



For Extreme Special Environments

***EXSEV* Product Guidebook**



EXSEV
BEARING SERIES
BEARINGS FOR
EXTREME SPECIAL
ENVIRONMENT

JTEKT | JTEKT CORPORATION

JTEKT
Koyo | **TOYODA**

CAT.NO.B1005E

EXSEV Bearing Series Product Guidebook

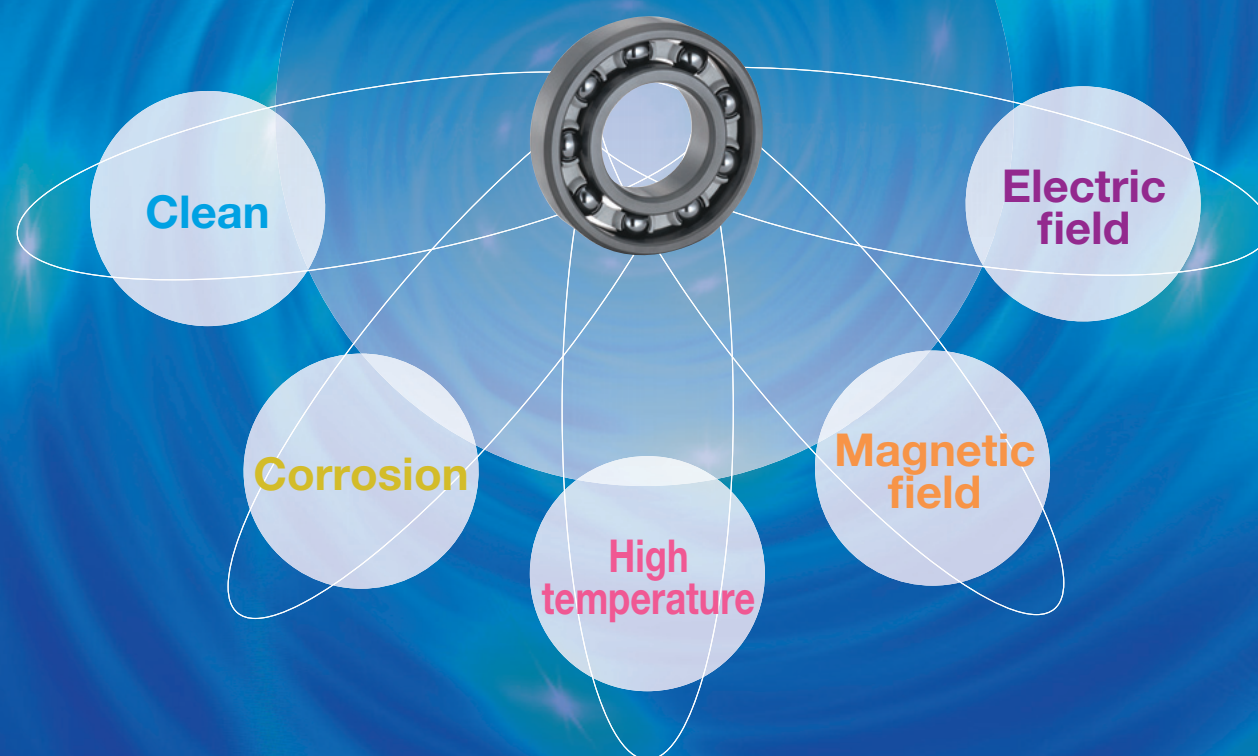
The Koyo EXSEV Bearing Series is a collection of high-performance bearings compatible with special operating environments and conditions, where conventional bearings are not applicable.

From among our varied collection of EXSEV Series bearings, this Guidebook includes products that are especially contributory to the semiconductor industry, such as in clean-room or vacuum-chamber applications.

Koyo is certain that the high-performance EXSEV Bearing Series, which is the materialization of new values, will assist the many engineers working not only in the semiconductor industry but in a variety of fields.

For your needs in varied extreme special environments

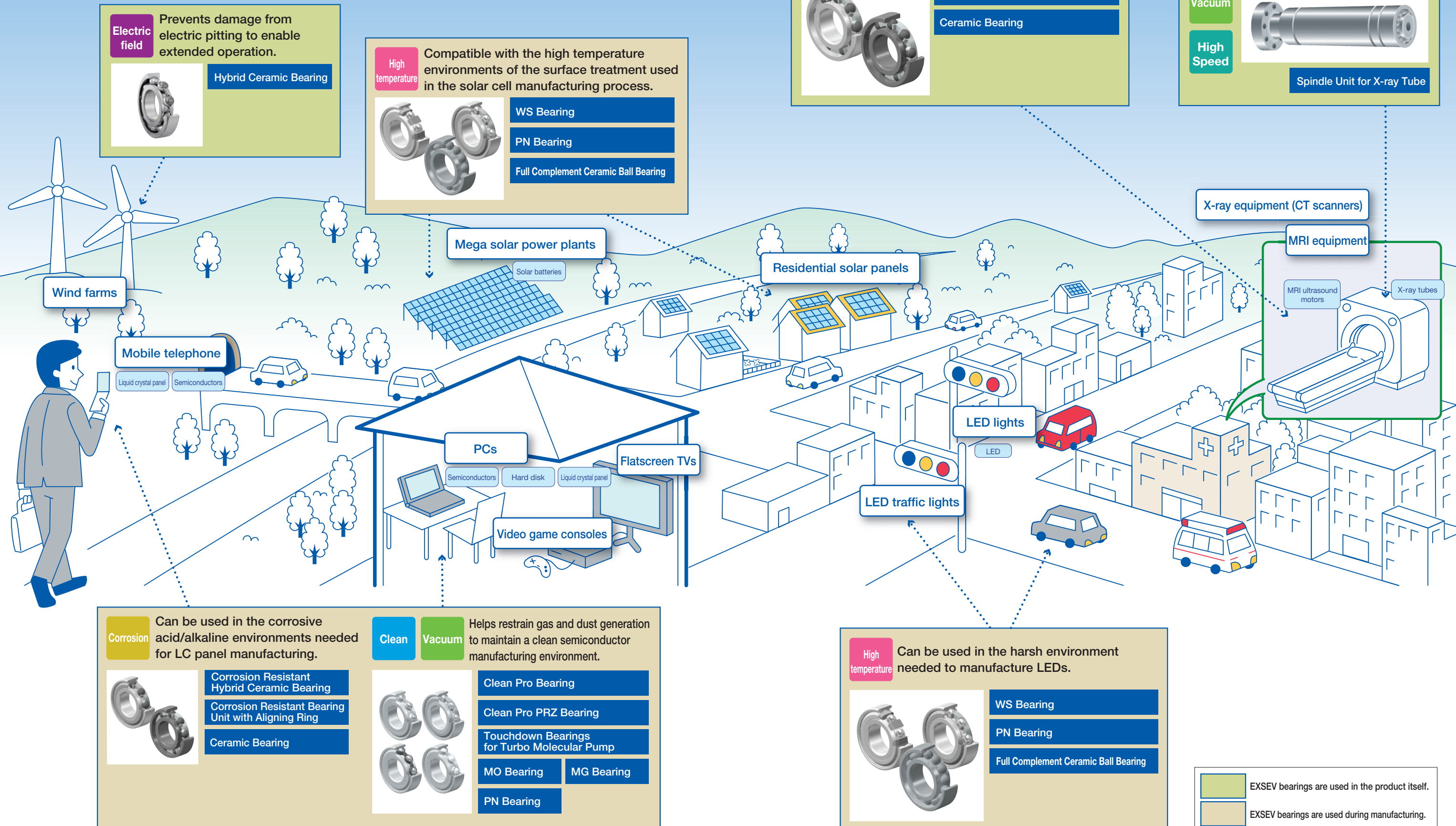
EXSEV Bearing Series
















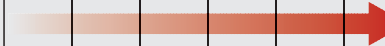




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EXSEV bearings in daily life and at the cutting edge of technology



EXSEV Bearings: Table of Characteristics

Major Uses	Products	Applicable Environments															Performance and functions	Bearing Number ³⁾ (Cage Code)	Page	
		Limiting Speeds		Permissible radial load	Operating Temp. (°C)							Vacuum (Pa)			Cleanliness (class) ²⁾					
		<i>dn</i> value ¹⁾	Max.(min ⁻¹)		~120	~200	~260	~300	~350	~800			Atmosphere	10 ⁻⁵	10 ⁻¹⁰	1000				100
Clean environment	Clean Pro PRZ Bearing	<10 000	1 000	Approximately 5% of <i>C_r</i> or less															SE□□□□ZZSTPRZ (YS)	Page 5
	High Temperature Clean Pro Bearing	<10 000	1 000	Approximately 3% of <i>C_r</i> or less															SE□□□□ZZSTPRB (YS)	Page 5
	Clean Pro Bearing	<10 000	1 000	Approximately 3% of <i>C_r</i> or less															SE□□□□ZZSTPR (YS)	Page 6
	DL Bearing	<40 000	—	—															SV□□□□ZZST (YS)	Page 6
	FA Bearing	<10 000	1 000	Approximately 1% of <i>C_r</i> or less															SE□□□□ZZST (FA)	Page 7
Corrosive environment	High Corrosion Resistant Ceramic Bearing	<10 000	1 000	Approximately 1% of <i>C_r</i> or less															NCZ□□□□ (FA)	Page 7
	Corrosion Resistant Ceramic Bearing	<10 000	1 000	Approximately 1% of <i>C_r</i> or less															NCT□□□□ (FA)	Page 8
	Ceramic Bearing	<10 000	1 000	Approximately 1% of <i>C_r</i> or less															NC□□□□ (FA)	Page 8
	Corrosion Resistant Hybrid Ceramic Bearing	<10 000	1 000	Approximately 1% of <i>C_r</i> or less															3NC□□□□ZZMD4 (FA)	Page 9
	SK Bearing	Equal to the <i>dn</i> value of normal bearings	—	—															SK□□□□ZZST (YS)	Page 9
High temperature environment	Full Complement Ceramic Ball Bearing	<4 000	1 000	Approximately 1% of <i>C_r</i> or less															NC□□□□V (—)	Page 10
	WS Bearing	<4 000	500	Approximately 5% of <i>C_r</i> or less															SE□□□□ZZST (WS)	Page 10
	MG Bearing	<10 000	500	Approximately 3% of <i>C_r</i> or less															SE□□□□ZZSTMG3 (YS)	Page 11
	MO Bearing	<10 000	1 000	Approximately 3% of <i>C_r</i> or less															SE□□□□ZZSTMSA7 (YS)	Page 11
	PN Bearing	<10 000	1 000	Approximately 1% of <i>C_r</i> or less															SE□□□□ZZST (PN)	Page 12
Magnetic field environment	Non-magnetic Hybrid Ceramic Bearing	<10 000	1 000	Approximately 1% of <i>C_r</i> or less															3NC□□□□YH4 (FA)	Page 12
Electric field environment	Hybrid Ceramic Bearing	No less than 1.2 times that of steel bearings	—	—															3NC□□□□ZZ (FG)	Page 13

1) dn value: Bearing bore diameter (mm) × Rotational speed (min⁻¹)
 2) The cleanliness classes may vary depending on operating conditions.

3) The four blank boxes represent the basic number of the bearing. A basic number consists of three or four alphanumeric characters.
 A bearing number may be used as a convenience in the case of any queries to JTEKT.

Clean Pro PRZ Bearing



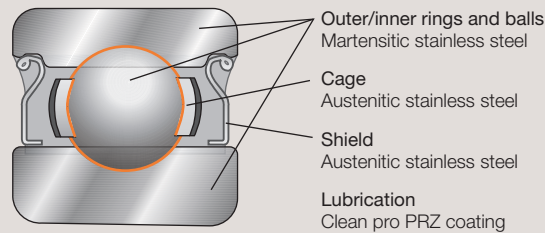
Typical bearing number

SE□□□□ZZSTPRZ (YS)

Advantages

This bearing has a fluoropolymer gel coating on its rolling surfaces as the lubricant.

Specifications



Performance

Cleanliness : Class 10¹⁾
Ambient pressure : Atmospheric pressure to 10⁻⁵ Pa
Temperature : -30 to 200 °C
Limiting speed : $dn < 10\,000$ ²⁾
1 000 min⁻¹ max.
Permissible radial load : $\leq 5\%$ of the basic dynamic load rating³⁾

Applications

- Semiconductor manufacturing equipment
- Lithography equipment
- Transfer systems
- Vacuum motors
- Vacuum equipment

High Temperature Clean Pro Bearing



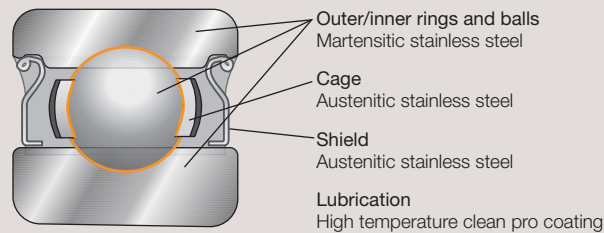
Typical bearing number

SE□□□□ZZSTPRB (YS)

Advantages

This bearing has a fluoropolymer coating on its rolling surface as the lubricant.

Specifications



Performance

Cleanliness : Class 10¹⁾
Ambient pressure : Atmospheric pressure to 10⁻⁵ Pa
Temperature : -100 to 260 °C
Limiting speed : $dn < 10\,000$ ²⁾
1 000 min⁻¹ max.
Permissible radial load : $\leq 3\%$ of the basic dynamic load rating³⁾

Applications

- Semiconductor manufacturing equipment
- LCD manufacturing equipment
- Transfer systems
- Vacuum equipment
- Sputtering equipment

Clean Pro Bearing



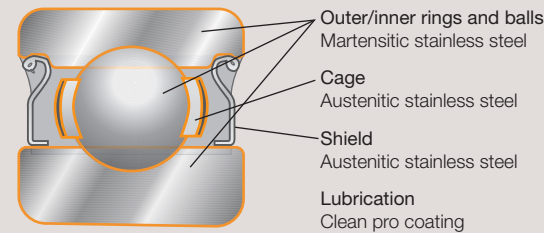
Typical bearing number

SE□□□□ZZSTPR (YS)

Advantages

This bearing is lubricated with a fluoropolymer coating over the entire surface of all bearing components.

Specifications



Performance

Cleanliness : Class 10¹⁾
Ambient pressure : Atmospheric pressure to 10⁻⁵ Pa
Temperature : -100 to 200 °C
Limiting speed : $dn < 10\,000$ ²⁾
1 000 min⁻¹ max.
Permissible radial load : $\leq 3\%$ of the basic dynamic load rating³⁾

Applications

- Semiconductor manufacturing equipment
- LCD manufacturing equipment
- Vacuum equipment
- Lithography equipment
- Sputtering equipment
- Vacuum motors

DL Bearing



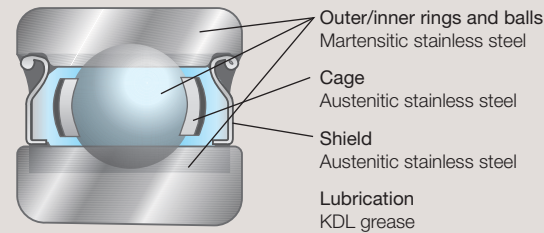
Typical bearing number

SV□□□□ZZST (YS)

Advantages

This bearing is lubricated with the packed fluorinated KDL grease, which is suitable for use in clean environments and vacuum environments.
* KDL grease can also be sold as a standalone product. For details, see page 15.

Specifications



Performance

Cleanliness : Class 100¹⁾
Ambient pressure : Atmospheric pressure to 10⁻⁵ Pa
Temperature : -30 to 200 °C
Limiting speed : $dn < 40\,000$ ²⁾

Applications

- Semiconductor manufacturing equipment
- LCD manufacturing equipment
- Transfer robots
- Vacuum pumps

1) The cleanliness class number represents specific environments where the individual products are useful. The cleanliness of the products themselves may vary depending on operating conditions.
2) When used in an environment where cleanliness is not a significant factor, the product can be used at higher speed, reaching the same limiting speed as that of standard products.

3) The permissible radial load indicates the approximate size of radial load the bearing can carry. If the bearing carries an axial load, the permissible radial load may be lower. Refer to the table at the end of the guidebook for each product's basic dynamic load rating (Cr).

FA Bearing

High Corrosion Resistant Ceramic Bearing

Corrosion Resistant Ceramic Bearing

Ceramic Bearing



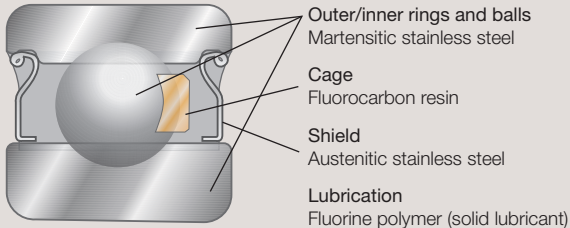
Typical bearing number

SE□□□□ZZST (FA)

Advantages

This bearing is lubricated with a solid fluoropolymer lubricant, which offers superior lubrication performance. The cage is made from a low-particle-emission fluorocarbon resin.

Specifications



Performance

Cleanliness : Class 1 000¹⁾

Ambient pressure : Atmospheric pressure to 10⁻⁵ Pa

Temperature : -100 to 200 °C

Limiting speed : $dn < 10\,000$ ²⁾

1 000 min⁻¹ max.

Permissible radial load : $\leq 1\%$ of the basic dynamic load rating³⁾

Applications

- Semiconductor manufacturing equipment
- LCD manufacturing equipment
- Transfer systems
- Inspection systems

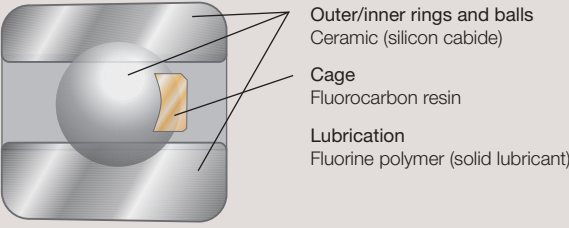
Typical bearing number

NCZ□□□□ (FA)

Advantages

This bearing uses a silicon carbide ceramic material, which is resistant to strong acids and alkalis.

Specifications



Performance

Cleanliness : Class 1 000¹⁾

Ambient pressure : Atmospheric pressure to 10⁻⁵ Pa

Temperature : -100 to 200 °C

Limiting speed : $dn < 10\,000$

1 000 min⁻¹ max.

Permissible radial load : $\leq 1\%$ of the basic dynamic load rating³⁾

Applications

- Aluminum electrolytic capacitor manufacturing equipment

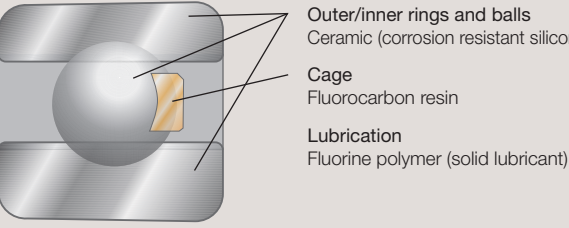
Typical bearing number

NCT□□□□ (FA)

Advantages

This bearing has its components made of corrosion resistant silicon nitride and is lubricated with fluoropolymer. This bearing can be used even in a highly corrosive solution.

Specifications



Performance

Cleanliness : Class 1 000¹⁾

Ambient pressure : Atmospheric pressure to 10⁻⁵ Pa

Temperature : -100 to 200 °C

Limiting speed : $dn < 10\,000$

1 000 min⁻¹ max.

Permissible radial load : $\leq 1\%$ of the basic dynamic load rating³⁾

Applications

- Liquid crystal film manufacturing equipment
- Aluminum electrolytic capacitor manufacturing equipment
- Plating equipment
- Synthetic fiber manufacturing equipment
- Food container washing machine

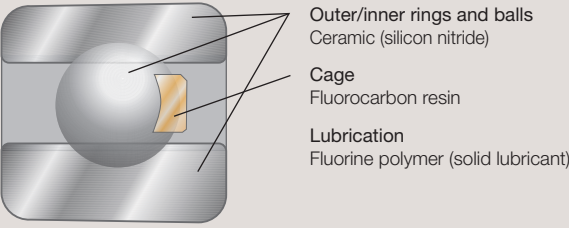
Typical bearing number

NC□□□□ (FA)

Advantages

This bearing has its components made of silicon nitride ceramic and uses fluoropolymer as the lubricant. It is typically used in vacuum and corrosive environments.

Specifications



Performance

Cleanliness : Class 1 000¹⁾

Ambient pressure : Atmospheric pressure to 10⁻⁵ Pa

Temperature : -100 to 200 °C

Limiting speed : $dn < 10\,000$

1 000 min⁻¹ max.

Permissible radial load : $\leq 1\%$ of the basic dynamic load rating³⁾

Applications

- Semiconductor manufacturing equipment
- LCD manufacturing equipment
- Semiconductor inspection equipment
- Synthetic fiber manufacturing equipment
- Canning machinery
- Ultrasonic motors

1) The cleanliness class number represents specific environments where the individual products are useful. The cleanliness of the products themselves may vary depending on operating conditions.
2) When used in an environment where cleanliness is not a significant factor, the product can be used at higher speed, reaching the same limiting speed as that of standard products.
3) The permissible radial load indicates the approximate size of radial load the bearing can carry. If the bearing carries an axial load, the permissible radial load may be lower. Refer to the table at the end of the guidebook for each product's basic dynamic load rating (Cr).



Corrosive environment

High temperature environment

Corrosion Resistant Hybrid Ceramic Bearing

SK Bearing

Full Complement Ceramic Ball Bearing

WS Bearing



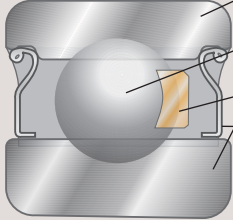
Typical bearing number

3NC□□□□ZZMD4 (FA)

Advantages

This bearing uses a stainless steel variety that has excellent corrosion resistance. As the lubricant, fluoropolymer is used. It is compatible with underwater use.

Specifications



- Outer/inner rings
Precipitation hardening stainless steel
- Balls
Ceramic (silicon nitride)
- Cage
Fluorocarbon resin
- Shield
Austenitic stainless steel
- Lubrication
Fluorine polymer (solid lubricant)

Performance

Cleanliness : Class 1 000¹⁾

Ambient pressure : Atmospheric pressure to 10⁻⁵ Pa

Temperature : -100 to 200 °C

Limiting speed : $dn < 10\,000$
1 000 min⁻¹ max.

Permissible radial load : $\leq 1\%$ of the basic dynamic load rating²⁾

Applications

- Semiconductor manufacturing equipment
- Chemical manufacturing equipment
- Food machinery
- Cleaning equipment

Typical bearing number

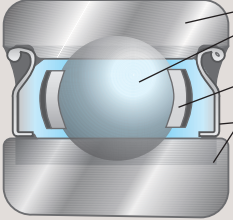
SK□□□□ZZST (YS)

Advantages

This bearing has its components made of stainless steel, and is lubricated with lithium containing KHD grease, which is packed in adequate amounts. This bearing is suitable for use in slightly corrosive environments.

* Unsuitable for clean environments due to anticorrosive treatment.

Specifications



- Outer/inner rings and balls
Martensitic stainless steel
- Cage
Austenitic stainless steel
- Shield
Austenitic stainless steel
- Lubrication
KHD grease

Performance

Cleanliness : -

Ambient pressure : Atmospheric pressure

Temperature : -30 to 120 °C

Limiting speed : Equal to the dn value of normal bearings

Applications

- Chemical equipment
- Transfer systems

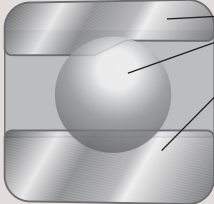
Typical bearing number

NC□□□□V (-)

Advantages

This bearing has all components made of ceramic for use in an ultrahigh temperature environments. No cage is provided. Being an angular contact ball bearing, this bearing is normally used in pairs.

Specifications



- Outer/inner rings and balls
Ceramic (silicon nitride)
- Cage
Not provided
- Lubrication
Not provided

Performance

Cleanliness : -

Ambient pressure : Atmospheric pressure to 10⁻¹⁰ Pa

Temperature : -200 to 800 °C

Limiting speed : $dn < 4\,000$
500 min⁻¹ max.

Permissible radial load : $\leq 1\%$ of the basic dynamic load rating²⁾

Applications

- Baking furnace cars
- Fans in furnaces

Typical bearing number

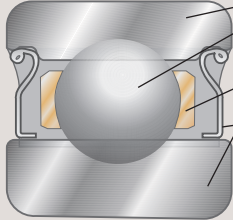
SE□□□□ZZST (WS)

Advantages

This bearing has extremely heat resistant tungsten disulfide included in the separator material as the lubricant.

* We recommend that this bearing is used with horizontal axes. For information on using this bearing with items other than horizontal axes, consult JTEKT.

Specifications



- Outer/inner rings and balls
Martensitic stainless steel
- Separator
Sintered composite material including tungsten disulfide
- Shield
Austenitic stainless steel
- Lubrication
Solid lubricant including tungsten disulfide

Performance

Cleanliness : -

Ambient pressure : Atmospheric pressure to 10⁻⁵ Pa

Temperature : -100 to 350 °C

Limiting speed : $dn < 4\,000$
500 min⁻¹ max.

Permissible radial load : $\leq 5\%$ of the basic dynamic load rating²⁾

Applications

- Semiconductor manufacturing equipment
- LCD manufacturing equipment
- Vacuum evaporator
- Plasma display panel manufacturing equipment

1) The cleanliness class number represents specific environments where the individual products are useful. The cleanliness of the products themselves may vary depending on operating conditions.

2) The permissible radial load indicates the approximate size of radial load the bearing can carry. If the bearing carries an axial load, the permissible radial load may be lower. Refer to the table at the end of the guidebook for each product's basic dynamic load rating (C_r).



High temperature environment

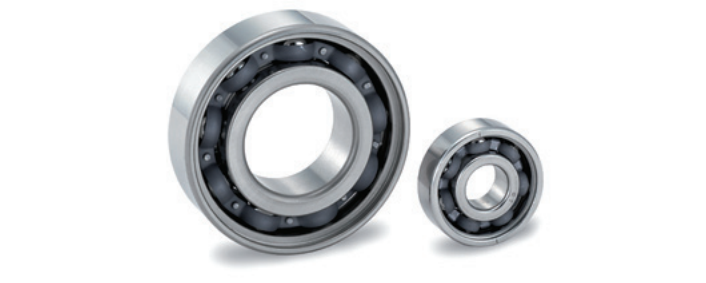
Magnetic field environment

MG Bearing

MO Bearing

PN Bearing

Non-magnetic Hybrid Ceramic Bearing



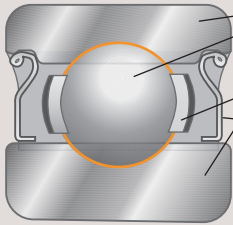
Typical bearing number

SE□□□□ZZSTMG3 (YS)

Advantages

This bearing has silver ion plated on the stainless steel balls, as the lubricant.

Specifications



Outer/inner rings and balls
Martensitic stainless steel

Cage
Austenitic stainless steel

Shield
Austenitic stainless steel

Lubrication
Silver ion plating

Performance

Cleanliness : -
Ambient pressure : 10^{-3} to 10^{-10} Pa
Temperature : -250 to $350\text{ }^{\circ}\text{C}$
Limiting speed : $dn < 10\,000$
 $1\,000\text{ min}^{-1}$ max.
Permissible radial load : $\leq 3\%$ of the basic dynamic load rating³⁾

Applications

- Semiconductor manufacturing equipment
- LCD manufacturing equipment
- Vacuum evaporator
- Medical equipment
- Vacuum motors

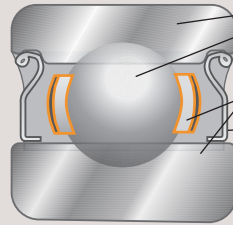
Typical bearing number

SE□□□□ZZSTMSA7 (YS)

Advantages

This bearing has molybdenum disulfide baked on the surface of the stainless steel cage, as the lubricant.

Specifications



Outer/inner rings and balls
Martensitic stainless steel

Cage
Austenitic stainless steel

Shield
Austenitic stainless steel

Lubrication
Molybdenum disulfide

Performance

Cleanliness : -
Ambient pressure : Atmospheric pressure to 10^{-5} Pa
Temperature : -100 to $300\text{ }^{\circ}\text{C}$
Limiting speed : $dn < 10\,000$
 $1\,000\text{ min}^{-1}$ max.
Permissible radial load : $\leq 3\%$ of the basic dynamic load rating³⁾

Applications

- Semiconductor manufacturing equipment
- LCD manufacturing equipment
- Vacuum evaporator
- Turbo molecular pump
- Rotary furnaces

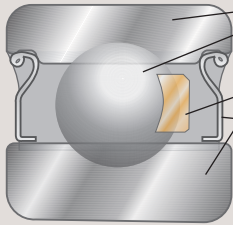
Typical bearing number

SE□□□□ZZST (PN)

Advantages

This bearing has a highly heat resistant solid lubricant, such as molybdenum disulfide included in the cage material.

Specifications



Outer/inner rings and balls
Martensitic stainless steel

Cage
PEEK resin

Shield
Austenitic stainless steel

Lubrication
Solid lubricant including molybdenum disulfide

Performance

Cleanliness : -
Ambient pressure : Atmospheric pressure to 10^{-5} Pa
Temperature : -30 to $300\text{ }^{\circ}\text{C}$
Limiting speed : $dn < 10\,000$
 $1\,000\text{ min}^{-1}$ max.
Permissible radial load : $\leq 1\%$ of the basic dynamic load rating³⁾

Applications

- Carton manufacturing equipment
- LCD cleaning equipment

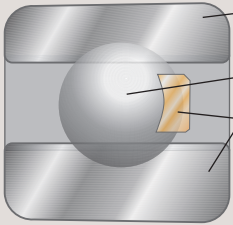
Typical bearing number

3NC□□□□YH4 (FA)

Advantages

This bearing uses non-magnetic stainless steel. It includes fluoropolymer as the lubricant. This bearing can be used in a vacuum environment.

Specifications



Outer/inner rings
Non-magnetic stainless steel

Balls
Ceramic (silicon nitride)

Cage
Fluorocarbon resin

Lubrication
Fluorine polymer (solid lubricant)

Performance

Cleanliness : Class 1 000¹⁾
Ambient pressure : Atmospheric pressure to 10^{-5} Pa
Temperature : -100 to $200\text{ }^{\circ}\text{C}$
Limiting speed : $dn < 10\,000$ ²⁾
 $1\,000\text{ min}^{-1}$ max.
Permissible radial load : $\leq 1\%$ of the basic dynamic load rating³⁾

Applications

- Semiconductor manufacturing equipment
- Semiconductor inspection equipment
- Canning machinery
- Superconductivity-related equipment
- Welder

1) The cleanliness class number represents specific environments where the individual products are useful. The cleanliness of the products themselves may vary depending on operating conditions.
2) When used in an environment where cleanliness is not a significant factor, the product can be used at higher speed, reaching the same limiting speed as that of standard products.

3) The permissible radial load indicates the approximate size of radial load the bearing can carry. If the bearing carries an axial load, the permissible radial load may be lower. Refer to the table at the end of the guidebook for each product's basic dynamic load rating (Cr).



Hybrid Ceramic Bearing



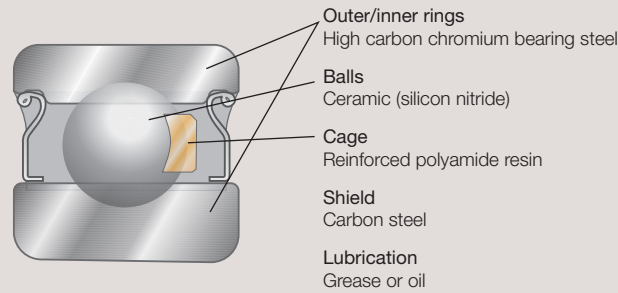
Typical bearing number

3NC□□□□ZZ (FG)

Advantages

This bearing is a standard hybrid ceramic bearing. Lubricated with grease or oil, it can be used as an insulating bearing or high speed bearing.

Specifications



Performance

Cleanliness : -
Ambient pressure : Atmospheric pressure
Temperature : -30 to 120 °C
Limiting speed : Equal to or higher than 1.2 times the limiting speed of steel bearings

Applications

- High speed stranding machine guide rollers
- Motors
- Generators

K Series Full Complement Hybrid Ceramic Ball Bearing



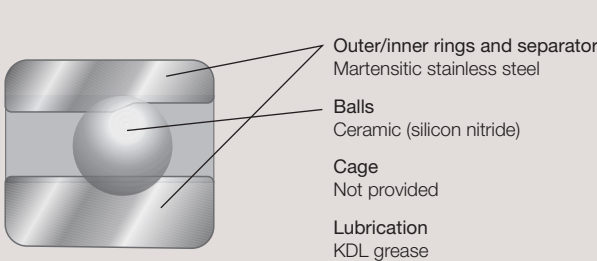
Typical bearing number

3NC□□□□VST-1

Advantages

This bearing is based on the K series super thin section ball bearing, which is widely used in industrial robots. Provided with some adaptations, this bearing is compatible with clean or vacuum environments. It uses fluorinated KDL grease as the standard lubricant. However, it can also be used with other solid greases such as Clean Pro.

Specifications



Performance

Cleanliness : Class 100¹⁾
Ambient pressure : Atmospheric pressure to 10⁻⁵ Pa
Temperature : -30 to 200 °C

Applications

- Wafer transfer robot
- LCD manufacturing equipment
- Semiconductor manufacturing equipment

Remark



For details, please refer to the ceramic bearings & EXSEV bearing series catalog (CAT.NO.B2004E) or consult JTEKT.

Linear Motion Ball Bearings



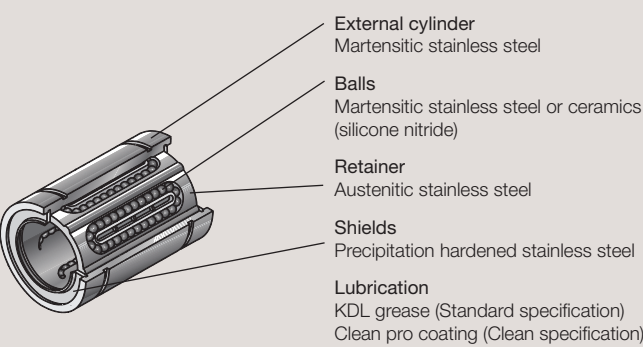
Typical bearing number

○○SDM□□ST△△

Advantages

The linear motion ball bearings are a high precision product that moves linearly in axial directions while having rolling contact with the shaft. Having balls, retainer and shields housed in an external cylinder, this compact bearing moves linearly without limit to the stroke distance.

Specifications



Performance

Lubrication specification	Performance		
	Cleanliness	Temperature	Ambient pressure
KDL	Class 100	-30 to 200 °C	Atmospheric pressure to 10 ⁻⁵ Pa
Clean Pro	Class 10	-100 to 200 °C	

Remark



Symbols determined according to factors such as the type, size, and material are entered in place of ○, □, and △.
For more information, including details of factors other than those mentioned above, please refer to the CERAMIC BEARINGS AND EXSEV BEARINGS catalog (CAT.NO.B2004E) or consult JTEKT.

Linear Way Bearing Units



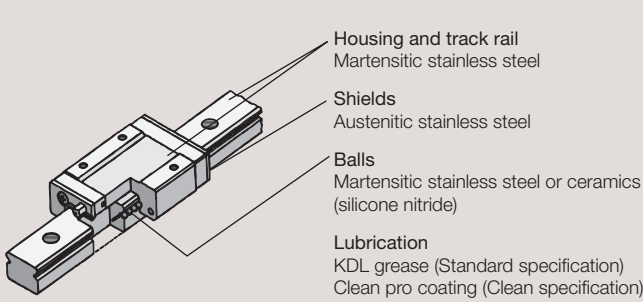
Typical bearing number

○○LW□□□□△△

Advantages

The Linear Way Bearing Units have a slide unit in which balls circulate, allowing the slide unit to move linearly on the track rail without limit. High precision linear motion can be obtained easily by fixing the slide unit and track rail with bolts.

Specifications



Performance

Lubrication specification	Performance		
	Cleanliness	Temperature	Ambient pressure
KDL	Class 100	-30 to 200 °C	Atmospheric pressure to 10 ⁻⁵ Pa
Clean Pro	Class 10	-100 to 200 °C	

Remark



Symbols determined according to factors such as the type, size, and material are entered in place of ○, □, and △.
For more information, including details of factors other than those mentioned above, please refer to the CERAMIC BEARINGS AND EXSEV BEARINGS catalog (CAT.NO.B2004E) or consult JTEKT.

1) The cleanliness class number represents specific environments where the individual products are useful. The cleanliness of the products themselves may vary depending on operating conditions.

Packaging and handling introductions



KDL Grease



Ceramic Balls



Handling the special-environment usage bearing series

- Pay special attention to items marked with "V" when using the bearing.
- For details, please refer to the Koyo ceramic bearings & EXSEV bearing series catalog (CAT.NO.B2004E).

	Precaution	(3,6) NC	SE	SV
(A)	When handling the bearing, use polyethylene gloves, or a similar item, that are clean of oil and dirt.		V	
(B)	Do not open the package until immediately before you will mount the bearing.	V	V	V
(C)	When not using the bearing, regardless of whether the package has been opened or not, insert it in an airtight and dry container, and store the container at room temperature.		V	
(D)	Do not apply grease, oil, or other solid lubricants to the bearing.		V	V
(E)	If oil is mistakenly applied to the bearing, clean the bearing with pure and neutral organic solvent (such as acetone and ligroin), allow the bearing to dry, and then use the bearing.		V	
(F)	Some bearings are not fit for long-term operation in atmosphere.		V	
(G)	The vibrations and noise generated during operation may be greater than those experienced with normal bearings.	V	V	

Bearing number example

3NC608SVST
SE6001ZZMD4MP10YS
SVWOB88ZZSTYSDL

Normal bearing number

Advantages

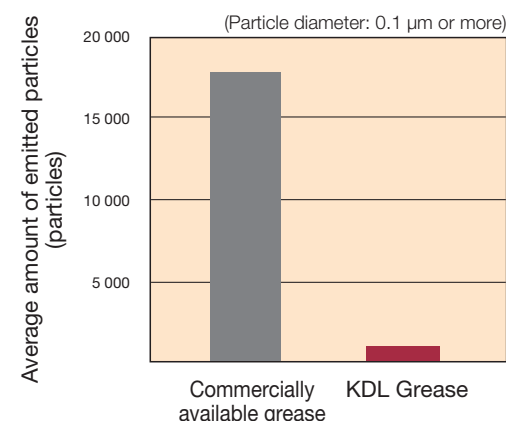
- This is low-particle-emission fluorocarbon grease for use in vacuum environments.
- KDL grease expresses its high properties when used with rolling bearings, linear-motion bearings, and ball screws.
 - JTEKT also respond to requests only for grease, so consult JTEKT with such requests.
 - This grease can be used up to an atmospheric pressure of 10^{-5} Pa, but consult JTEKT for information on using this grease under conditions combining high temperature and high vacuum.

Performance

Characteristics

Thickener	Fluorocarbon resin
Base oil	Fluorocarbon oil
Dropping point	None
Evaporation amount (200 °C for 22 h)	0.1 wt% or less
Degree of oil separation (100 °C for 24 h)	2 wt% or less
Operating temperature range	Atmosphere: -30 to 200 °C Vacuum: -30 to 100 °C

Particle-emission characteristic when used to lubricate a rolling bearing
(number of particles per $2.83 \times 10^{-3} \text{ m}^3$ [0.1 ft³])



Advantages

- JTEKT also supplies Ceramic Balls (silicon nitride), which have excellent resistance to wear and seizure, and are usable in corrosive environments and ultrahigh vacuums. Other major features of these balls are excellent heat resistance (up to 800°C), high rigidity, lightweight (40% compared to bearing steel), non-magnetic, and have insulating characteristics. The Ceramic Balls are useful in many applications such as jigs, tools, gauges, solenoid valves, check valves, other valve varieties, high grade bicycle parts, automotive parts, and machine components.

Table of Dimensions and Masses

Nominal dimension	Nominal outside diameter	Precision	Mass ²⁾
mm	inch	grade ¹⁾	(per piece)
0.8			0.866 mg
1.0			1.691 mg
1.2			2.922 mg
	1/16		6.766 mg
2.0			13.530 mg
	3/32		22.836 mg
	7/64		36.262 mg
	1/8		54.129 mg
3.5			72.511 mg
	5/32		0.105 7g
	3/16		0.182 7g
	7/32		0.290 1g
	15/64		0.356 8g
	1/4		0.433 0g
	17/64		0.519 4g
	9/32		0.616 6g
	5/16		0.845 8g
	11/32		1.125 7g
	3/8		1.461 5g
	13/32		1.858 2g

Nominal dimension	Nominal outside diameter	Precision	Mass ²⁾
mm	inch	grade ¹⁾	(per piece)
	7/16		2.320 8g
	15/32		2.854 5g
	1/2		3.46 g
	17/32		4.2g
	9/16		4.9g
	19/32		5.8g
	5/8		6.8g
	3/4		11.7g
	13/16		14.9g
	7/8		18.6g
	15/16		22.8g
	1		27.7g
	1 1/8		39.5g
	1 3/16		46.4g
	1 1/4		54.1g
	1 5/16		62.7g
	1 1/2		93.5g

Notes 1) For the grades, those specified in JIS B 1501 shall apply.
2) The masses are calculated on the basis of 3.23 g/cm³ in density.

Numbering System

5/32 G5 NCR

Material code : Silicon nitride ceramic
Precision grade code
Nominal dimension

EXSEV Bearing : Table of standard delivery times

Boundary dimensions (mm)			Basic load ratings ¹⁾ (kN)		Series	Clean Pro PRZ Bearing	High Temperature Clean Pro Bearing	Clean Pro Bearing	DL Bearing	FA Bearing	High Corrosion Resistant Ceramic Bearing		Corrosion Resistant Ceramic Bearing	Ceramic Bearing	Corrosion Resistant Hybrid Ceramic Bearing	SK Bearing	SK Bearing (Seal)	Full Complement Ceramic Ball Bearing	WS Bearing	MG Bearing	MO Bearing	PN Bearing	Non-magnetic Hybrid Ceramic Bearing	Hybrid Ceramic Bearing
						SE ZZSTPRZ YS	SE ZZSTPRB YS	SE ZZSTPR YS	SV ZZST YS	SE ZZST FA	NCZ FA		NCT FA	NC FA	3NC ZZMD4 FA	SK ZZST YS	SK 2RSST YS	NC V (No cage)	SE ZZST WS	SE ZZSTMG3 YS	SE ZZSTMSA7 YS	SE ZZST PN	3NC YH4 FA	3NC ZZ FG
						Prefix Suffix Cage code																		
Bore dia.	Outside dia.	Width	Cr	C0r	Basic number																			
4	12	4	0.97	0.36	604																			
	13	5	1.30	0.49	624																			
5	14	5	1.30	0.49	605																			
	16	5	1.75	0.67	625																			
6	17	6	1.95	0.74	606																			
	19	6	2.60	1.05	626																			
7	19	6	2.60	1.05	607																			
	22	7	3.30	1.35	627																			
8	22	7	3.30	1.35	608										*									
	24	8	3.35	1.40	628																			
9	24	7	3.35	1.40	609																			
	26	8	4.55	1.95	629																			
9.525	22.225	7.142	2.83	1.13	EE3S																			
10	22	6	2.30	1.00	6900																			
	26	8	4.55	1.95	6000																			
	30	9	5.10	2.40	6200																			
12	24	6	2.45	1.15	6901																			
	28	8	5.10	2.40	6001																			
	32	10	6.80	3.05	6201																			
15	28	7	3.65	1.80	6902																			
	32	9	5.60	2.85	6002																			
	35	11	7.65	3.75	6202																			
17	30	7	3.90	2.05	6903												*							
	35	10	6.00	3.25	6003																			
	40	12	9.55	4.80	6203																			
20	37	9	5.40	2.95	6904																			
	42	12	9.40	5.05	6004																			
	47	14	12.8	6.65	6204																			
25	42	9	5.95	3.65	6905																			
	47	12	10.1	5.85	6005																			
	52	15	14.0	7.85	6205																			
30	47	9	6.15	4.00	6906											*								
	55	13	13.2	8.25	6006										*									
	62	16	19.5	11.3	6206																			
35	55	10	9.25	6.20	6907											*								
	62	14	15.9	10.3	6007											*								
	72	17	25.7	15.4	6207											*	*							
40	68	15	16.7	11.5	6008											*								
	80	18	29.1	17.8	6208																			
Note) As a general rule, the internal clearance of bearings is as shown on the right.						C3	C3	C3	C3 Packed with KDL grease	C3	CN		CN	CN	CN ²⁾	CN ²⁾	CN ²⁾	— ³⁾	C4	C4	C3	C3	CN	C3

1) The basic load rating (Cr) indicates the value for high-carbon steel chrome bearings. These values are used in the calculation of the permissible radial load.

1) The basic load rating (Cr) of each bearing may differ from the values shown in this table.

2) The bearing number marked with an asterisk have a C3 clearance.

3) Because the configuration of these bearings is that of angular contact ball bearings, their basic bearing number and basic load ratings differ from those shown in this table.

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Koyo® ***EXSEV*** Product Guidebook

For Extreme Special Environments

Value & Technology

