DESIGN GUIDELINE

Bearing Housing Design Guide

When a bearing goes into a 3D-printed part, a hole that is too tight cracks the part or damages the bearing, and one that is too loose lets it wobble. Model the bearing hole, shoulders and walls to this guide so the bearing presses in once and spins smoothly.

01 · SIZE CHART

Size chart

Model ZZ shielded / open	Bore × OD × Width d × D × B	Press-fit hole ØH tight	Slip-fit hole removable	Hole depth flush	Housing shoulder ØDa min.	Shaft shoulder Øda max.	Min. wall t
MR117ZZ MR117	7 × 11 × 3 open 2.5	**11.1**	11.25	3 open 2.5	10.2	7.8	3
MR137ZZ MR137	7 × 13 × 4 open 3	**13.1**	13.25	4 open 3	11.8	8.2	3
687ZZ 687	7 × 14 × 5 open 3.5	**14.1**	14.25	5 open 3.5	12.6	8.4	3
697ZZ 697	7 × 17 × 5	**17.1**	17.25	5	15	9	3
607ZZ 607	7 × 19 × 6	**19.1**	19.25	6	16.6	9.4	3
627ZZ 627	7 × 22 × 7	**22.1**	22.25	7	19	10	3
637ZZ 637	7 × 26 × 9	**26.1**	26.25	9	22.2	10.8	3
MR128ZZ MR128	8 × 12 × 3.5 open 2.5	**12.1**	12.25	3.5 open 2.5	11.2	8.8	3
MR148ZZ MR148	8 × 14 × 4 open 3.5	**14.1**	14.25	4 open 3.5	12.8	9.2	3
688ZZ 688	8 × 16 × 5 open 4	**16.1**	16.25	5 open 4	14.4	9.6	3
698ZZ 698	8 × 19 × 6	**19.1**	19.25	6	16.8	10.2	3
608ZZ 608	8 × 22 × 7	**22.1**	22.25	7	19.2	10.8	3
628ZZ 628	8 × 24 × 8	**24.1**	24.25	8	20.8	11.2	3

Model ZZ shielded / open	Bore × OD × Width d × D × B	Press-fit hole ØH tight	Slip-fit hole removable	Hole depth flush	Housing shoulder ØDa min.	Shaft shoulder Øda max.	Min. wall t
638ZZ 638	8 × 28 × 9	**28.1**	28.25	9	24	12	3
689ZZ 689	9 × 17 × 5 open 4	**17.1**	17.25	5 open 4	15.4	10.6	3
699ZZ 699	9 × 20 × 6	**20.1**	20.25	6	17.8	11.2	3
609ZZ 609	9 × 24 × 7	**24.1**	24.25	7	21	12	3
629ZZ 629	9 × 26 × 8	**26.1**	26.25	8	22.6	12.4	3
639ZZ 639	9 × 30 × 10	**30.1**	30.25	10	25.8	13.2	3
6700ZZ 6700	10 × 15 × 4 open 3	**15.1**	15.25	4 open 3	14	11	3
6800ZZ 6800	10 × 19 × 5	**19.1**	19.25	5	17.2	11.8	3
6900ZZ 6900	10 × 22 × 6	**22.1**	22.25	6	19.6	12.4	3
6000ZZ 6000	10 × 26 × 8	**26.1**	26.25	8	22.8	13.2	3
6200ZZ 6200	10 × 30 × 9	**30.1**	30.25	9	26	14	3
6300ZZ 6300	10 × 35 × 11	**35.1**	35.25	11	30	15	3.5
6701ZZ 6701	12 × 18 × 4	**18.1**	18.25	4	16.8	13.2	3
6801ZZ 6801	12 × 21 × 5	**21.1**	21.25	5	19.2	13.8	3
6901ZZ 6901	12 × 24 × 6	**24.1**	24.25	6	21.6	14.4	3
6001ZZ 6001	12 × 28 × 8	**28.1**	28.25	8	24.8	15.2	3
16001ZZ 16001	12 × 28 × 7	**28.1**	28.25	7	24.8	15.2	3

Model ZZ shielded / open	Bore × OD × Width d × D × B	Press-fit hole ØH tight	Slip-fit hole removable	Hole depth flush	Housing shoulder ØDa min.	Shaft shoulder Øda max.	Min. wall t
6201ZZ 6201	12 × 32 × 10	**32.1**	32.25	10	28	16	3.2
6301ZZ 6301	12 × 37 × 12	**37.1**	37.25	12	32	17	3.7
6802ZZ 6802	15 × 24 × 5	**24.1**	24.25	5	22.2	16.8	3
6902ZZ 6902	15 × 28 × 7	**28.1**	28.25	7	25.4	17.6	3
6002ZZ 6002	15 × 32 × 9	**32.1**	32.25	9	28.6	18.4	3.2
16002ZZ 16002	15 × 32 × 8	**32.1**	32.25	8	28.6	18.4	3.2
6202ZZ 6202	15 × 35 × 11	**35.1**	35.25	11	31	19	3.5
6302ZZ 6302	15 × 42 × 13	**42.1**	42.25	13	36.6	20.4	4.2
6803ZZ 6803	17 × 26 × 5	**26.1**	26.25	5	24.2	18.8	3
6903ZZ 6903	17 × 30 × 7	**30.1**	30.25	7	27.4	19.6	3
6003ZZ 6003	17 × 35 × 10	**35.1**	35.25	10	31.4	20.6	3.5
16003ZZ 16003	17 × 35 × 8	**35.1**	35.25	8	31.4	20.6	3.5
6203ZZ 6203	17 × 40 × 12	**40.1**	40.25	12	35.4	21.6	4
6303ZZ 6303	17 × 47 × 14	**47.1**	47.25	14	41	23	4.7
6804ZZ 6804	20 × 32 × 7	**32.1**	32.25	7	29.6	22.4	3.2
6904ZZ 6904	20 × 37 × 9	**37.1**	37.25	9	33.6	23.4	3.7
16004ZZ 16004	20 × 42 × 8	**42.1**	42.25	8	37.6	24.4	4.2

Model ZZ shielded / open	Bore × OD × Width d × D × B	Press-fit hole ØH tight	Slip-fit hole removable	Hole depth flush	Housing shoulder ØDa min.	Shaft shoulder Øda max.	Min. wall t
6004ZZ 6004	20 × 42 × 12	**42.1**	42.25	12	37.6	24.4	4.2
6204ZZ 6204	20 × 47 × 14	**47.1**	47.25	14	41.6	25.4	4.7
6304ZZ 6304	20 × 52 × 15	**52.1**	52.25	15	45.6	26.4	5.2
6805ZZ 6805	25 × 37 × 7	**37.1**	37.25	7	34.6	27.4	3.7
6905ZZ 6905	25 × 42 × 9	**42.1**	42.25	9	38.6	28.4	4.2
16005ZZ 16005	25 × 47 × 8	**47.1**	47.25	8	42.6	29.4	4.7
6005ZZ 6005	25 × 47 × 12	**47.1**	47.25	12	42.6	29.4	4.7
6205ZZ 6205	25 × 52 × 15	**52.1**	52.25	15	46.6	30.4	5.2
6305ZZ 6305	25 × 62 × 17	**62.1**	62.25	17	54.6	32.4	6.2
6806ZZ 6806	30 × 42 × 7	**42.1**	42.25	7	39.6	32.4	4.2
6906ZZ 6906	30 × 47 × 9	**47.1**	47.25	9	43.6	33.4	4.7
16006ZZ 16006	30 × 55 × 9	**55.1**	55.25	9	50	35	5.5
6006ZZ 6006	30 × 55 × 13	**55.1**	55.25	13	50	35	5.5
6206ZZ 6206	30 × 62 × 16	**62.1**	62.25	16	55.6	36.4	6.2
6306ZZ 6306	30 × 72 × 19	**72.1**	72.25	19	63.6	38.4	7.2
6807ZZ 6807	35 × 47 × 7	**47.1**	47.25	7	44.6	37.4	4.7
6907ZZ 6907	35 × 55 × 10	**55.1**	55.25	10	51	39	5.5

Model ZZ shielded / open	Bore × OD × Width d × D × B	Press-fit hole ØH tight	Slip-fit hole removable	Hole depth flush	Housing shoulder ØDa min.	Shaft shoulder Øda max.	Min. wall t
16007ZZ 16007	35 × 62 × 9	62.1	62.25	9	56.6	40.4	6.2
6007ZZ 6007	35 × 62 × 14	62.1	62.25	14	56.6	40.4	6.2
6207ZZ 6207	35 × 72 × 17	72.1	72.25	17	64.6	42.4	7.2
6307ZZ 6307	35 × 80 × 21	80.1	80.25	21	71	44	8
6808ZZ 6808	40 × 52 × 7	52.1	52.25	7	49.6	42.4	5.2
6908ZZ 6908	40 × 62 × 12	62.1	62.25	12	57.6	44.4	6.2
16008ZZ 16008	40 × 68 × 9	68.1	68.25	9	62.4	45.6	6.8
6008ZZ 6008	40 × 68 × 15	68.1	68.25	15	62.4	45.6	6.8
6208ZZ 6208	40 × 80 × 18	80.1	80.25	18	72	48	8
6308ZZ 6308	40 × 90 × 23	90.1	90.25	23	80	50	9
6809ZZ 6809	45 × 58 × 7	58.1	58.25	7	55.4	47.6	5.8
6909ZZ 6909	45 × 68 × 12	68.1	68.25	12	63.4	49.6	6.8
16009ZZ 16009	45 × 75 × 10	75.1	75.25	10	69	51	7.5
6009ZZ 6009	45 × 75 × 16	75.1	75.25	16	69	51	7.5
6209ZZ 6209	45 × 85 × 19	85.1	85.25	19	77	53	8.5
6309ZZ 6309	45 × 100 × 25	100.1	100.25	25	89	56	10
6810ZZ 6810	50 × 65 × 7	65.1	65.25	7	62	53	6.5

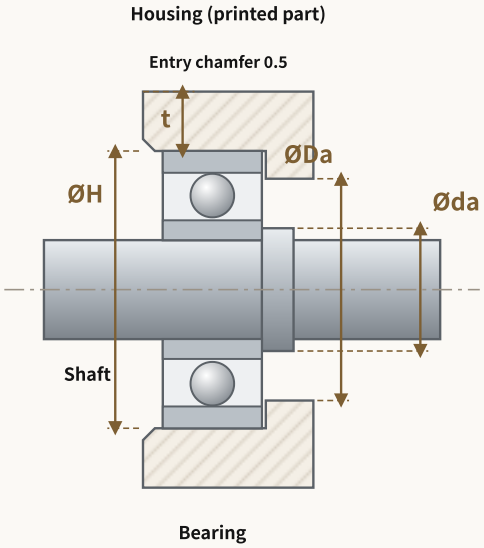
Model ZZ shielded / open	Bore × OD × Width d × D × B	Press-fit hole ØH tight	Slip-fit hole removable	Hole depth flush	Housing shoulder ØDa min.	Shaft shoulder Øda max.	Min. wall t
6910ZZ 6910	50 × 72 × 12	72.1	72.25	12	67.6	54.4	7.2
16010ZZ 16010	50 × 80 × 10	80.1	80.25	10	74	56	8
6010ZZ 6010	50 × 80 × 16	80.1	80.25	16	74	56	8
6210ZZ 6210	50 × 90 × 20	90.1	90.25	20	82	58	9
6310ZZ 6310	50 × 110 × 27	110.1	110.25	27	98	62	11
6811ZZ 6811	55 × 72 × 9	72.1	72.25	9	68.6	58.4	7.2
6911ZZ 6911	55 × 80 × 13	80.1	80.25	13	75	60	8
16011ZZ 16011	55 × 90 × 11	90.1	90.25	11	83	62	9
6011ZZ 6011	55 × 90 × 18	90.1	90.25	18	83	62	9
6211ZZ 6211	55 × 100 × 21	100.1	100.25	21	91	64	10
6311ZZ 6311	55 × 120 × 29	120.1	120.25	29	107	68	12
6812ZZ 6812	60 × 78 × 10	78.1	78.25	10	74.4	63.6	7.8
6912ZZ 6912	60 × 85 × 13	85.1	85.25	13	80	65	8.5
16012ZZ 16012	60 × 95 × 11	95.1	95.25	11	88	67	9.5
6012ZZ 6012	60 × 95 × 18	95.1	95.25	18	88	67	9.5
6212ZZ 6212	60 × 110 × 22	110.1	110.25	22	100	70	11
6312ZZ 6312	60 × 130 × 31	130.1	130.25	31	116	74	13

Model ZZ shielded / open	Bore × OD × Width d × D × B	Press-fit hole ØH tight	Slip-fit hole removable	Hole depth flush	Housing shoulder ØDa min.	Shaft shoulder Øda max.	Min. wall t
6813ZZ 6813	65 × 85 × 10	**85.1**	85.25	10	81	69	8.5
6913ZZ 6913	65 × 90 × 13	**90.1**	90.25	13	85	70	9
16013ZZ 16013	65 × 100 × 11	**100.1**	100.25	11	93	72	10
6013ZZ 6013	65 × 100 × 18	**100.1**	100.25	18	93	72	10
6213ZZ 6213	65 × 120 × 23	**120.1**	120.25	23	109	76	12
6313ZZ 6313	65 × 140 × 33	**140.1**	140.25	33	125	80	14
6814ZZ 6814	70 × 90 × 10	**90.1**	90.25	10	86	74	9
6914ZZ 6914	70 × 100 × 16	**100.1**	100.25	16	94	76	10
16014ZZ 16014	70 × 110 × 20	**110.1**	110.25	20	102	78	11
6014ZZ 6014	70 × 110 × 20	**110.1**	110.25	20	102	78	11
6214ZZ 6214	70 × 125 × 24	**125.1**	125.25	24	114	81	12.5
6314ZZ 6314	70 × 150 × 35	**150.1**	150.25	35	134	86	15

Unit: mm. Press-fit hole = OD + 0.1, slip-fit hole = OD + 0.25 (FDM-printed holes usually come out 0.1–0.2 smaller; print a test ring first). Hole depth = bearing width (add or subtract if the bearing should stick out or sit deeper). Housing shoulder = OD − 0.2 × (OD − bore) and shaft shoulder = bore + 0.2 × (OD − bore), so they touch only the outer or inner ring and never the shield or cage. Minimum wall = 10% of the OD, at least 3 mm. Open bearings (no shields, model without ZZ, e.g. 608) have the same bore and OD as ZZ; the small text under each model is the open model number. Where the open version is narrower (MR117, MR137, MR128, MR148, 687–689 and 6700), its width and hole depth are marked “open”; model the hole for the bearing you actually use.

02 · CROSS SECTION

Housing cross section



- **ØH** Bearing hole: use the press-fit size, or the slip-fit size if the bearing must come out again. Add a 0.5 mm chamfer at the opening so the bearing lines up easily.
- **ØDa** Housing shoulder: leave a lip at the bottom of the hole for the bearing to sit on. Its inner diameter must not be smaller than the table value, or it rubs the shield (the cage on open bearings) and the bearing will not turn.
- **Øda** Shaft shoulder: the step on the shaft must touch only the inner ring; keep it no larger than the table value.
- **t** Wall: keep at least the listed thickness around the bearing hole so the part does not crack when the bearing is pressed in.

03 · FIT

Choosing a fit

01 **Press fit (tight)**: The most common choice. The hole wall grips the bearing, so nothing else is needed; best where it is rarely removed. Press on the outer ring only, slowly, using a flat plate or another bearing as a pusher.

02 **Slip fit + retainer**: A slightly loose hole; after the bearing goes in, hold it with a cover plate, circlip or screws. Easy to take apart and service.

03 **Glued**: Use the slip-fit size and put a little CA glue or epoxy on the outer ring. Keep glue out of the bearing or it will seize.

04 **Embedded while printing**: Pause the print at the top of the hole, drop the bearing in and continue, so it is fully enclosed (mention it in your quote and we will do it).

04 · DESIGN TIPS

Design tips

Reading the model number

- **MR, 6xx**: miniature bearings, e.g. 608ZZ = 8 mm bore, 22 mm OD, 7 mm wide.
- **67, 68, 69 series**: thin section; small OD for tight spaces.
- **60, 62, 63 series**: for the same bore, a higher number means a larger, stronger bearing.
- **ZZ** = metal shields on both sides (dust-resistant, not waterproof); without ZZ (e.g. 608) = open, no shields. We sell Taiwan-made and KOYO (Japan) bearings, shielded (ZZ) and open; KOYO is price on request.

Print orientation

- Print the bearing hole **perpendicular to the build plate** (axis pointing up) for the roundest, most accurate hole.
- If the hole touches the build plate, the first layer flares out (elephant's foot); add a 0.3–0.5 mm chamfer at the opening.
- Horizontal holes sag at the top and press in tighter; add 0.1 mm to the hole or use a slip fit with a retainer.

Shafts and retention

- Use a metal shaft (h6–k6 tolerance); printed shafts suit only low speed and light loads.
- Hold the bearing on both sides: a shoulder on one side and a cover plate, circlip or screws on the other.
- When two bearings carry one shaft, space them as far apart as possible, at least 2× the shaft diameter.

Speed and load

- Printed parts slowly deform under constant load (creep); for long-term loads use PETG or better and thicker walls.
- High speed creates heat and PLA softens at about 55 °C; near motors or fans use ABS, ASA or PC.
- ZZ shields are not enough for water or fine dust; add a seal or ask us.

05 · MATERIALS

Materials

Good **PLA / PLA+**	Accurate and easy to print; fine for light loads and low speed, but deforms under long-term load or heat.
Good **PETG**	Tough and less likely to crack when pressing in; the first choice for general mechanisms.
Good **ABS / ASA / PC**	Heat-resistant and strong; for housings near motors, hot areas or higher loads.
Good **PA / carbon-fiber composites**	Best stiffness and wear resistance for long-running mechanisms (confirm the material with us).
Caution **Resin (SLA)**	Brittle and cracks easily when pressing in; use a slip fit with a retainer, or ask us first.
Caution **TPU (flexible)**	Too soft, the bearing wobbles; it works as a damping sleeve, but needs a separate rigid housing.

06 · CHECKLIST

Checklist before you submit

- ☐ Bearing hole modeled from the size chart (press fit or slip fit)
- ☐ Housing and shaft shoulders do not touch the shields or cage
- ☐ 0.3–0.5 mm chamfer at the hole opening
- ☐ Pressing in or embedding by us is noted in the quote
- ☐ Hole depth equals the bearing width, or the offset is noted
- ☐ Wall around the hole ≥ the listed minimum
- ☐ Hole printed axis-up, or the orientation is noted

Questions about your design? Send it to us first

Attach your file or a screenshot and we will check the bearing model and hole sizes

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