



Ceramic Bearing Balls - Selection & Spec Sheet

Si₃N₄ balls, grades G5 / G10 / G20, 3-50 mm | ~60% lighter than steel, electrically insulating, corrosion resistant

NitriCeram silicon nitride bearing balls for hybrid and full-ceramic bearings. A hybrid bearing pairs steel rings with Si₃N₄ balls - about 60% lighter, harder than bearing steel and electrically insulating. That combination lets spindles, turbines and EV motors run faster, cooler and longer than an all-steel design allows.

Why ceramic balls

Advantage	What it does in the bearing
~60% lighter than steel	Lower centrifugal load lets spindles and turbines run at higher DN values before the balls deform, skid or overheat.
Hardness 1500-1800 HV	Polished to Ra <= 0.02 um - less wear, lower friction heat and longer relubrication intervals.
Electrically insulating	Blocks shaft currents in VFD- and inverter-driven motors, preventing fluting and arc pitting on the races.
Corrosion resistant	Survives food, chemical, vacuum and coastal environments that rust steel balls.
Non-magnetic, tolerant of marginal lubrication	Stable in sensor, medical and magnetic environments; keeps running through dry-run events, lube starvation and vacuum.

Material comparison

Property	Bearing steel (GCr15)	Zirconia (ZrO ₂)	Si ₃ N ₄
Density (g/cm ³)	~7.8	~6.0	~3.2
Hardness (HV)	~700	~1200-1300	1500-1800
Relative ball weight	Baseline	~77% of steel	~41% of steel
Electrical behaviour	Conductive	Insulating	Insulating
Corrosion resistance	Poor - rusts	Good	Excellent
Best for	Heavy, shock-loaded, low-speed duty	Cost-sensitive insulation, lower speed	High speed, high temperature, electrical and corrosive duty

Zirconia insulates and costs less, but it is heavier and does not match silicon nitride on hardness or corrosion resistance. For very heavy, shock-loaded or low-speed duty, steel is still the honest answer - we say so when it is true, and decide with a duty-cycle review rather than a catalogue page.

Standard capability

Item	Standard capability
Grade	G5 / G10 / G20, per the ISO 3290 ball-grade convention
Diameter	3 - 50 mm (custom sizes quoted on request)
Sphericity	<= 0.13 um at G5; <= 0.25 um at G10
Surface finish	Ra <= 0.02 um (polished)
Material	Gas-pressure sintered Si ₃ N ₄ , HIP densified, >= 3.20 g/cm ³ - above 99% of theoretical density
Hardness	1500 - 1800 HV10



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Si3N4 balls, grades G5 / G10 / G20, 3-50 mm | ~60% lighter than steel, electrically insulating, corrosion resistant

Item	Standard capability
Supply form	Loose balls; hybrid sets (Si3N4 balls with steel rings); full-ceramic assemblies
Inspection	100% visual and dimensional inspection; grade report with sphericity and roughness values on request
Packing	Cleaned and individually protected so the polished surface arrives intact - a scratched ball is a rejected ball

Applications

Application	Why Si3N4 balls
Machine-tool spindles	Higher DN limits and lower running temperature mean less thermal growth - better dimensional accuracy at the tool tip
EV motors and VFD-driven equipment	Insulating balls stop shaft currents from arcing through the races, the classic cause of inverter-bearing failure
Turbines, aerospace and vacuum	Low mass and oil-free tolerance suit turbochargers, gyros, vacuum pumps and other high-speed or lube-starved duty
Pumps, wind generators, food / chemical / medical	Where rust or contamination rules steel out

How we work

Step	What happens
1 - Send the duty cycle	Speed (or DN value), load, temperature, lubrication, media and the rings you intend to pair with
2 - Selection review in 24-48 h	Grade, diameter, tolerance class and a plain recommendation - including "steel is cheaper here" when that is the honest answer
3 - Sample balls	Supplied with grade data and material certificate so you can run your own bench or rig test
4 - Production	Per-lot records, 100% dimensional inspection and a certificate naming grade, sintering route and measured density

Why NitriCeram

Sintered in-house, not bought in and resold. NitriCeram is a brand of Shandong Dolphin Technology Co., Ltd., with an integrated line from powder synthesis through forming, gas-pressure sintering, HIP, precision grinding and lapping, and in-house testing - 15 gas-pressure sintering furnaces, 9 HIP and 3 hot press units. Ball grinding and lapping are done on site, so sphericity and surface finish are controlled at the process rather than negotiated with a subcontractor. Diamond grinding and lapping for bores and profiles; ~100 R&D; staff (15 PhDs, 40+ MSc) and an in-house reliability (Weibull) laboratory built in 2024. ISO 9001 quality system; material certificate naming grade, route and measured density (> 99% of theoretical) with every shipment.

Send your speed, load, temperature and media to dolphintec@aliyun.com - we reply within 24-48 hours with the right grade, diameter and tolerance class, or an honest note that steel still wins for your case. NDA signed on request before drawings or test data change hands.