MECHANICAL · CHEAT SHEET

Bearing *dimension reference*.

Common ball bearings — **bore, outside diameter, and width** for 6xxx-series single-row deep-groove bearings. The cross-reference between number designation and physical size.

The chart

BEARING NUMBER	BORE (MM)	OD (MM)	WIDTH (MM)	SERIES / NOTES
608	8	22	7	Skateboard / fidget spinner standard
6000	10	26	8	Light (60xx)
6001	12	28	8	Light series
6002	15	32	9	Light series
6003	17	35	10	Light series
6004	20	42	12	Light series
6005	25	47	12	Light series
6006	30	55	13	Light series
6007	35	62	14	Light series
6008	40	68	15	Light series
6200	10	30	9	**Medium (62xx)** — most common general-purpose

BEARING NUMBER	BORE (MM)	OD (MM)	WIDTH (MM)	SERIES / NOTES
6201	12	32	10	Medium series
6202	15	35	11	Medium series
6203	17	40	12	Medium — typical small electric motor
6204	20	47	14	Medium series
6205	25	52	15	Medium — common gearbox bearing
6206	30	62	16	Medium series
6207	35	72	17	Medium series
6208	40	80	18	Medium series
6209	45	85	19	Medium series
6210	50	90	20	Medium series
6300	10	35	11	Heavy (63xx) — higher load capacity
6301	12	37	12	Heavy series
6302	15	42	13	Heavy series
6303	17	47	14	Heavy series
6304	20	52	15	Heavy series
6305	25	62	17	Heavy series
6306	30	72	19	Heavy series
6307	35	80	21	Heavy series
6308	40	90	23	Heavy series

How bearing numbers work. For 6xxx-series ball bearings: the **first digit (6)** indicates single-row deep-groove ball bearing. The **second digit** is the series — 0 (extra light), 2 (medium), 3 (heavy), reflecting load capacity. The **last two digits** indicate bore: for digits ≥ 04, multiply by 5 (so 6206 = 30 mm bore). For 00-03, bore is 10/12/15/17 mm respectively. Width and OD scale with the series.

Common applications

APPLICATION	TYPICAL BEARING	WHY
Skateboard / fidget spinner	608	8 mm bore standard
Inline skate wheel	608	Same as skateboard
Small electric motor (washer, fridge)	6203, 6204	Common shaft sizes
Larger electric motor (5 HP)	6205, 6206	25-30 mm shaft
Automotive wheel hub	Tapered roller	Not 6xxx — uses tapered roller bearings
Bicycle wheel hub (loose ball)	1/4" balls	Older designs; modern uses sealed cartridges
Bicycle bottom bracket (cartridge)	6804, 6805, etc.	Thin-section bearings (68xx series)
Industrial pillow block bearing	6206, 6208	Mounted in housing for shaft support
High-speed spindle (machine tool)	Angular contact	Not 6xxx — uses 7xxx series for axial load
Conveyor roller	6204, 6205	Plus seals for dust resistance

Common pitfalls

- **Bearing number tells you size, not service condition.** A 6205 ZZ (with metal shields), 6205 2RS (rubber seals), 6205 C3 (looser radial clearance), and 6205 P5 (higher precision) all have the same dimensions but different sealing, clearance, and tolerance. The suffix matters.
- **Radial vs angular contact bearings.** 6xxx series carries mostly radial load. For combined radial + axial, use angular contact (7xxx) or tapered roller. A 6xxx bearing under significant axial load will fail.
- **Bore tolerance and shaft fit matter.** A 25 mm bore bearing has a specific tolerance (typically -0.000/-0.010 mm). The shaft must be sized for press fit (k5/k6/n6) or sliding fit (g6/h6) depending on whether the inner race rotates or is stationary.
- **Speed limits depend on lubrication.** A 6205 ball bearing can run at 12,000+ rpm with grease, 20,000+ rpm with oil. Above these limits, heat builds up faster than it can dissipate.
- **'Sealed for life' isn't.** Sealed bearings (2RS, 2Z) are good for 5-10 years in normal service, but seal life depends on temperature, dust exposure, and rotation speed. Hot or dirty environments shorten service life significantly.

Common questions

What does the 6200 series number mean?

It's a size code. The first digit (6) means deep-groove ball bearing; the second (2) is the series (light duty). The last two digits multiplied by 5 give the bore diameter for sizes 04 and up. So a 6204 has a 20 mm bore (04 × 5

= 20). Sizes 00-03 are exceptions: 00 = 10 mm, 01 = 12 mm, 02 = 15 mm, 03 = 17 mm.

What's the difference between 6200 and 6300 series?

Same bore diameters, but 6300 is heavier duty — bigger outer diameter, thicker rings, higher load capacity. A 6204 and a 6304 both fit a 20 mm shaft, but the 6304 is physically larger overall and handles roughly 50% more radial load. Use 6300 when shaft sizes are fixed but loads are high.

How do I identify a sealed vs shielded bearing?

Sealed bearings (suffix 2RS, RS, or DDU) have rubber lips that contact the inner race — better at keeping contamination out but creates friction. Shielded bearings (suffix ZZ, 2Z, or Z) have metal shields with a small gap — lower friction but less protection. For a wet or dusty environment use sealed; for high-speed clean applications use shielded.

What does '608' mean and why is it everywhere?

608 = deep-groove ball bearing, light series, 8 mm bore. It's the standard skateboard wheel bearing, also used in fidget spinners, fans, and many small motors. Cheap, mass-produced, available in literally millions of variants. Outer diameter is 22 mm, width 7 mm.

Are 608ZZ and 608RS interchangeable?

Mechanically yes — same bore, OD, width, and load rating. The difference is the seal. 608ZZ (metal shielded) is fine for skateboards and fans where dust isn't constant. 608RS or 6082RS (rubber sealed) is better for wet, dirty environments at the cost of slightly higher rolling resistance.

Sources

- **Bearing dimension standards:** ISO 15 — Rolling bearings — Radial bearings — Boundary dimensions, general plan.
- **ABMA standards (US):** ABMA Standard 20 — Radial Bearings of Ball, Cylindrical Roller and Spherical Roller Types — Boundary Dimensions.
- **Tolerance grades:** ABMA Standard 20 and ISO 492.
- **Designation system:** ISO 15, with manufacturer-specific extensions (SKF, FAG, Timken catalogs).

Disclaimer. Bearing selection requires load analysis (radial, axial, dynamic, static), speed, lubrication, temperature, and environment. For critical applications, consult bearing manufacturer catalog or engineering reference.