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Metric Bolt Tightening Torque Chart — Property Classes 8.8, 10.9 and 12.9 (M3–M36)

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Tightening torque table for metric coarse-thread bolts in property classes 8.8, 10.9 and 12.9 from M3 to M36, for dry and lightly oiled threads, with the K-factor method, proof-load background and stainless A2/A4 guidance.

How the values are calculated

The torque needed to preload a bolt follows T = K × F × d, where F is the target preload (normally 70–75 % of the proof load for the property class), d is the nominal diameter and K is the nut factor. K "H 0.20 describes plain, dry, zinc-plated or black-oxide threads; K "H 0.15 describes lightly oiled threads; dedicated anti-seize or MoS , pastes reach K "H 0.11–0.13 and need the paste manufacturer's own table. The values below use 75 % of proof load with K = 0.20 (dry) and K = 0.15 (oiled) for coarse metric threads. They are assembly guide values for general machine construction — a drawing, equipment manual or flange calculation always takes precedence.

Torque table, coarse thread (Nm)

Size | Pitch
(mm) | Class 8.8 | Class 10.9 | Class 12.9 |
dry | oiled | dry | oiled | dry | oiled |

M3 | 0.5 | 1.3 | 1.0 | 1.8 | 1.4 | 2.1 | 1.6 |

M4 | 0.7 | 2.9 | 2.2 | 4.1 | 3.1 | 4.9 | 3.7 |

M5 | 0.8 | 5.7 | 4.3 | 8.1 | 6.1 | 9.7 | 7.3 |

M6 | 1.0 | 9.9 | 7.4 | 14 | 10.5 | 17 | 12.6 |

M8 | 1.25 | 24 | 18 | 34 | 25 | 40 | 30 |

M10 | 1.5 | 47 | 36 | 67 | 50 | 80 | 60 |

M12 | 1.75 | 82 | 62 | 116 | 87 | 139 | 104 |

M14 | 2.0 | 131 | 98 | 184 | 138 | 221 | 166 |

M16 | 2.0 | 203 | 152 | 285 | 214 | 342 | 257 |

M18 | 2.5 | 280 | 210 | 394 | 296 | 473 | 355 |

M20 | 2.5 | 397 | 298 | 558 | 419 | 670 | 502 |

M22 | 2.5 | 541 | 406 | 761 | 571 | 913 | 685 |

M24 | 3.0 | 687 | 515 | 966 | 724 | 1159 | 869 |

M27 | 3.0 | 1005 | 754 | 1414 | 1060 | 1696 | 1272 |

M30 | 3.5 | 1366 | 1024 | 1920 | 1440 | 2304 | 1728 |

M33 | 3.5 | 1858 | 1394 | 2612 | 1959 | 3134 | 2351 |

M36 | 4.0 | 2387 | 1790 | 3356 | 2517 | 4027 | 3020 |

Guide values. Round to the resolution of the wrench in use, and apply the equipment manufacturer's figure whenever one is published.

Stainless and special cases

Austenitic stainless bolts (A2-70, A4-70) have a 0.2 % proof stress of 450 N/mm² — between class 8.8 and 5.8 carbon steel — and gall easily. Use roughly 80 % of the class 8.8 "oiled" column with an anti-seize paste on the threads, and never run stainless nuts on dry stainless threads at speed. A4-80 reaches 600 N/mm² proof stress and may be taken to approximately the 8.8 dry values with lubrication. Property class is marked on the bolt head; see the catalogue's EN 15048 structural bolts (8.8), DIN 933 hex screws and A2-70 stainless bolts. For ASTM B7 stud bolts used on flanges, the dedicated A193 B7 stud bolt chart applies, and torque wrenches should meet the accuracy classes in the ISO 6789 torque-tool guide — calibrated wrenches are listed under torque wrenches.

Frequently asked questions

What torque should an M10 class 8.8 bolt be tightened to?An M10 class 8.8 coarse-thread bolt is tightened to approximately 47 Nm dry or 36 Nm with lightly oiled threads, based on 75 % of proof load and K = 0.20/0.15.What torque should an M12 class 8.8 bolt be tightened to?An M12 class 8.8 coarse-thread bolt is tightened to approximately 82 Nm dry or 62 Nm with lightly oiled threads.Does lubrication change bolt torque?Yes. Lubricated threads convert more torque into preload, so the target torque drops by roughly 25 % with light oil and up to 40–45 % with MoS , or anti-seize pastes — always follow the lubricant's own K-factor.What torque for A4 stainless bolts?For A4-70 stainless, use about 80 % of the class 8.8 oiled value with anti-seize paste; for A4-80, up to the 8.8 dry value with lubricated threads. Unlubricated stainless-on-stainless galls.Where do these values come from?They are computed from T = K·F·d with preload at 75 % of the ISO 898-1 proof load, the standard engineering guide method; equipment-specific instructions always override a generic chart.

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