

M22 Stud Bolt Torque Chart

M22 · 6 property classes · K 0.12 / 0.15 / 0.20 · N·m · target preload kN · coarse + fine thread

M22

As 303 mm² · N·m

Torque by Property Class and Nut Factor K

Class	Rp0.2 (MPa)	Target preload (kN)	K 0.12 N·m	K 0.15 N·m	K 0.20 N·m
4.8	340	72.1	190	238	317
8.8	640	135.7	358	448	597
10.9	940	199.4	526	658	877
12.9	1100	233.3	616	770	1027
A2-70	450	95.4	252	315	420
A4-80	600	127.3	336	420	560

Each K column shows the tightening torque at that nut factor (N·m). K combines thread and bearing-surface friction: 0.12 ≈ well lubricated (MoS₂ / assembly paste), 0.15 ≈ normal assembly oil (typical default), 0.20 ≈ unlubricated or plated surfaces. Select by your actual lubrication condition; verify on site for critical joints.

Fine-Thread Torque Matrix

Fine-thread series (M22 × 1.5 mm) target preload and tightening torque, same basis as the coarse chart; the fine-thread stress area As follows ISO 898-1:2013 Table 6 (this page takes M22 As = 333 mm²).

Class	Rp0.2 (MPa)	Target preload (kN)	K 0.12 N·m	K 0.15 N·m	K 0.20 N·m
4.8	340	79.3	209	262	349
8.8	640	149.2	394	492	656
10.9	940	219.1	578	723	964
12.9	1100	256.4	677	846	1128
A2-70	450	104.9	277	346	462
A4-80	600	139.9	369	462	615

Basis of Calculation & Sources

Torque follows the K-factor (nut factor) method $T = K \cdot D \cdot F$: D is the nominal diameter and F the target preload = 70% of $Rp0.2 \times$ thread stress area (size As = {as} mm²). Yield strengths are published values from ISO 898-1 (carbon/alloy steel) and ISO 3506-1 (stainless A2/A4). The three K columns follow the standard stud-bolt torque table format (K = 0.12 / 0.15 / 0.20), the same three-column output as the online torque calculator's stud bolt mode.

Boundary: this chart is a simplified K-factor estimate, not a full VDI 2230 analysis (which also accounts for joint resilience, embedment and assembly method). Friction and lubrication are the dominant variables — the spread between K 0.12 and K 0.20 can reach ~65% of the torque value. Always follow the design specification or the manufacturer's 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.

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