



Taper Roller Bearing

gruponbi.com

BEARINGS EUROPE | **NBI**[®]
Premium brand



Distribuidor autorizado NBI
Curitiba/PR · atendemos todo o Brasil · mippei.com

WhatsApp (41) 99937-1387
vendas@mippei.com

NBI bearings history milestones



Global footprint of the bearings division

NBI BEARINGS EUROPE

NBI headquarter, 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 Brazil, Mexico, Chile, Peru, USA and Germany

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

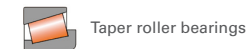
Laboratories in Wafandiang (China)

JERRY BEARINGS TRANSMISSION TECHNOLOGY

Roller manufacturing plant in Zhejiang (China)



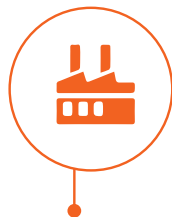
Strengths



Commercial capacity

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

Very active **commercial team** distributed across all the world



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



Bearing damage analysis



Advanced calculation capabilities



Assistance for maintenance issues, fitting practice, internal clearance selections



Lubrication analysis



Technical trainings and seminars

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

BEARINGS EUROPE **NBI**[®]



Distribuidor autorizado NBI

Curitiba/PR · atendemos todo o Brasil · mippei.com

WhatsApp (41) 99937-1387

vendas@mippei.com

NBI Taper Roller Bearing (TRB)

NBI taper 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.



Single row taper roller bearings

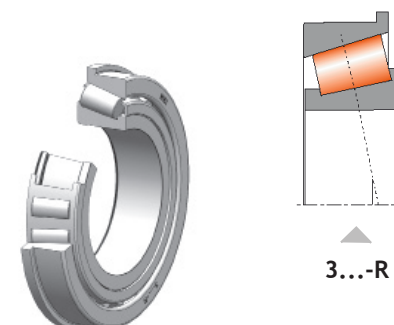
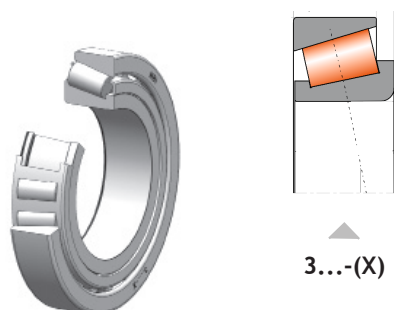
Single row taper roller bearings are separable radial bearings.

The main dimensions of the metric sized taper roller bearings are standardized by DIN 720 (Rolling Bearing - taper roller bearing) and ISO 355 (Rolling bearing - tapered roller bearing - Boundary dimensions and series designations).

NBI produces taper roller bearings in several design variants, (e.g. with flanges on outer rings) and types of material (e.g. through-hardening steels or case-hardening steels) on customer request or order, and also in mm and imperial dimensions.

These bearings are produced to tolerance class PN as standard but NBI bearings can be produced with closer tolerances according to customer requirements.

NBI taper roller bearings are fitted with pressed steel cages as standard.



NBI Taper Roller Bearing (TRB)

Paired single row taper roller bearings

Paired taper roller bearings are used where either the load capacity of single bearings does not meet the requirements, or to overcome the time consuming adjustment under the conditions of a mass mounting.

Paired taper roller bearings consist of two matched single row taper roller bearings using spacers for a specific axial clearance or a preload.

Depending on the particular requirements, such pairs may be supplied in:

Tandem arrangement, DT suffix

Bearings in tandem arrangements are used where the actual thrust force exceeds the load capacity of a single bearing. Require two spacers for matching as a unit, hence the desired total width of the bearing arrangement must be defined when ordering.

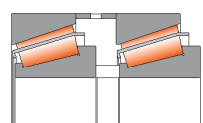
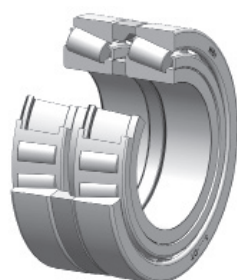
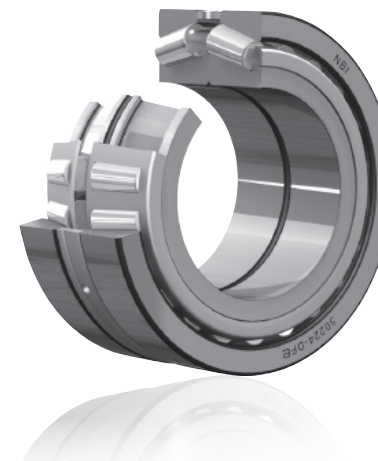
Back to back arrangement, DB suffix

Thrust forces are accommodated in both directions and in each direction forces are supported by one of matched the tapered roller bearings. Require two spacers for matching as a unit, the desired total width of bearing arrangement must be defined when ordering.

Face to face arrangement, DF suffix

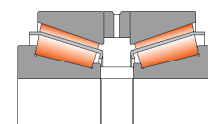
Thrust forces are accommodated in both directions and in each direction forces are supported by one of the matched tapered roller bearings. For bearing pairs arranged face to face the heating of the shaft will cause either a reduction of axial internal clearance or an increase in preloading forces.

Other arrangements are produced upon order request.



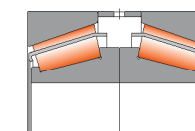
3....-DT

In tandem



3....-DB

Back to back



3....-DF

Face to face

NBI Taper Roller Bearing (TRB)



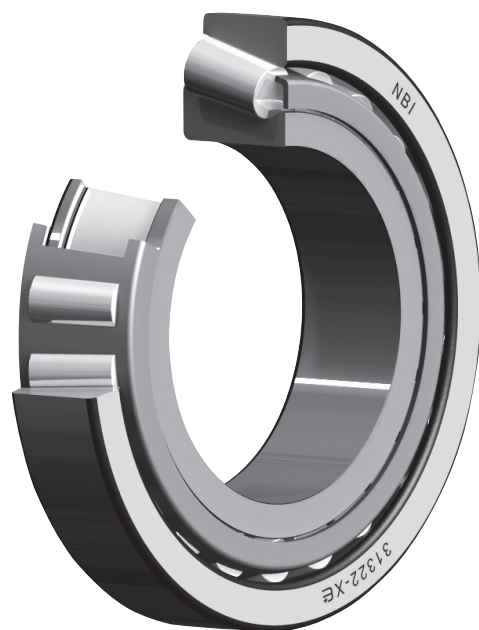
What is Enhanced+ bearing line?

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

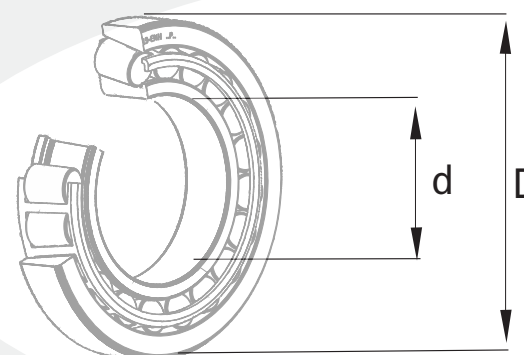
Enhanced+ advantages

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



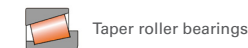
TRB
(Taper Roller Bearing)

Manufacturing sizes



From 15mm $\varnothing$ inner ring
to 1.600mm $\varnothing$ outer ring

Segments / Applications with typical needs for a premium TRB



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



Heavy lifting

Heavy lifting: hoist drives, sheaves, hook blocks



Mining/ Quarrying

haul mining trucks, drag/hoist/swing machineries for draglines and shovels, tunnel-boring machines, mechanical rock excavation machines, longwall shearers, armored face conveyors, continuous miners



Various industries / miscellaneous applications

industrial ventilators, fans, blowers, dryers, mechanical presses,



Steel

Rollneck support for rolling mills, pipe mills, auxiliary equipment



Power transmission pumps and compressors



Cement plants

vertical roller mills grinding rolls, geardrives for crushers and grinders



Off-road vehicles

wheel bearings, final drives and transmissions for front loaders, excavators, trucks, mobile cranes, agricultural machines, military vehicles



Aviation

Landing wheels



Oil & Gas

crown & travelling blocks, top drives, drawworks



Wind energy

Main shaft support, pitch and yaw drives for wind turbines

BEARINGS EUROPE | **NBI**[®]



Distribuidor autorizado NBI

Curitiba/PR · atendemos todo o Brasil · mippei.com

WhatsApp (41) 99937-1387

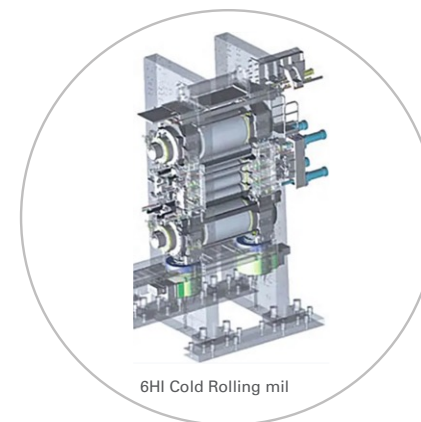
vendas@mippei.com

Examples of NBI customized TRB solutions

4-row tapered roller bearings for Steel industry

Rolling mills are maybe the most critical piece of equipment in a steel plant, mill operators depend on high-performance bearings to keep their operations running smoothly. Only the best engineered bearings can operate at high speeds and withstand harsh working conditions, all while carrying the heavy loads which define the normal operating environment in steel mills.

The 4-row tapered roller bearings from NBI are designed to satisfy the most stringent requirements of the rolling mill applications, including heavy load support capabilities, durability, and resistance to adverse environmental factors.



Rollneck bearings - 4-row TRB

Feature highlights

Designed to provide the maximum load carrying capacity in a minimum space

TQO design type, typical construction including:

- Inner Rings: Two double cones, straight bore
- Outer Rings: One double/two single cups
- Pin-type or stamped steel sheet cage
- Profiled rollers for optimal stress distribution
- Superfinished raceways for performance improvement in marginal lubrication conditions
- Typically delivered with normal precision
- Preset assembly with specific axial clearance adapted to the application conditions
- Bainitic hardened or case carburized components

Optional features

- Four single cups configuration (2TDI)
- Inner rings face slots: promote lubricant circulation to reduce face wear
- Lubrication entries in the outer ring spacers: ready for in-chock relubrication
- Helical groove in bore
- Restricted width tolerance



Special bearings for mining truck wheels

- Mining operations call for reliability, in all conditions. This is especially true for critical assets like mining / dump trucks, which often require specialized bearing features more often than other heavy mining vehicles due to their sustained heavy load and variable road condition operating environments, as well as diverse speeds.
- Applied load is an obvious factor that impacts wheel bearings performance, but other factors must also be considered, such as the operating speed (low speed can actually be detrimental to lubrication film generation hence affecting the bearing life), the contamination risk which is always present at any mining site, and specifics of transport operation - frequency of cornering, as well as the amount of time climbing or descending with load, for instance.
- Mining truck wheels support is generally based on two large tapered roller bearings (300-900 mm OD, typically with dissimilar sizes for front wheel and similar sizes for rear wheel) in O-arrangement, preloaded

NBI solution proposed for mining truck wheels support consists of large size, single-row tapered roller bearings with optimized internal geometry, using premium materials and manufacturing technologies for the best performance in the field.

- Separable bearing construction facilitates mounting and dismounting
- Special metric or inch dimensions and tolerances may be provided, as agreed with equipment manufacturers.
- Optimized cone rib design for enhanced axial load support capability and system rigidity
- Customized modifications of surface finishings and contact profiles for enhanced lubrication, low friction, and stress reduction.
- Wear-resistant coatings available upon request, for enhanced debris resistance, and reduced adhesive wear at the roller-race interface and smearing damage
- Tapped holes for handling purpose may be provided, at request



Examples of NBI customized TRB solutions

Special bearings for crown and travelling blocks in drilling rigs

-In an industry with a high cost of downtime, like Oil & Gas, the demands placed on the equipment are very high. Crown and travelling blocks play a critical role for the seamless operation of oil drilling rigs.

Crown and travelling blocks are built as sets of sheaves and work in tandem: crown block is affixed in the top of the derrick and used to change the direction of pull from the drawworks; travelling block handles the drill line keeping the topdrive / swivel at the required height position during operations

-Tapered roller bearings designed to API 8C standard are a popular alternative to cylindrical roller bearings for heavy sheaves, as those in drilling rigs' crown and travelling blocks

-Most popular choice is double-row tapered roller bearings in O-arrangement, with stamped steel cages and no cone spacer

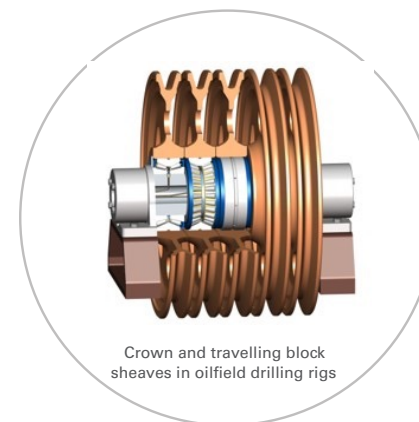
-Inch design - market preferred sizes: 8" - 10" - 12" - 14" - 15" bore

NBI solutions in sealed or open configurations comply with API 8C standard. Available also with anti corrosion coating.

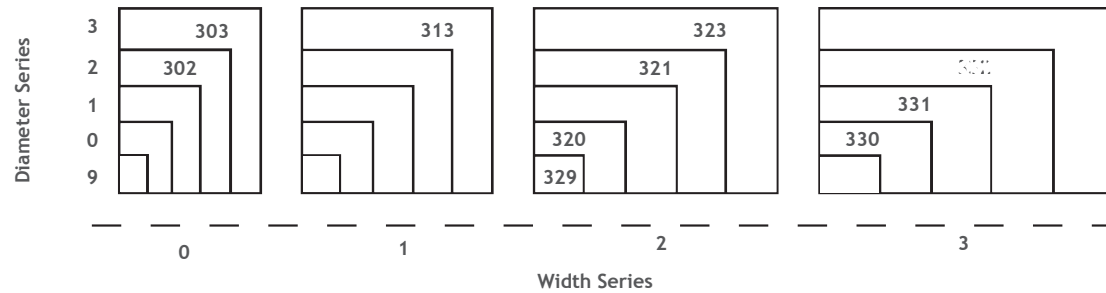
-Selected endplay value according to application specifics

-For open bearings, the outer surface of cones' large rib is appropriately prepared (ground) for seal riding

- Anti-corrosion coating available upon request



Dimensional Series for Original ISO System

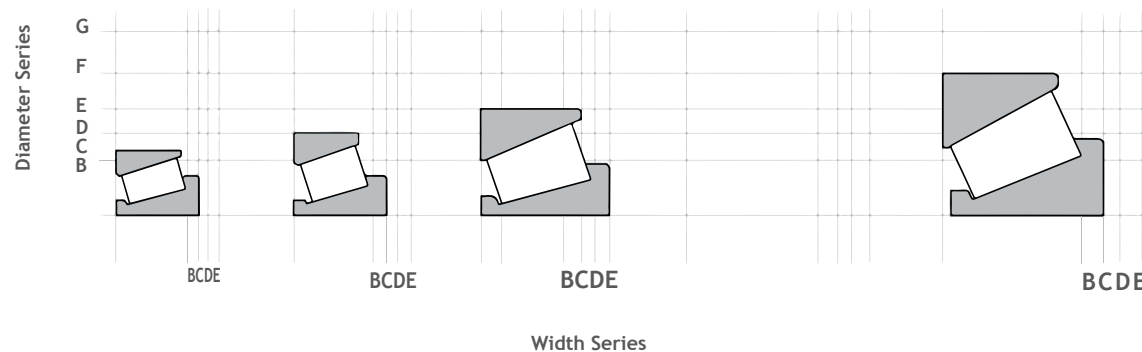


Highly engineered solutions

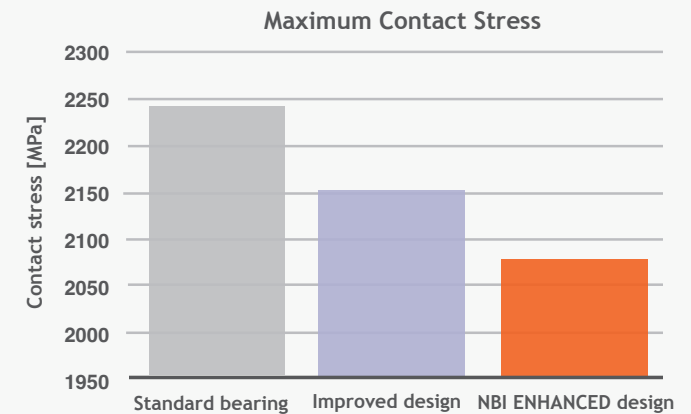
Advanced computer simulations using state-of-the-art computer analysis tools, combined with accurate laboratory analysis, confirmed that **NBI E+ Enhanced Taper roller bearings** are fully capable to deliver performance under the most demanding operating conditions.



Dimensional Series for new ISO System



Effects of ENH+ improved features over bearing performance



Original ISO System

Part-numbering of NBI TRB

TRB Dimension Series* Bore Code Suffixes Enhanced

3 **20** **08** **X-TVP** **ENH**

3 **23** **13** **B**

29, 20, 30, 31, 02,
22, 32, 03, 13, 23

If $20 \leq d < 500 \text{ mm} = d/5$
i.e. 32011 >> $d=55 \text{ mm}$
Exceptions:
02 = 15 mm
03 = 17 mm

* Based on ISO 15 dimensional plan for radial bearings

New ISO 355 System

Part-numbering of NBI TRB

TRB (optional) Angle Series Diameter & wind series Bore diameter Enhanced

T **4** **CB** **140** **ENH**

T **7** **FC** **060**

Angle Series Designation	α	
	Over	Incl.
1		Reservd for future use
2	10°	13° 52'
3	13° 52'	15° 59'
4	15° 59'	18° 55'
5	18° 55'	23°
6	23°	27°
7	27°	30°

Width Series Designation	T ($\frac{D-d}{2}$)	
	Over	Incl.
A		Reservd for future use
B	0,5	0,68
C	0,68	0,8
D	0,8	0,88
E	0,88	1

Diameter Series Designation	$\frac{D}{d}$	
	Over	Incl.
A		Reservd for future use
B	3,4	3,8
C	3,8	4,4
D	4,4	4,7
E	4,7	5
F	5	5,6
G	5,6	7



Taper roller bearings

BEARINGS EUROPE **NBI**®



Distribuidor autorizado NBI

Curitiba/PR · atendemos todo o Brasil · mippei.com

WhatsApp (41) 99937-1387

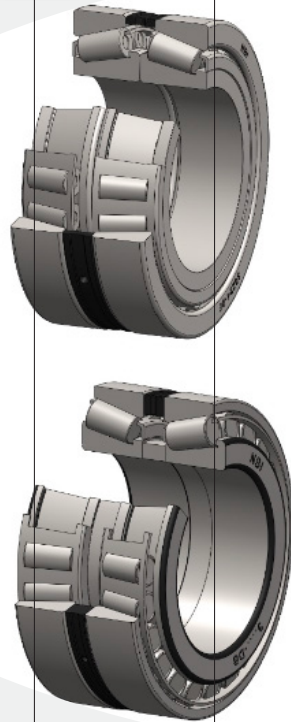
vendas@mippei.com

Matched bearings

Part-numbering of NBI TRB

TRB	Dimension Series	Bore Code	Arrangement	Clearance (non-standard)	Enhanced
3	02	17	DF	A390-450	ENH
3	20	30	DB		

If $20 \leq d < 500 \text{ mm} = d/5$
i.e. 32030 >> d=150mm
Exceptions:
02 = 15 mm
03 = 17 mm

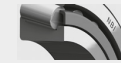


DF: Matched Face to Face (X arrangement)
DB: Matched Back to Back (O arrangement)
DT: Matched in Tandem

A = Axial clearance
Numbers = Lower & upper limit of the clearance range in microns
i.e. 390-450
= clearance range between 390 µm and 450 µm



Taper roller bearings



NBI Suffix

Suffix	Description
(J)	Pressed window-type steel cage. No suffix as standard on NBI tapered roller bearings
DB	Matched bearing pair arranged back-to-back
DF	Matched bearing pair arranged face-to-face
DT	Matched bearing pair arranged in tandem
C..	Special clearance. The two or three-figure number immediately following the C gives the mean axial internal
P6	Dimensional and running accuracy to old ISO tolerance class 6, better than Normal
T..	The number immediately following T gives the total width of bearing pairs arranged back-to-back or in tandem
TVP	Injection moulded window-type cage of glass fibre reinforced polyamide 6,6, roller centred
X	Boundary dimensions changed to conform to ISO
B	Steeper contact angle than standard design
R	Integrated flanged outer ring (Fig. 3)
HT01	Case Carburized
ENH	Dynamic load rating for Cr E*-values of the product table

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

BEARINGS EUROPE | **NBI**[®]



Distribuidor autorizado NBI

Curitiba/PR · atendemos todo o Brasil · mippei.com

WhatsApp (41) 99937-1387

vendas@mippei.com

Multi-location NBI manufacturing plants

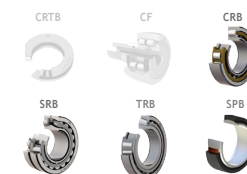


Cylindrical roller bearings



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

BEARINGS EUROPE | **NBI**[®]



Distribuidor autorizado NBI

Curitiba/PR · atendemos todo o Brasil · mippei.com

WhatsApp (41) 99937-1387

vendas@mippei.com

In-house laboratories equipped with the latest technology



Cylindrical roller bearings



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

BEARINGS
EUROPE **NBI**[®]



Distribuidor autorizado NBI

Curitiba/PR · atendemos todo o Brasil · mippei.com

WhatsApp (41) 99937-1387

vendas@mippei.com



Taper Roller Bearing

BEARINGS EUROPE | **NBI**[®]
Premium brand

3A-04-NBI taper roller bearing ballset v.0.

gruponbi.com



Distribuidor autorizado NBI
Curitiba/PR · atendemos todo o Brasil · mippei.com

WhatsApp (41) 99937-1387
vendas@mippei.com



Distribuidor autorizado NBI no Brasil

Rolamentos de rolos cônicos NBI

A Mippei Tecnologia Industrial é distribuidora autorizada NBI Bearings Europe.

Sede em Curitiba/PR, com atendimento técnico para todo o Brasil.

Fale com a engenharia de aplicação para selecionar o rolamento certo para a sua máquina.

Fale com a Mippei

WhatsApp / telefone: (41) 99937-1387

E-mail: vendas@mippei.com

Site: mippei.com

Curitiba · Paraná · Brasil