

WHAT TYPES AND SIZES OF ROLLING ELEMENTS FOR THE BEARING? WHERE'S CYLINDRICAL DOWEL PINS MANUFACTURER AND CUSTOM ROLLER CHARTS FACTORY? HOW TO BUY LOOSE PARALLEL PINS (SS304,SS316, SS440C) OR CERAMIC ROLLERS (SI3N4,ZRO2)?



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MANUFACTURER OF CYLINDER DOWEL PINS AND SUPER PRECISION ROLLERS(STAINLESS STEEL SS440C,SI3N4,ZRO2)! USA SUPPLIER OF SILICON NITRIDE SI3N4 ROLLERS CATALOGUE AND ZIRCONIUM OXIDE(ZRO2) DOWELS PINS



The choice of rolling element is fundamental to a bearing's design, performance, and application. Here are the main types, categorized by shape and function.

Needle Rollers

Shape: Thin, long cylinders with a length 3 to 10 times their diameter.



Characteristics: High Load in Small Space: Provide a very high radial load capacity for a given cross-sectional height. Compact Design: Enable lightweight and space-saving bearing assemblies. Requires Hardened Raceways: Often run directly on hardened shafts and housings (no inner/outer rings). Typical Bearing: Needle Roller Bearings, Needle Roller and Cage Assemblies, Cam Followers.

Quick Selection Guide Summary for precision rolling elements

precision needle rollers,bearing roller needles, needle roller bearing pins

Rolling Element	Best For...	Not Ideal For...
Needle Roller	High radial load in a very constrained space	Applications requiring high precision or axial loads
Cylindrical Roller	Very high pure radial loads, rigidity	Axial loads (generally)
Tapered Roller	High combined radial & axial loads	High-speed-only applications, misalignment

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Spherical Roller	Extreme radial loads, misalignment, shock loads	Very high precision, ultra-high speeds
precision needle rollers, needles, rollers, pins, bearing roller needles, needle roller bearing pins		

drive pins
steel balls
cylindrical roller
dowel pins

Cylindrical Rollers

Shape: Cylinders with a length slightly greater than their diameter.

Characteristics: Line Contact: Contact the raceways along a line, distributing load over a larger area. High Radial Load Capacity: Excellent for heavy pure radial loads. Limited Axial Capacity: Generally cannot handle axial loads unless flanged or as a special design. High Rigidity: Low deformation under load. Typical Bearing:



Cylindrical Roller Bearings (NU, NJ, N, NF types).

Tapered Rollers

Shape: Truncated cones. All extensions of the rollers converge at a common point on the bearing axis.

Characteristics: Line Contact (Tapered): Designed to handle combined loads. High Combined Load



Capacity: Can support significant radial and axial loads in one direction. Separable: The cup (outer ring) and cone (inner ring with rollers) can be mounted separately. Typical Bearing: Tapered Roller Bearings. Ubiquitous in automotive wheel hubs, gearboxes, and heavy machinery.

standard sizes of needle rollers

φ1x5.8	φ1x6.8	φ1x7.8	φ1x9.8				
φ1.5x5.8	φ1.5x6.8	φ1.5x7.8	φ1.5x9.8	φ1.5x11.8	φ1.5x13.8		
φ2x6.8	φ2x7.8	φ2x9.8	φ2x11.8	φ2x13.8	φ2x15.8	φ2x17.8	φ2x19.8
φ2.5x7.8	φ2.5x9.8	φ2.5x11.8	φ2.5x13.8	φ2.5x15.8	φ2.5x17.8	φ2.5x19.8	φ2.2x21.8
φ2.5x23.8							
φ3x9.8	φ3x11.8	φ3x13.8	φ3x15.8	φ3x17.8	φ3x19.8	φ3x21.8	φ3x23.8
φ3x25.8	φ3x27.8	φ3x29.8					
φ3.5x11.8	φ3.5x13.8	φ3.5x15.8	φ3.5x17.8	φ3.5x19.8	φ3.2x21.8	φ3.5x23.8	φ3.5x25.8
φ3.5x27.8	φ3.5x29.8	φ3.5x34.8					
φ4x11.8	φ4x13.8	φ4x15.8	φ4x17.8	φ4x19.8	φ4x21.8	φ4x23.8	φ4x25.8
φ4x27.8	φ4x29.8	φ4x34.8	φ4x39.8				
φ5x15.8	φ5x17.8	φ5x19.8	φ5x21.8	φ5x23.8	φ5x25.8	φ5x27.8	φ5x29.8
φ5x34.8	φ5x39.8	φ5x49.8					
φ6x17.8	φ6x19.8	φ6x21.8	φ6x23.8	φ6x25.8	φ6x27.8	φ6x29.8	φ6x34.8
φ6x39.8	φ6x49.8	φ6x59.8					
loose needle rollers, cylindrical rollers, needle rolling elements, bearing, precision needle rollers							

Spherical Rollers

Shape: Barrel-shaped (symmetrical or asymmetrical).

Characteristics: Line Contact (Self-Aligning): Roll between the spherical outer ring raceway and the inner ring. Self-Aligning: Can tolerate significant shaft misalignment and mounting errors. Very High Radial Load Capacity: Excellent for heavy, shock, and vibratory loads. Moderate Axial Load Capacity: Can handle axial loads in both directions. Typical Bearing: Spherical Roller Bearings. Used in mining, pulp and paper, and vibrating screens.

The choice is driven by the primary load type (radial, axial, or combined), magnitude of the load, required speed, available space, misalignment tolerance, and operating environment.

material of needle rolling elements

Material	Key Properties	Primary Driver for Use	Typical Applications
52100 Chrome Steel	High hardness, good fatigue life, cost-effectiv	General Purpose	Electric motors, appliances, automotive, industrial gearboxes
440C Stainless	Good hardness, corrosion resistant	Corrosion Resistance + Load	Food processing, marine, medical instruments
Silicon Nitride	Light, hard, insulating, corrosion resistant	High Speed ,Specialty	Machine tool spindles, precision devices, vacuum, aerospace
High-Temp Alloys (M50)	Retains hardness at high temperature	High Temperature	Jet engine main shaft bearings
needle rollers,cylindrical rollers, needle rolling elements, bearing,precision needle rollers			

Ceramic (Silicon Nitride - Si₃N₄)rollers

Used in Hybrid Bearings (ceramic balls with steel rings) and, less commonly, Full Ceramic Bearings.

Advantages: Low Density (40% of steel): Reduced centrifugal force, enabling much higher speeds. High Hardness: Superior wear resistance. Low Thermal Expansion: Maintains clearance under temperature swings. Electrical Insulation: Prevents arcing and electrolytic corrosion. Corrosion Resistance: Inert to most chemicals.

Typical Use: High-speed machine tool spindles, precision medical/dental handpieces, aerospace, vacuum/clean environments, applications where lubrication is scarce

hardness of martensitic bearing parts, (needle rollers, cylindrical rollers) quenching, tempering

parts	>	<	quenching hardness	tempering hardness	200°C	250°C	300°C
roller diameter,	...	20,	64HRC,	61~66HRC,	60~65HRC,	58~63HRC,	56~60HRC

what types and sizes of rolling elements for the bearing? where's cylindric...

roller diameter,	20,	40,	63HRC,	59~65HRC,	58~63HRC,	57~61HRC,	55~59HRC
roller diameter,	40,	...	61HRC,	58~64HRC,	57~62HRC,	57~60HRC,	54~58HRC

High-Temperature Steels & Specialty Alloys

M50, M50NiL: Tool steels used in jet engines. M50 is through-hardening; M50NiL is case-hardening. They retain hardness at temperatures up to 315°C (600°F).

Cronidur 30 (X30CrMoN15-1): A nitrogen-alloyed, corrosion-resistant steel with very high fatigue life. Used in aerospace and extreme conditions.

Tungsten Carbide (WC): Extremely hard and wear-resistant, but very dense and brittle. Used in very small, ultra-precision bearings for instruments or under extreme abrasion

diameter tolerances, grades, tolerance, roughness of precision rollers

tolerance grade(um)	roughness(um) t _{Ra.max}	t _{Rw}	upper limit	lower limit	regulation value	t _{WDwl}
G2	0.2,	1,	0	-2	0/-2	2
G2	0.2,	1,	-1	-3	-1/-3	2
G2	0.2,	1,	-2	-4	-2/-4	2
G2	0.2,	1,	-3	-5	-3/-5	2
G2	0.2,	1,	-4	-6	-4/-6	2
G2	0.2,	1,	-5	-7	-5/-7	2
G2	0.2,	1,	-6	-8	-6/-8	2
G2	0.2,	1,	-7	-9	-7/-9	2
G2	0.2,	1,	-8	-10	-8/-10	2
G3	0.2,	1.5,	0	-3	0/-3	3
G3	0.2,	1.5,	-1.5	-4.5	-1.5/-4.5	3
G3	0.2,	1.5,	-3	-6	-3/-6	3
G3	0.2,	1.5,	-4.5	-7.5	-4.5/-7.5	3
G3	0.2,	1.5,	-6	-9	-6/-9	3
G3	0.2,	1.5,	-7	-10	-7/-10	3
G5	0.2,	2.5,	0	-5	0/-5	5
G5	0.2,	2.5,	-3	-8	-3/-8	5
G5	0.2,	2.5,	-5	-10	-5/-10	5

precision needle rollers, needles, rollers, pins, bearing roller needles, needle roller bearing pins

Automotive Applications for Needle Rollers

Transmissions (Manual, Automatic, DCT, CVT) Planetary Gear Sets. Gear Supports: Used as needle roller and cage assemblies or drawn cup needle roller bearings on transmission input/output shafts, countershafts. Engine Components Rocker Arm Pivots. Piston Pins (Wrist Pins). Differentials & Axles, Differential Pinion & Side Gears. Steering Systems, Steering Columns and Intermediate Shafts. Universal Joints (U-Joints) & Constant Velocity (CV) Joints Cross Trunnions: The classic cross-and-yoke universal joint uses needle rollers in the bearing cups on each trunnion of the cross. Two-Wheelers & Small Engines. Small Engine Crankshafts: In some small-displacement engines, needle roller main bearings are used for their compactness and cost-effectiveness.

length tolerances of grades needle rollers

>	<	upper limit $t_{LW}(h13)$	lower limit $t_{LW}(h13)$
3	6	0	-0.18
6	10	0	-0.22
10	18	0	-0.27
18	30	0	-0.33
30	50	0	-0.39
50	80	0	-0.46

Why Needle Rollers Are Chosen for Automotive?

Space & Weight Savings (Most Critical): Automotive design is a relentless battle for space and weight reduction to improve fuel efficiency, packaging, and performance. Needle rollers win where other bearings simply won't fit.

High Load in Small Diameter: They can support the high radial loads from gears, belts, and shafts without requiring a large increase in shaft or housing size. Cost-Effective Compactness: Often, a simple needle roller and cage assembly running directly on a hardened shaft and in a hardened housing is cheaper and more compact than installing a bearing with separate inner and outer rings.

needle rollers Vs mini shafts needle rollers Vs grooved pins needle rollers Vs dowel pins needle rollers Vs cylindrical rollers needle rollers Vs locating pins needle rollers Vs locating pins rollers Vs needle bearings different types manufacturing process stainless steel bearing steel robot joint bearings linear actuators roller sensors cross guide rails cross bearings drive pins needle roller bearing copyright©2017-2026 YDTech®