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M22 · English · bolt-torque-chart-m22-en

Bolt Torque Chart — M22

M22 · 6 property classes · 5 friction states · N·m (typ / min–max) · coarse + fine thread

M22

N·m · As 303 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	**72.1**	317 286–349	270 238–317	349 286–397	206 190–238	159 127–190
8.8	640	**135.7**	597 538–657	508 448–597	657 538–747	388 358–448	299 239–358
10.9	940	**199.4**	877 790–965	746 658–877	965 790–1097	570 526–658	439 351–526
12.9	1100	**233.3**	1027 924–1129	873 770–1027	1129 924–1283	667 616–770	513 411–616
A2-70	450	**95.4**	420 378–462	357 315–420	462 378–525	273 252–315	210 168–252
A4-80	600	**127.3**	560 504–616	476 420–560	616 504–700	364 336–420	280 224–336

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 (M22 As = 303 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	**79.3**	349 314–384	296 262–349	384 314–436	227 209–262	174 139–209
8.8	640	**149.2**	656 591–722	558 492–656	722 591–821	427 394–492	328 263–394
10.9	940	**219.1**	964 868–1061	819 723–964	1061 868–1205	627 578–723	482 386–578
12.9	1100	**256.4**	1128 1015–1241	959 846–1128	1241 1015–1410	733 677–846	564 451–677
A2-70	450	**104.9**	462 415–508	392 346–462	508 415–577	300 277–346	231 185–277
A4-80	600	**139.9**	615 554–677	523 462–615	677 554–769	400 369–462	308 246–369

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 — M22 — 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/m22