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M12 · English · bolt-torque-chart-m12-en

Bolt Torque Chart — M12

M12 · 6 property classes · 5 friction states · N·m (typ / min–max) · coarse + fine thread

M12

N·m · As 84.3 mm²

Class	Rp0.2 (MPa)	Target preload (kN)	Dry / Black K 0.18–0.22 · N·m	Electro Zinc K 0.15–0.2 · N·m	Hot-Dip Galv. K 0.18–0.25 · N·m	Oiled K 0.12–0.15 · N·m	Wax / PTFE / Anti-seize K 0.08–0.12 · N·m
4.8	340	**20.1**	48 43–53	41 36–48	53 43–60	31 29–36	24 19–29
8.8	640	**37.8**	91 82–100	77 68–91	100 82–113	59 54–68	45 36–54
10.9	940	**55.5**	133 120–146	113 100–133	146 120–166	87 80–100	67 53–80
12.9	1100	**64.9**	156 140–171	132 117–156	171 140–195	101 93–117	78 62–93
A2-70	450	**26.6**	64 57–70	54 48–64	70 57–80	41 38–48	32 25–38
A4-80	600	**35.4**	85 76–93	72 64–85	93 76–106	55 51–64	42 34–51

Torque follows the K-factor (nut factor) method T = K·D·F: D is the nominal diameter and F the target preload = 70% of Rp0.2 × thread stress area (M12 As = 84.3 mm²). Yield strengths are published values from ISO 898-1 (carbon/alloy steel) and ISO 3506-1 (stainless A2/A4). K follows published empirical ranges per friction condition (Machinery's Handbook; the wax/PTFE/anti-seize band K≈0.10 follows Machine Design test data). The grease/MoS_2 band (K≈0.11) nearly overlaps anti-seize and is available in the calculator instead of a separate column.

Fine-Thread Torque Matrix

Class	Rp0.2 (MPa)	Target preload (kN)	Dry / Black K 0.18–0.22 · N·m	Electro Zinc K 0.15–0.2 · N·m	Hot-Dip Galv. K 0.18–0.25 · N·m	Oiled K 0.12–0.15 · N·m	Wax / PTFE / Anti-seize K 0.08–0.12 · N·m
4.8	340	**21**	50 45–55	43 38–50	55 45–63	33 30–38	25 20–30
8.8	640	**39.5**	95 85–104	81 71–95	104 85–118	62 57–71	47 38–57
10.9	940	**58**	139 125–153	118 104–139	153 125–174	90 83–104	70 56–83
12.9	1100	**67.8**	163 147–179	138 122–163	179 147–204	106 98–122	81 65–98
A2-70	450	**27.8**	67 60–73	57 50–67	73 60–83	43 40–50	33 27–40
A4-80	600	**37**	89 80–98	75 67–89	98 80–111	58 53–67	44 36–53

Cell shows the typical value; the small line below is the range (min–max).

Basis of Calculation & Sources

Boundary: this chart is a simplified K-factor estimate, not a full VDI 2230 analysis (which accounts for joint resilience, embedment and assembly method). Friction is the dominant variable — no single torque value exists without its friction state. Always follow the design specification or manufacturer torque table.

References

- ISO 898-1:2013 — Mechanical properties of fasteners made of carbon and alloy steel — https://www.iso.org/standard/60610.html
- ISO 3506-1:2020 — Mechanical properties of corrosion-resistant stainless steel fasteners (A2/A4) — https://www.iso.org/standard/70045.html
- GB/T 3098.1-2010 — Mechanical properties of bolts, screws and studs (CN national standard, official full text) — https://openstd.samr.gov.cn/bzgk/gb/std?std_no=GB%2FT%203098.1-2010
- GB/T 3098.6-2014 — Mechanical properties of stainless steel bolts, screws and studs (CN, official full text) — https://openstd.samr.gov.cn/bzgk/gb/std?std_no=GB%2FT%203098.6-2014
- ISO 16047:2005 — Fasteners: torque/clamp force testing (K-factor measurement method)
- Machinery's Handbook (30th ed.) — empirical K-factor ranges
- Machine Design — anti-seize compound friction test (K≈0.10)

Disclaimer: This chart is an engineering estimation for selection and budgeting only. It does not constitute assembly instructions or acceptance criteria.

Bolt Torque Chart — M12 — Yaxiio full-range reference PDF, pack v1 · generated 2026-09-10 · data source: yaxiio-customer/utils/fastenerCalc.ts (single source of truth) · methodology matches the online tool pages · https://www.yaxiio.com/en/tools/bolt-torque-chart/m12