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M33 · English · bolt-torque-chart-m33-en

Bolt Torque Chart — M33

M33 · 6 property classes · 5 friction states · N·m (typ / min–max) · coarse + fine thread

M33

N·m · As 694 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	**165.2**	1090 981–1199	927 818–1090	1199 981–1363	709 654–818	545 436–654
8.8	640	**310.9**	2052 1847–2257	1744 1539–2052	2257 1847–2565	1334 1231–1539	1026 821–1231
10.9	940	**456.7**	3014 2713–3315	2562 2260–3014	3315 2713–3767	1959 1808–2260	1507 1206–1808
12.9	1100	**534.4**	3527 3174–3880	2998 2645–3527	3880 3174–4409	2292 2116–2645	1763 1411–2116
A2-70	450	**218.6**	1443 1299–1587	1226 1082–1443	1587 1299–1804	938 866–1082	721 577–866
A4-80	600	**291.5**	1924 1731–2116	1635 1443–1924	2116 1731–2405	1250 1154–1443	962 770–1154

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 (M33 As = 694 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	**181.1**	1195 1076–1315	1016 897–1195	1315 1076–1494	777 717–897	598 478–717
8.8	640	**340.9**	2250 2025–2475	1913 1688–2250	2475 2025–2813	1463 1350–1688	1125 900–1350
10.9	940	**500.7**	3305 2974–3635	2809 2479–3305	3635 2974–4131	2148 1983–2479	1652 1322–1983
12.9	1100	**586**	3867 3481–4254	3287 2901–3867	4254 3481–4834	2514 2320–2901	1934 1547–2320
A2-70	450	**239.7**	1582 1424–1740	1345 1187–1582	1740 1424–1978	1028 949–1187	791 633–949
A4-80	600	**319.6**	2109 1899–2320	1793 1582–2109	2320 1899–2637	1371 1266–1582	1055 844–1266

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 — M33 — 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/m33