1
61828	–	2RZ	2RS1
61830	–	–	–
61832	–	–	–
61834	–	–	–
61836	–	–	–
61838	–	–	–
61840	–	–	–
61844	–	–	–
61848	–	–	–
61852	–	–	–
61856	–	–	–
61860	–	–	–
61864	–	–	–
61868	–	–	–

Series 619	2Z	2RZ	2RS1
619/4	2Z	–	–
619/5	2Z	–	–
619/6	2Z	–	–
619/7	2Z	–	–
619/8	2Z	–	2RS1
619/9	2Z	–	–
61900	2Z	–	2RS1
61901	2Z	–	2RS1
61902	2Z	2RZ	2RS1
61903	2Z	–	2RS1
61904	–	2RZ	2RS1
61905	–	2RZ	2RS1
61906	–	2RZ	2RS1
61907	–	2RZ	–
61908	–	2RZ	2RS1
61909	–	2RZ	2RS1
61910	–	2RZ	2RS1
61911	–	–	2RS1
61912	–	–	2RS1
61913	–	–	–
61914	–	–	–
61915	–	–	–
61916	–	2RZ	–
61917	–	–	–
61918	–	–	–
61919	–	–	–
61920	–	–	–
61921	–	–	–
61922	–	–	–
61924	–	–	–
61926	–	–	–
61928	–	–	–
61930	–	–	–
61932	–	–	–
61934	–	–	–
61936	–	–	–
61938	–	–	–
61940	–	–	–
61944	–	–	–
61948	–	–	–
61952	–	–	–
61956	–	–	–
61960	–	–	–

Series 16	2Z
16002	2Z
16003	2Z
16004	–
16005	–
16006	–
16007	–
16008	–
16009	–
16010	–
16011	–
16012	–
16013	–
16014	–
16015	–
16016	–
16017	–
16018	–
16019	–
16022	–
16024	–
16026	–
16028	–
16030	–
16032	–
16034	–
16036	–
16038	–
16040	–
16044	–
16048	–
16052	–
16056	–

Chapter 3

SKF product designations

Designation system overview

W 6306-2ZTN9 / C3WT

Prefix
- Bearing classification
  - W (Stainless steel)
  - BX- (Prototypes)
  - BY- (Samples)
  - BZ- (Initial samples)

Basic designation
- Bearing type
  - 6 for deep groove ball bearings
- Dimension series
  - Diameter and width
- Bore diameter
  - ISO system

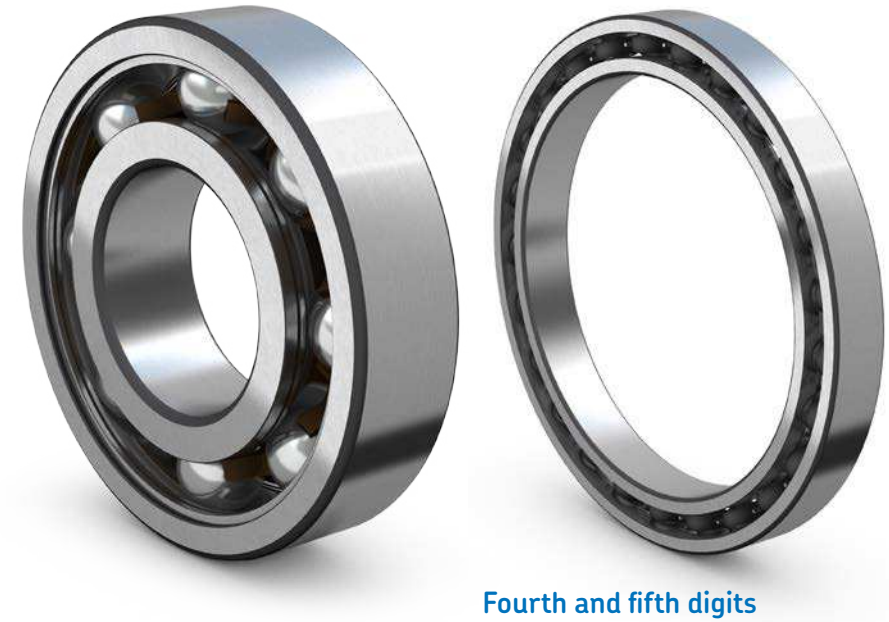
Suffix
- Internal design
  - e.g., E type
- External design
  - e.g., -Z, -RZ, -RS1, D8, K, N, NR...
- Cage design
  - e.g., TN9, MA...

Suffix
- Materials
- Accuracy, clearance, quiet running
- Bearing sets
- Stabilization
- Grease
- V number

This designation is an example for training purposes.
It is not an actual bearing designation.

Designation system: basic designation

SKF deep groove ball bearings



First digit

Bearing type, “6” (or “16”) e.g., 6306, 61822, 16010

Second digit

Width series, “0, 1, 2 or 3”

6306 or 6(0)306, “0” and “1” are never shown in the designation for the series 160, 60, 62, 63 or 64

61822, ”1” is for the width series

Third digit

Diameter series, “8, 9, 0, 1, 2, 3 or 4”, 6306 or 61822

Fourth and fifth digits

The last two digits identify the size code of the bearing bore. The size code multiplied by 5 gives the bore diameter (d) in mm. E.g., for 6306, “06” x 5 = a bore diameter of 30 mm.

- “00” = 10 mm
- “01” = 12 mm
- “02” = 15 mm
- “03” = 17 mm

For bearings with bore diameter < 10 mm or ≥ 500 mm, the bore diameter is given in millimetres (uncoded) with an oblique stroke, 618/8 = 8 mm or 618/530 = 530 mm and for some bearings with bore diameter < 10 mm, the bore diameter is given in millimetres (uncoded) without an oblique stroke, 608 = 8 mm.

Designation system: suffixes

Seals and shields

-RS1, -2RS1, -RS2, -2RS2, -RSH, -2RSH, -RSL, -2RSL, -RZ, -2RZ, -Z, -2Z

Snap ring

N = snap ring groove in outer ring
NR = snap ring groove and snap ring

Cage suffix

Without suffix = standard steel cage
M = brass cage, ball guided
MA = OR guided brass cage / **MB** = IR guided brass cage
TN9 = polymer cage
TNH = PEEK cage

Radial clearance:

C1 = smaller than C2
C2 = smaller than CN
Without suffix = CN normal clearance
C3 = greater than CN
C4 = greater than C3
C5 = greater than C4

Grease suffix

Without suffix = standard MT grease
GJN
HT
LHT23

Stabilization

Without suffix = SN, operating temperature ≤ 120 °C (*250 °F*)
S0 = operating temperature ≤ 150 °C (*300 °F*)
S1 = operating temperature ≤ 200 °C (*400 °F*)

Surface treatment

HN1 and **HN3**

Ceramic balls

HC5

Paired bearings

DB, DT, DF

V numbers

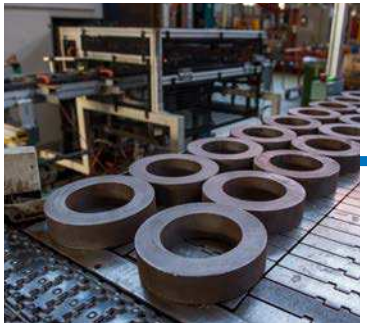
VA to VX + 3 numbers for other specifications

Chapter 4

Additional information

Manufacturing process

Soft rings



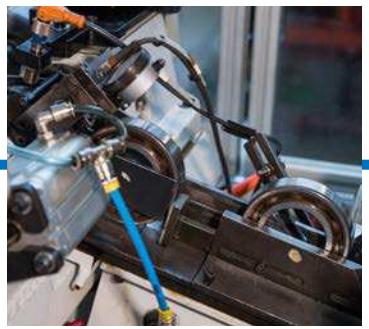
Heat treatment

Outer ring grinding
face/OD/raceway

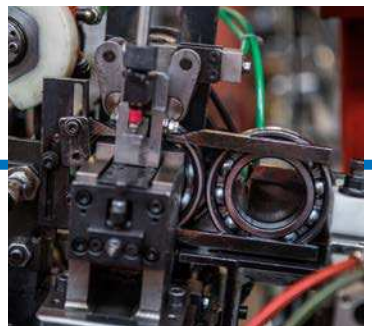
Outer ring honing

Inner ring grinding
face/raceway/bore

Inner ring honing



Vibration checking

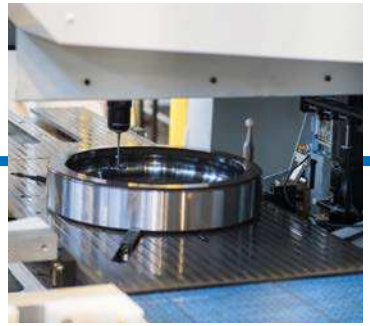


Radial clearance checking

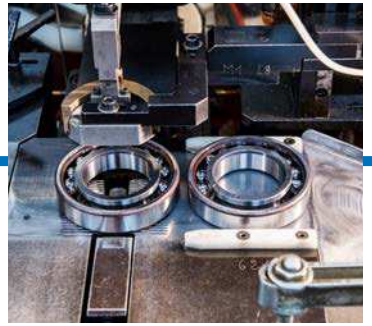
Part number marking

Greasing and capping

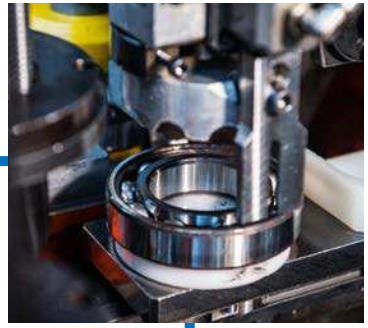
Rings grading and pairing

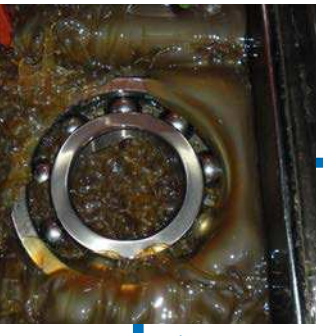


Balls filling

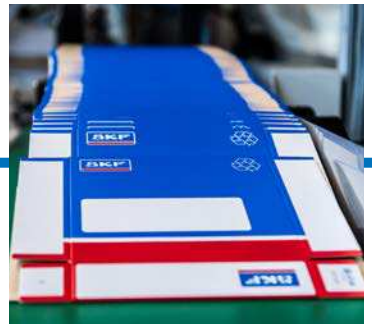


Cage mounting





Preservation



Packaging

Vocabulary

Heat treatment

Gives the steel properties, e.g., hardness and temperature stabilization.

Grinding operation

Accurate machining of hardened rings and rolling elements to required finished dimensions.

Honing

Finishes and polishes the raceway surfaces to required surface roughness.

Assembly process

Assembly of the component parts to make up a finished bearing (matching of rings, rolling elements plus cages, lubricant, seals or shields as required).

Internal clearance

Total distance through which one bearing ring can be moved relative to the other in the radial direction (radial internal clearance) or in the axial direction (axial internal clearance).

Clearance checking

Internal clearance is measured to confirm that it is within specification.

Vibration checking

Vibration levels are checked to verify the bearing quality and its quiet running.

Bearing storage

Storage conditions

To maximize the service life of bearings, SKF recommends the following basic housekeeping practices:

- Keep bearings in their original, unopened and undamaged packaging until immediately before mounting, to prevent the ingress of contaminants and corrosion.
- Store indoors, in a frost- and condensation-free environment, at a maximum ambient temperature of 40 °C (105 °F), avoiding air flow.
- Store in vibration-free conditions. Vibration can cause damage to raceways.
- Store horizontally, preferably, to avoid damage that could be caused by the bearing falling over.

Inventory control

Inventory control can also play an important role in performance, particularly if seals and lubricants are involved. Therefore, SKF recommends a “first in, first out” inventory policy.

Bearing storage

Storage time for open bearings

SKF bearings are coated with a high-quality preservative oil to protect them from corrosion, and are suitably packaged before distribution. The storage time of bearings also depends on their storage environment conditions.

Storage environment conditions			Storage time
Relative air humidity	Ambient temperature		
%	°C	°F	years
65	20 to 25	70 to 75	10
75	20 to 25	70 to 75	5
75	35 to 40	95 to 105	3
Uncontrolled tropical conditions			1

Storage time for capped bearings

Capped bearings (bearings with seals or shields) should be stored for a maximum of three years to avoid deterioration of their grease fill.

Notes

Notes

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