Cause and Countermeasures for Operating Irregularities

Irregularities		Possible cause	Countermeasures
Noise	Loud metallic sound[1]	Abnormal load	Improve the fit, internal clearance, preload, position of housing shoulder, etc.
		Incorrect mounting	Improve the machining accuracy and alignment of shaft and housing, accuracy of mounting method.
		Insufficient or improper lubricant	Replenish the lubricant or select another lubricant.
		Contact of rotating parts	Modify the labyrinth seal, etc.
	Loud regular sound	Dents generated by foreign matters, corrosion, flaws, or scratches on raceways	Replace or clean the bearing, improve the seals, and use clean lubricant.
		Brinelling	Replace the bearing, and use care when handling bearings.
		Flaking on raceway	Replace the bearing.
	Irregular sound	Excessive clearance	Improve the fit, clearance, and preload.
		Penetration of foreign particles	Replace or clean the bearing, improve the seals, and use clean lubricant.
		Flaws or flaking on balls	Replace the bearing.
Abnormal temperature rise		Excessive amount of lubricant	Reduce amount of lubricant, or select stiffer grease.
		Insufficient or improper lubricant	Replenish lubricant or select a better one.
		Abnormal load	Improve the fit, internal clearance, preload, or position of housing shoulder.
		Incorrect mounting	Improve the machining accuracy and alignment of the shaft and housing, accuracy of mounting, or mounting method.
		Creep on fitted surface, excessive seal friction	Correct the seals, replace the bearing, or correct the fitting or mounting.
Vibration (Radial runout of shaft)		Brinelling	Replace the bearing and use care when handling bearing.
		Flaking	Replace the bearing.
		Incorrect mounting	Correct the squareness between the shaft and housing shoulder or side of spacer.
		Penetration of foreign particles	Replace or clean the bearing, improve the seals.
Leakage or discoloration of lubricant		Too much lubricant. Penetration by foreign matter or abrasion chips	Reduce the amount of lubricant, select a stiffer grease. Replace the bearing or lubricant. Clean the housing and adjacent parts.

Note [1] Squeaking may arise from grease lubricated ball bearings or cylindrical roller bearings (medium to large sized). This is especially true during winter when temperature will not rise, leaving fatigue or grease life unaffected. Consequently, such a bearing can continue to be used. If you have concerns regarding squeaking noise, please contact NSK.

MOTION & CONTROL NSK

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REPUBLIC Blower Systems™

MOTION & CONTROL NSK

High Precision Ceramic Angular Contact Ball Bearings

Ceramic Angular Contact Ball Bearings for high speed, high temperature and high rigidity applications

High-Precision Single-Row Angular Contact Ball Bearings

Conventional Type 72, 70, 79 Series

70 16 A5 TR V1V DU L P4Y

Precision Class:
P4 : ISO Class 4 (ABEC7)
P4Y* : ISO Class 4
P3 : Dimensions - ISO Class 4
Running Accuracy : ISO Class 2
P2 : ISO Class 2 (ABEC9)
*P4Y indicates special ID/OD tighter tolerancing for ease of matching sets.

Preload:
L - Light
M - Medium
H - Heavy
Gxx - Preload in Kfg (G5=5 Kgf)
CPxx - Median Preload in Microns (CP10=10μm)
CAxx - Median Axial Clearance in Microns (CA15=15μm)

Mounting Configuration:
SU - Single Universal
DU - Duplex Universal
DB, DF, DT - Duplex Arrangement
DBB, DFD, DTD, DUD - Triplex Arrangement
DBB, DFF, DBT, DFT, DTT, QU - Quad Arrangement

Seal:
No Symbol - Open type
V1V - Non contact rubber seal

Retainer:
T - Phenolic Cage
TYN - Polyamide Cage

Material:
Blank Symbol : Bearing Steel (SUJ2)
SN24 : Ceramic Balls

Contact Angle:
A = 30°
A5 = 25° **C** = 15°

Bore Diameter Designator:

Bearing Series:

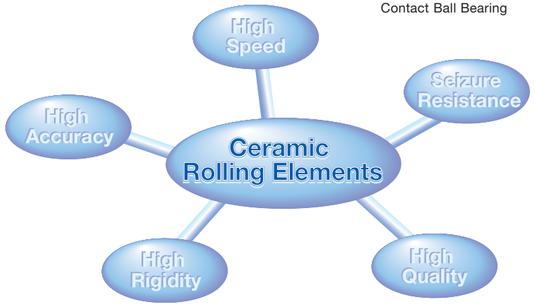
NSK *Quality*

Ceramic Rolling Elements

High speed, high rigidity and high reliability are all achieved using ceramic rolling elements.

Ceramic hybrid bearings have many excellent performance characteristics such as heat resistance, extended life, light weight, lower thermal expansion, electrical non-conductance and thus can be used in an infinite number of applications as a new generation material. NSK's early experience of materials and bearing manufacturing led us to utilize one ceramic in particular, silicon nitride (Si_3N_4), for the rolling elements in ceramic hybrid bearings. These hybrid bearings have earned an excellent reputation for ultra high speed combined with ultra high accuracy; a performance combination that is not achievable in bearings with steel rolling elements.

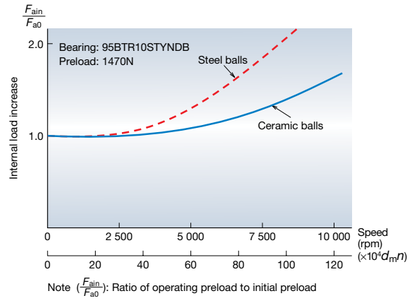
Precision Ceramic Angular Contact Ball Bearing



Superior High Speed Performance

- **Lightweight**
  As the density is 40% lower than that of steel, the centrifugal force from the rolling elements is lower, thus extending bearing life.

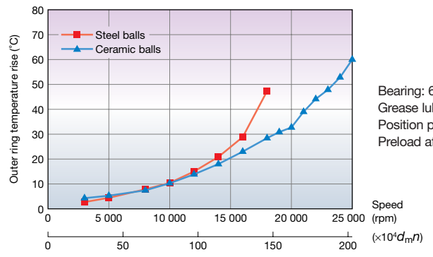
Preload Increase Due To Centrifugal Force



Note ($\frac{F_{ain}}{F_{a0}}$): Ratio of operating preload to initial preload

- **Low coefficient of linear expansion**
  In applications involving high speed operation, although the temperature of the bearing is high, this low coefficient results in lower preload and lower heat generation.
- **Low friction**
  The slip of the rolling element during operation is reduced, resulting in less heat being generated.

The Outer Ring Temperature Rise in High Speed Operation.

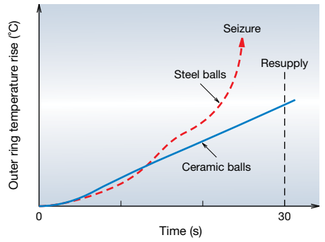


Bearing: 65BNR10XTDB+KL144
Grease lubrication (Isoflex NBU15)
Position preload (no jacket cooling)
Preload after mounted: 300 (N)

Seizure Resistance

Relative to steel rolling elements, ceramics have a higher seizure resistance.

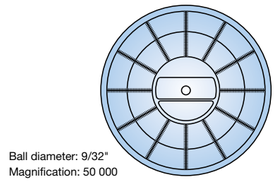
Oil Interruption Test Result



High Accuracy through Manufacturing Technology

NSK's expertise in the manufacturing of balls and rollers, improvements in the sintering process and the grade of materials used enables NSK to produce higher accuracy balls and rollers.

Roundness of Ceramic Ball

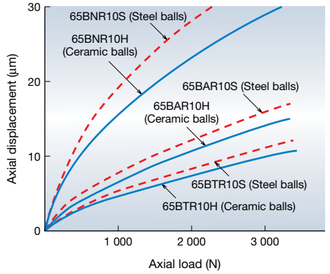


Ball diameter: 9/32"
Magnification: 50 000

High Rigidity

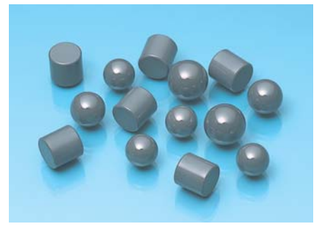
Ceramic balls have a Youngs Modulus that is 50% higher than that of steel, making it an ideal material for use in machine tool spindles requiring high stiffness during cutting.

Axial rigidity of ceramic angular contact ball bearings



High Quality by Selecting the Best Materials

By including the purchase of materials in the QA system, NSK bearings with ceramic rolling elements are well accepted in the field as being of the highest quality.

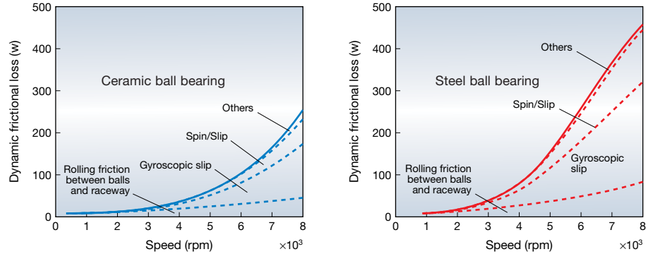


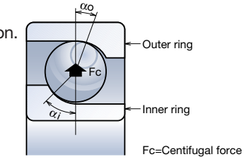
High Speed Performance Characteristics of Balls and Rollers

When using ceramic rolling elements in:

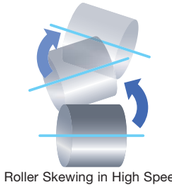
ACBB: low centrifugal forces decrease the gyroscopic moment and spin/slip in high speed operation.
CRB: low material density reduces the heat generation caused by the skewing of the rollers.

Calculated result of heat generation





ACBB: Difference in Contact Angles in High Speed Operation



CRB: Roller Skewing in High Speed Operation