Product leaflet

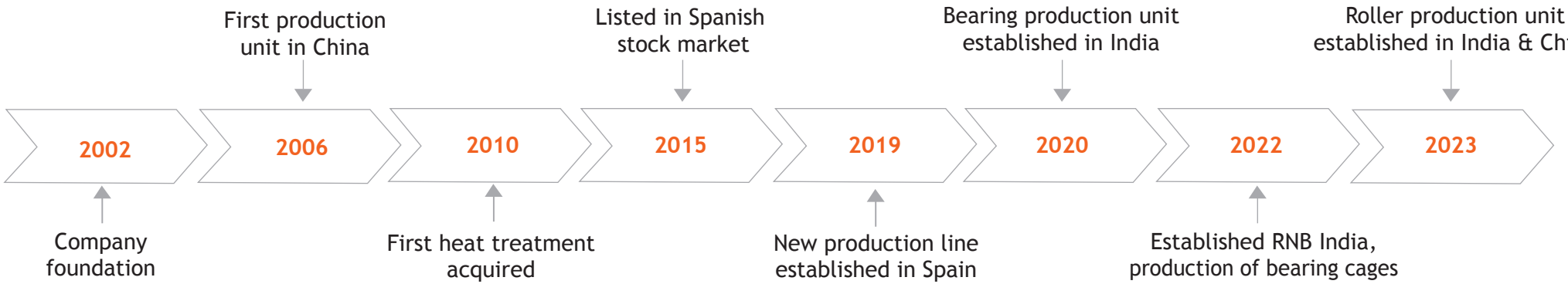
Cylindrical Roller Bearing

BEARINGS EUROPE NBI®

Premium brand

gruponbi.com

NBI bearings history milestones



Global footprint of the bearings division

NBI BEARINGS EUROPE
NBI headquartes, R&D, designing, manufacturing plant, warehouse and sales office in Oquendo (Spain)

NBI BEARINGS ROMANIA
Application engineering and sales office in Bucharest (Romania)

LOCAL SALES SUPPORT
in Brasil, Mexico, Chile, Peru and USA

NBI INDIA
Manufacturing plant and warehouse in Ahmedabad and sales office in Kolkata (India)

RNB COMPONENTS
Manufacturing plant of bearings steel cages and other auxiliary components in Rajkot (India)

CRONOS
Manufacturing plant warehouse and sales office in Wujin (China)

WAFANDIANG SQA
Laboratories in Wafandiang (China)

JERRY BEARINGS TRANSMISSION TECHNOLOGY
Roller manufacturing plant in Zhejiang (China)

Strengths

Commercial capacity

Supplying bearings for a variety of OEM's applications with high technical requirements

Very active **commercial team** distributed across Spain, India, USA, Romania, Mexico, Chile, Peru, USA and Brazil

Design and manufacturing

Continuous investment in **R&D** supported by own design softwares and life test simulation programs

Manufacturing plants in Spain, China and India for CRB, SRB, TRB, CRTB, SPB and CF

Financial Position

Solid financial health thanks to a robust cash position

Publicly listed in the BME Growth (Spanish stock exchange) since 2015 with stable core shareholders

Strategic alliances

NBI maintains a **strategic partnership** with Cronos (bearing manufacturer) with 30% equity stake

Joint Ventures to integrate vertically the production of bearing components

Application engineering

Bearing performance optimization

Romax TECHNOLOGY · ANSYS · easyC · vitope · desoft

Advanced calculation capabilities

Lubrication analysis

Bearing damage analysis

Assistance for maintenance issues, fitting practice, internal clearance selections

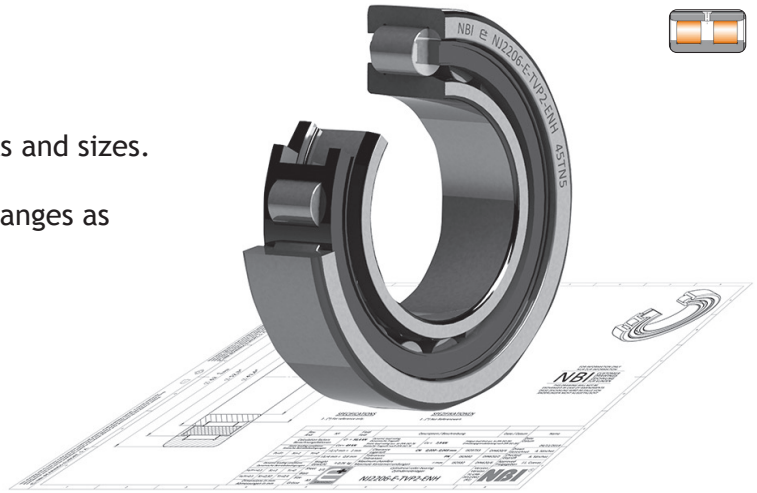
Technical trainings and seminars

E'asyc and E'desoft are analytical and simulation tools: developed by NBI

NBI Cylindrical Roller Bearing (CRB)

NBI Cylindrical roller bearings are available in a wide range of designs, series, variants and sizes.

The main design differences are the number of roller rows and the inner/outer ring flanges as well as cage designs and materials.

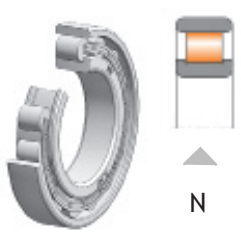


Single row cylindrical roller bearings with cage

Single row cylindrical roller bearings with cage are radial and separable bearings.
Due to the possibility of fitting the different components of the bearings, i.e. the outer and the inner rings, individually, the mounting becomes easier.

Depending on their design, single row cylindrical roller bearings can be used as non-locating bearings, semi-locating bearings or as locating bearings.

NBI single row cylindrical roller bearings are available in several basic designs as standard.



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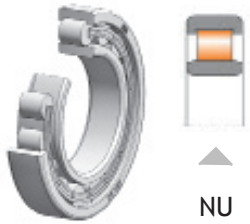

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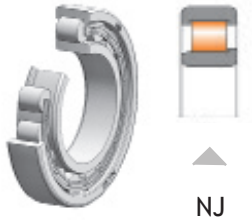
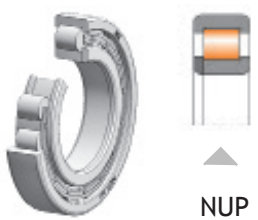
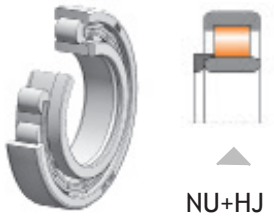


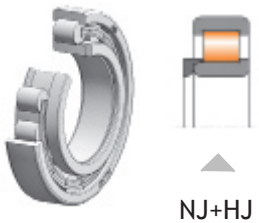
NJ



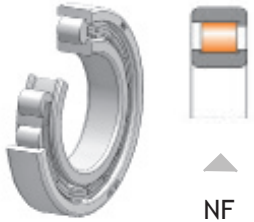
NUP



NU+HJ



NJ+HJ



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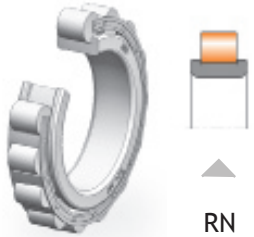
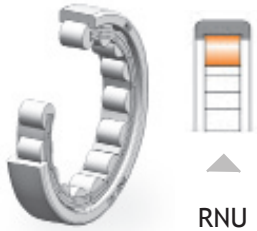


RN



RNU

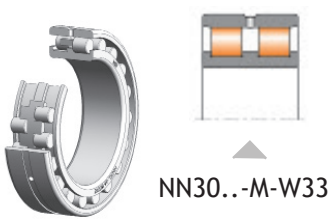
NBI Cylindrical Roller Bearing (CRB)

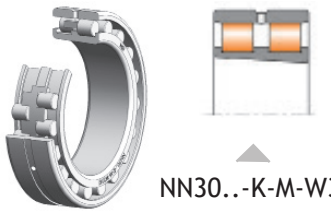
Double row cylindrical roller bearings with cage

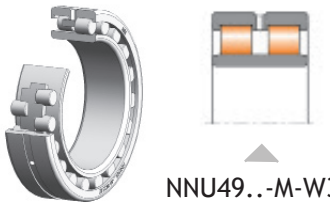
They are used as non-locating bearings in bearing arrangements of machine tool spindles. Therefore, these bearings are normally used in high precision tolerance class, frequently in combination with reduced internal clearance. They are also commonly used with tapered bores, namely suffix K.

These bearings also feature high radial load capacity and are satisfactory for high-speed applications, providing a very stiff and rigid bearing arrangement.

Produced as standard with roller riding solid brass cages.


NN30..-M-W33


NN30..-K-M-W33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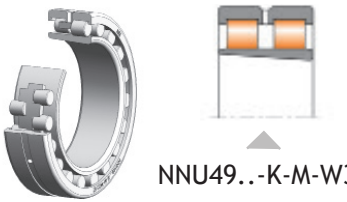
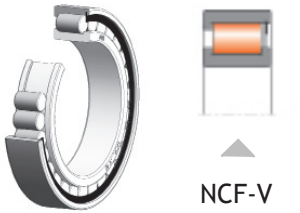
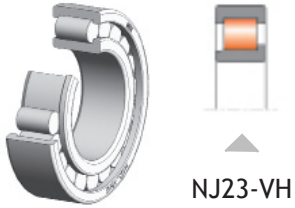

NNU49..-K-M-W33

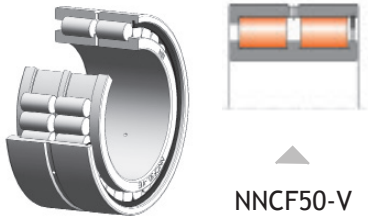
Full complement cylindrical roller bearings

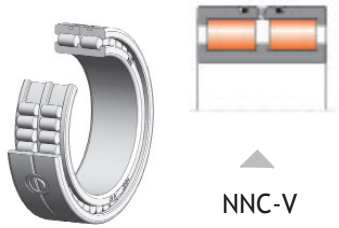
Full complement cylindrical roller bearings are designed without cages in order to have the maximum possible number of rolling elements. Therefore, they feature extremely high radial load carrying capacities and provide high rigidity. However, due to their kinematics, they have a lower speed ability as cylindrical roller bearings fitted with cages.

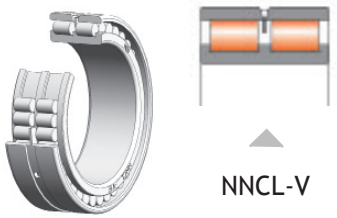
NBI full complement cylindrical roller bearings are available as single and double row designs as non-locating, semi-locating and locating bearings.

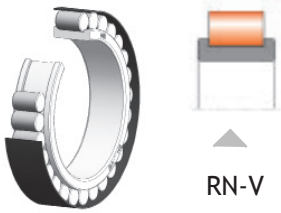

NCF-V

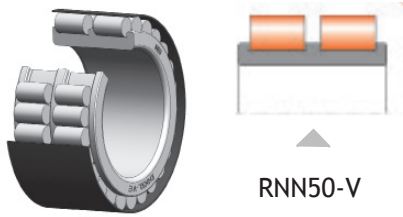

NJ23-VH


NNCF50-V


NNC-V


NNCL-V


RN-V


RNN50-V

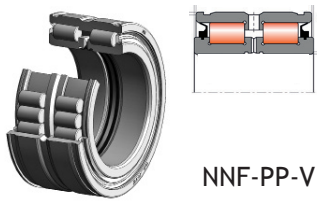
NBI Cylindrical Roller Bearing (CRB)

Sealed and pre-greased double row full complement cylindrical roller bearing

Have a two-piece inner ring having three integral flanges which is held together by a retaining ring for ease of handling and mounting. The outer ring features an integral central flange.

These bearings are being produced with two contacting seals as standard and typically used in rope sheaves for heavy lifting equipment.

NNF-PP-V type bearings are being satisfactory in supporting high radial loads and axial forces acting in both directions. Due to their internal geometry, they can also accommodate tilting moments.



NNF-PP-V

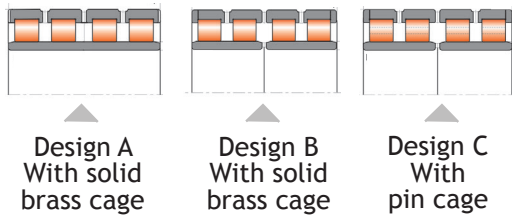
Four and six row cylindrical roller bearings with cage

Multi row cylindrical roller bearings are used in applications where a high radial load capacity is required, chiefly in rolling mill stands, roller presses and calenders.

These bearings are designed for accepting high radial loads only. Hence, any axial load must be accommodated by a separate locating bearing.

Four row

Six row



Design A
With solid
brass cage

Design B
With solid
brass cage

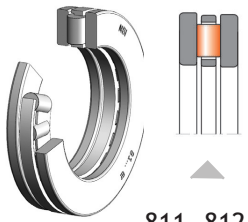
Design C
With
pin cage

Cylindrical roller thrust bearings

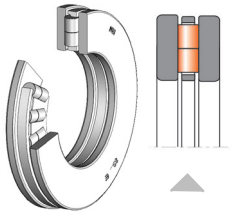
Cylindrical roller thrust bearings series 811 and 812 are single direction acting separable axial bearings, insensitive to shock loading and feature much higher load carrying capacity compared to thrust ball bearings.

They accommodate very high axial loads but no radial forces. They provide a very rigid bearing assembly for high thrust loading with less space requirement.

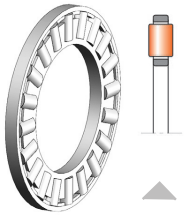
Due to their specific kinematic behaviour, cylindrical roller thrust bearings are only suitable for low-speed applications only.



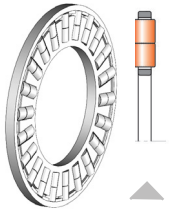
811, 812



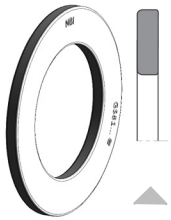
893, 894



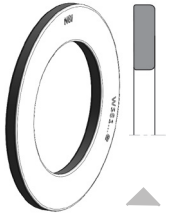
K811, K812



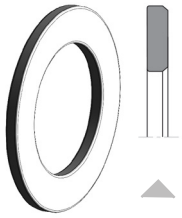
K893, K894



GS811, GS812
GS893, GS894



WS811, WS812
WS893, WS894



ZS

NBI cages for Cylindrical Roller Bearings

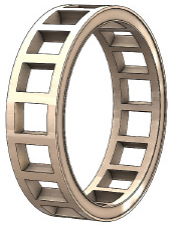
NBI provides a variety of CRB cage types, from brass, polymer, or steel, guided on rollers, inner or outer ring's shoulders, in order to realize the best balance between cost-effectiveness, reliability, and performance in a wide range of operating conditions.

Cages for single-row bearings

Polyamide cage
- High elasticity and light weight
- With very good sliding and self-lubricating properties, minimizes heat generation and wear
- Less inertia
- Making the cage suitable for vibrations, reversible rotations, and high acceleration / deceleration conditions

Poliamide
+ glass fibre
(suffix TVP2)

Peek cage
- Polyether-ether-ketone Thermoplastic with excellent mechanical properties
- Dimensional stability
- Excellent resistance to aggressive media
- Good choice in applications with problematic lubrication or dry friction



Peek cage
(suffix
PK/PKA PKB)

Steel cage
- Relatively high strength, good stiffness and impact resilience
- Nitriding heat treatment may be optionally provided, with benefits including superior toughness and wear resistance
- Not affected by mineral or synthetic oil-based lubricants mineral or synthetic oil-based lubricants or by the organic

Steel cage

Brass cage
with steel rivets
(suffix M/MA/MB)

Brass cage with trapezoidal
integral brass rivets
(suffix M1/M1A/M1B)

Single-piece
brass cage
(suffix MPA/MPB)

Riveted brass cage
- Optimized pocket design realizes reduced friction with rollers
- Better guidance of rollers out of load zone
- Low friction, low noise, good strength for demanding applications
- Suitable for a wide spectrum of speed and load conditions

Single-piece machined brass cage
- Enhanced precision and the best rigidity
- Suitable for applications with vibration

Cages for multi-row bearings

Single-piece finger-type cage
- Machined brass
- Commonly used for double-row or 4-row bearings
- Favors the lubrication from the side superior guidance of rollers, contributing to enhanced bearing performance in vibration, reversing and shock load applications

Brass cage finger type
(Only for 2
and 4-row bearings)

Pin cage
(Only for
4-row bearings)

Pin-type cage
- Used for large diameter 4-row CRB where machined brass cages are not available
- Additional rollers can typically be added, maximizing the bearing dynamic capacity

CRB Enhanced+ premium line

What is Enhanced+ bearing line?

NBI combines experience in designing and producing bearings with material research and latest technology in manufacturing.

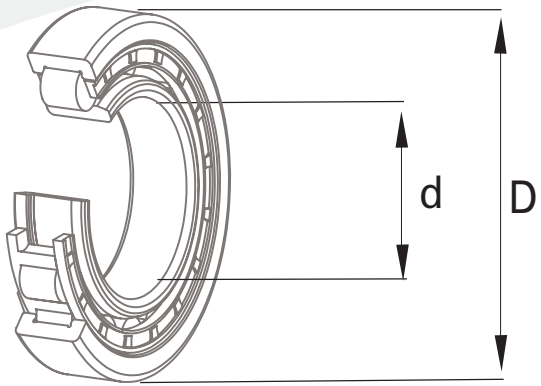
- Premium steel and improved heat treatment
- Tighter manufacturing tolerances
- Enhanced surface finish
- Optimized internal geometry and cage design

Enhanced+ advantages

- Improved dynamic load rating and consequently longer operating time
- Reduced friction and lower operating temperature
- Downsizing possibility
- Lower overall costs

CRB
(Cylindrical Roller Bearing)

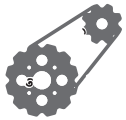
Manufacturing sizes



From 8mm ø inner ring
to 1.600mm ø outer ring

Segments / Applications with typical needs for a premium CRB

Gearboxes
industrial gearboxes for all processing industries including mining, aggregates and mineral processing, steel, cement, etc, material handling, wind turbine gear boxes, marine drives, power splitters

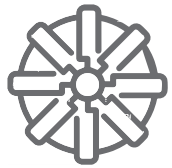


Geardrives
Geardrives and geared motors: planetary transmissions, slewing drives, yaw & pitch drives for wind turbines, final drives for wheeled and tracked off-road vehicles

Minerals processing / Aggregates
aggregates, cement: vertical roller mills grinding rolls, vertical shaft impactors, vibratory motors for linear screens

Construction equipment
vibration generators in road rollers, vibratory plates exciters

Heavy lifting
sheaves for cranes and construction/ mining machines like draglines, excavators, etc, hook blocks



Various industries / miscellaneous applications
industrial ventilators, fans, blowers, dryers, medium to large electric motors, mechanical presses, textile machineries

Rail vehicles
axleboxes, traction motors, transmissions

Power transmission
pumps and compressors

Machine-tool spindles

Metals
rolling mills rolls' support

Examples of NBI customized CRB solutions

Sheave bearings for dredging and under-water operations

With proved efficiency in offshore applications, NBI's proprietary CE05 coating is an extremely thin anti-corrosion coating consisting of an electroplated coating and a chromate passivation that ensures long term protection of bearing metallic surfaces against corrosion.

Advantages:

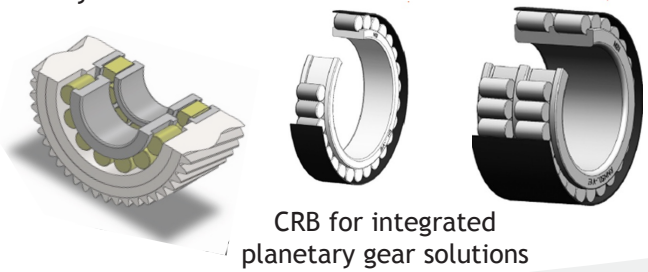
- Significant increase in operating life compared to uncoated bearings
- Long-term prevention against rust penetration under the seals
- Normally supplied combined with special water-and oxidation-resistant grease and seals for extreme environments
- Fully interchangeable with standard bearings with same boundary dimensions

NNF-PP-V with CE05
anti-corrosion coating

CRB with one ring only for integrated planetary gear solutions

Caged bearings with one ring only, RN design – same geometry as N type but no outer ring, with glass fiber reinforced polyamide cage or brass cage.

- Full complement bearings in single or double-row configurations,with one ring only, RN-V or RNN-V designs, cageless
- Intended for restricted space applications, the missing outer raceway is integrated in customer's planet gear, so rollers run directly on the hardened and ground surface of the housing cavity
  Because of the missing ring, additional space is available for a larger shaft diameter or housing section, hence providing a stronger, stiffer arrangement
- Radial loads only

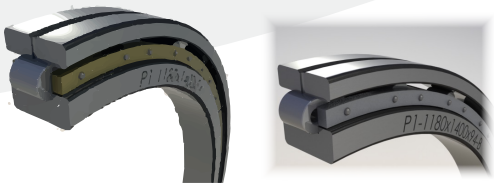


CRB for integrated
planetary gear solutions

Special bearings for high speed tubular stranders

NBI solution proposed for rotor support consists of large size, thin section cylindrical roller bearings with N-type configuration.

- Redesigned internal geometry, as rollers & raceways profiles, to improve kinematic characteristics, reducing the inertia and bring the bearing to higher speed limits
- Capable to accommodate big axial displacements required by the shaft linear expansion due to temperature differentials
- Increased running accuracy, in order to minimize the running noise and vibrations
- Robust cage with special design, guided on the inner ring ribs
- Lubrication holes in outer ring
- Tapped holes for handling purpose may be provided, at request, in one of the rings' faces



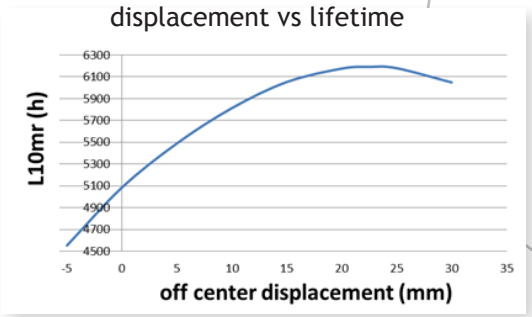
Examples of NBI customized CRB solutions

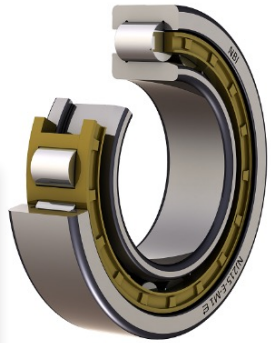
Optimization of NJ2328-E-M1-ENH raceway profile to increase the service lifetime in applications with high misalignment

CNC modern grinding and superfinishing equipment a of complex profiles in the raceways of cylindrical roller bearings with a great degree of accuracy. The design optimization of these profiles for a specific application requires to calculate accurately the expected misalignment the internal load distribution and therefore, the fatigue life according to ISO/TS16281.
NBI solution by Romax, optimized “crown high” of 4 µm has lead to a rating life increase of **13%** (according to ISO/TS 16281) and optimized “off center displacement” of 20 mm has lead to an additional rating life increase of **22%.**

NBI solution: Optimization of raceway profile leads to **38%** rating life increase.

Influence of the profile off-center displacement vs lifetime

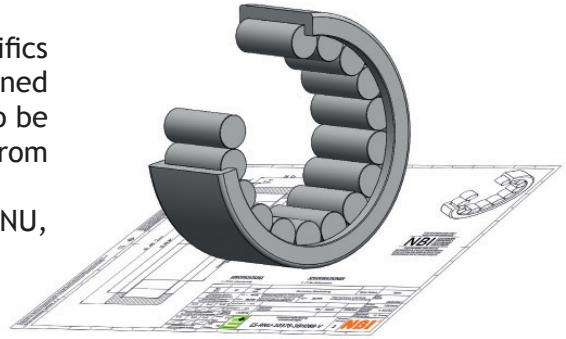


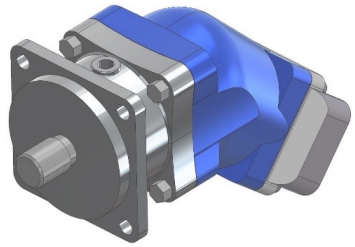


NJ2328-E-M1

Special bearings for axial piston hydraulic pumps and motors

- Bearing selection for drive shaft support in case of axial piston pumps and motors should take into account the specifics of the application: for bent axis design, since this is more commonly used in motor drive units, bearings are dimensioned so that to be capable to carry all the wheel loads against their shaft; swash plate pumps, on the other hand, tend to be driven through flexible couplings, so the drive shaft bearings are sized based on the magnitude of the internal loads from the dynamic and pressure loading forces
- NBI offers different caged or cageless cylindrical roller bearing with special construction like ES-NCF, ES-NUP, or ES-RNU, for both fixed and floating positions
- Special dimensions, tolerances and internal clearance ranges may be provided, as agreed with equipment manufacturers
- Optimized rib design for enhanced axial load support in case of bearings intended for locating positions
- Black oxide coating available upon request, in case of full complement bearings used in higher speed conditions



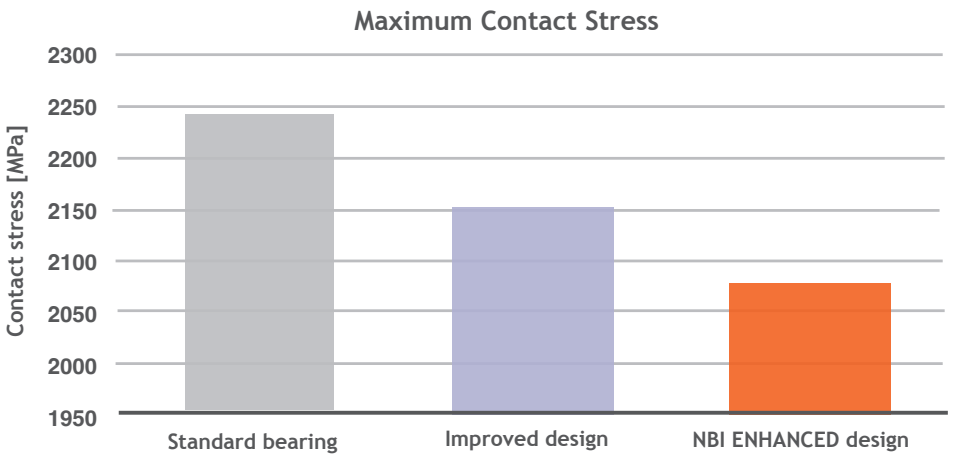


Highly engineered solutions

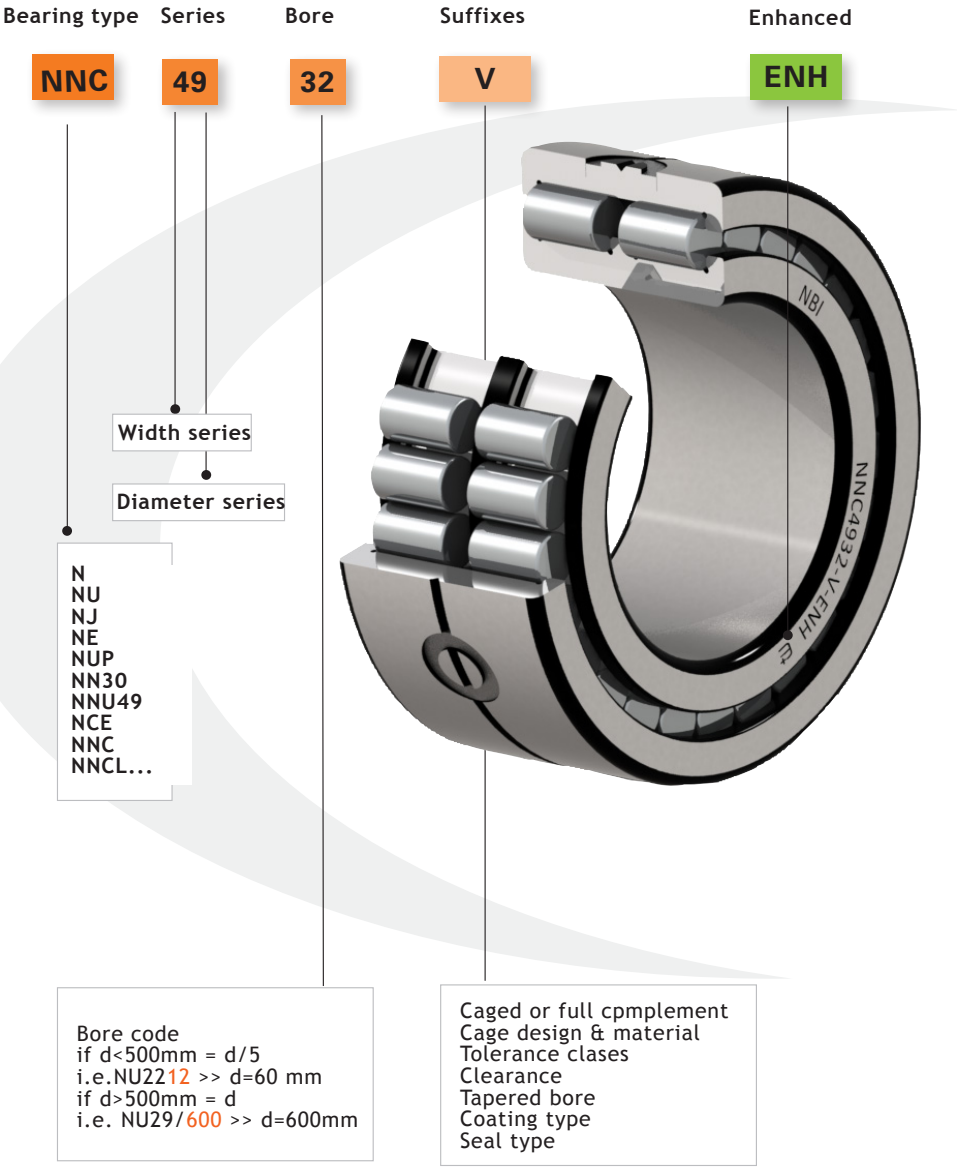
Advanced computer simulations using state-of-the-art computer analysis tools, combined with accurate laboratory analysis, confirmed that **NBI E+ Enhanced cylindrical roller bearings** are fully capable to deliver performance under the most demanding operating conditions.

NBI CRB Enhanced + premium performance

Effects of ENH+ improved features over bearing performance



Part-numbering of NBI CRB



Suffix	Description
C1	Radial internal clearance smaller than C2
C2	Radial internal clearance smaller than normal
C3	Radial internal clearance larger than normal
C4	Radial internal clearance larger than C3
C5	Radial internal clearance larger than C4
CE02	Bearings for railway axle box applications
CE03	Black oxide coated
CE04	Phosphate coated
CE05	Special coating anti corrosion
CE09	Bearings for wind energy applications
E	Modified internal design to increase the load capacity (interchangeable)
ENH	E+ Enhanced bearing series with improved dymanic load rating and consequently longer operating time
J	Steel cage
K	Tapered bore, taper 1:12
L08	Special grease with great resistance to fresh and salt water as well as water vapor
L24	Grease for low temperature properties
M	Solid brass cage with steel rivets, roller guided
M1	Solid brass cage with trapezoid integral brass rivets, hot riveted, roller guided
M1A	Solid brass cage with trapezoid integral brass rivets, hot riveted, outer ring guided
M1B	Solid brass cage with trapezoid integral brass rivets, hot riveted, inner ring guided
M2	Solid brass cage with cylindrical integral brass rivets, hot riveted, roller guided
M2A	Solid brass cage with cylindrical integral brass rivets, hot riveted, outer ring guided
M2B	Solid brass cage with cylindrical integral brass rivets, hot riveted, inner ring guided

Suffix	Description
MA	Solid brass cage with steel rivets, outer ring guided
MB	Solid brass cage with steel rivets, inner ring guided
MPA	Single piece solid brass cage, outer ring guided
MPB	Single piece solid brass cage, inner ring guided
P5	Increased dimensional and running accuracy to ISO tolerance class 5
P51	Tolerance class P5 and radial internal clearance C1
PE	Modified internal design to increase the misalignement capacity
PK	Polyether-ether-ketone cage for high temperatures , roller guided
PKA	Polyether-ether-ketone cage for high temperatures , outer ring guided
PKB	Polyether-ether-ketone cage for high temperatures , inner ring guided
PP	Contact seals of polyurethane on both sides of the bearings
PP5	Seals for high temperature work
PP8	Special contact seals designed to special offshore applications
PP9	Special contact seals designed to withstand pressure underwater up to 4 bar
TN	Glass fiber reinforzed polyamide cage
TVP2	Glass fiber reinforzed polyamide cage
V	Full complement of rollers, without cage
VH	Full complement of rollers, without cage, self-retaining
W20	Three lubrication holes in the outer ring without circunferencial lubrication grrove
W23	With circunferential lubrication groove and three lubrication holes in inner ring
W33	With a circumferential lubrication groove and lubrication holes in outer ring
2S	Bearings specially selected to be used matched for uniform load distribution
2Z	Sheet steel shields

NBI can offer, under requirement, alternative designs,
Should you need a special design, please contact our sales department in NBI Bearings Europe

Multi-location NBI manufacturing plants

Oquendo (Spain)

- Investment up to €10MM
- 2.500 m² surface for manufacturing (total area 5.500 m²)
- Latest European manufacturing technology to achieve high-precision bearings
- Long term investment plan in place for €10MM to reach 1 meter OD bearing
- Certified with: ISO 9001: 2015

Current capacity (mm)
Inner diameter 80 ÷ 240
Outer diameter 100 ÷ 400

Incoming capacity (mm)
Inner diameter 240 ÷ 700
Outer diameter 400 ÷ 1.000

Wujin (China)

- Investment up to €18MM
- 15.000 m² surface for manufacturing (total area 35.000 m²)
- Latest technology to achieve high-precision bearings equipped with an Aichelin thought hardening line and new case carburizing line for multi row roller bearings
- Long term investment plan in place for €4MM
- Certified with: IATF 16949:2016. TÜV, ISO 14001:2015. DNV and ISO 45001:2018. DNV

Current capacity (mm)
Inner diameter 20 ÷ 1.400

Outer diameter 30 ÷ 1.600
Specialized in CRB and TRB

Ahmedabad (India)

- Investment up to €5MM
- 3.000 m² surface for manufacturing
- Latest manufacturing technology to achieve high-precision bearings. Automatic lines
- Automatic line for bearing production and heat treatment arriving in 2023.
  Long term investment plan in place for €9MM
- Certified with: ISO 9001: 2015 TÜV

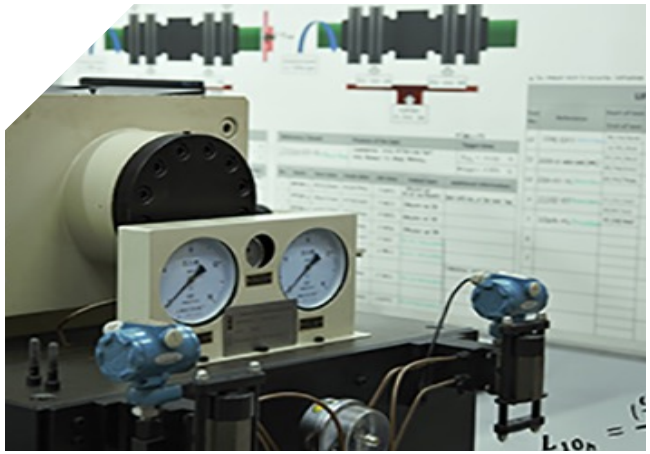
Current capacity (mm) SRB-TRB
Inner diameter 40 ÷ 125
Outer diameter 100 ÷ 200

Incoming capacity (mm) SRB
Inner diameter 120 ÷ 200
Outer diameter < 500

In-house laboratories equipped with the latest technology

Metrology laboratory

Metallographic laboratory



Other tests laboratory

NBI Quality

NBI has the latest state-of-the-art heat treatment technology and equipments

Quality of raw material is one of the most critical factors to ensure an enhanced bearing life.
NBI improves rolling contact fatigue life with:
- Enhanced cleanliness. Inclusions size and quantity closely controlled by restricting the chemical composition. Narrower carbides threshold.
- Selection of through hardening steel type according to the rings' and rollers' thickness and improved heat treatment to achieve a better microstructure and hardness uniformity on the functional section.

Quality control inspection procedure throughout the whole bearing manufacturing process

The most advanced heat treatment
Martensitic hardening: high hardness.
Bainitic hardening: strength to resist fracture and absorb shocks
Case hardening: can endure heavy shock loads

Central Office: Pol. Industrial Basauri nave 25 - 01409 Oquendo (Álava) Spain - Phone: (+34) 945 898 397 - sales@gruponbi.com

Cylindrical Roller Bearing

BEARINGS EUROPE NBI®

Premium brand

gruponbi.com

3A-04-NBI cylindrical roller bearing leaflet v.0.