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This article provides a reference chart for standard metric bolts, showing recommended maximum tightening torques for coarse-threaded bolts based on bolt diameter and property class. The values are derived from ISO 898, which defines the mechanical properties of fasteners made from carbon and alloy steel. See our torque conversion chart for In./Lbs. to Nm conversion. Thread Size Grade 4.6 Grade 4.8 Grade 5.8 Grade 6.8 Grade 8.8 Grade 9.8 Grade 10.9 Grade 12.9 M3 0.8Nm 0.9Nm 1.2Nm 1.4Nm 1.6Nm 1.8Nm 2.3Nm 2.7Nm M4 1.9Nm 2.2Nm 2.8Nm 3.3Nm 3.7Nm 4.2Nm 5.4Nm 6.3Nm M5 3.7Nm 4.4Nm 5.6Nm 6.6Nm 7.0Nm 7.8Nm 10.0Nm 11.7Nm M6 6.4Nm 7.5Nm 9.6Nm 11.2Nm 11.8Nm 13.3Nm 17.0Nm 19.9Nm M8 15.4Nm 18.2Nm 23.3Nm 27.3Nm 28.8Nm 32.3Nm 41.3Nm 48.3Nm M10 30.5Nm 36.0Nm 46.1Nm 54.0Nm 57.3Nm 64.1Nm 81.8Nm 95.7Nm M12 53.2Nm 62.7Nm 80.3Nm 94.1Nm 99.8Nm 112Nm 143Nm 167Nm M14 79.5Nm 93.8Nm 120Nm 141Nm 149Nm 167Nm 214Nm 250Nm M16 123Nm 145Nm 186Nm 218Nm 248Nm 277Nm 354Nm 413Nm M18 170Nm 200Nm 256Nm 300Nm 340Nm 380Nm 485Nm 567Nm M20 250Nm 294Nm 377Nm 442Nm 500Nm 590Nm 709Nm M22 335Nm 395Nm 507Nm 594Nm 672Nm 752Nm 960Nm 1123Nm M24 430Nm 507Nm 650Nm 762Nm 865Nm 1195Nm 1395Nm M27 625Nm 737Nm 945Nm 1108Nm 1257Nm 1406Nm 1796Nm 2100Nm M30 855Nm 1009Nm 1294Nm 1517Nm 1719Nm Nm 2377Nm 2774Nm Important Notes: These are recommended maximum tightening torques for dry, unlubricated threads with standard pitch. Reduce torque by 10-15% for lubricated bolts. Values marked with - indicate grades not commonly available for that size. Always refer to manufacturer specifications when available. Grade numbers indicate tensile strength (first digits) and yield strength ratio (last digit). Use proper torque wrench calibration and tightening procedures. Parting Thoughts MISUMI USA offers a wide range of screws and boltsboth standard and metricincluding hex head bolts, narrow head bolts, square head bolts, and more. If youre unsure which bolt product best suits your application, our engineering team is here to help. For more technical insights, explore our other manufacturing-focused tables and articles, such as a machine screw size chart. Browse Bolt Products Author: Scott Bredemann | Updated: 6/30/2025 Disclaimer:The content on this webpage is for informational purposes only. MISUMI makes no guarantees, expressed or implied, regarding the accuracy, completeness, or validity of the information. Performance parameters, tolerances, designs, materials, or processes should not be assumed to reflect third-party suppliers or manufacturers deliverables within MISUMIs network. Buyers are responsible for specifying their part requirements Bolts are graded using various systems.The metric classes adhere to ISO standards, set by the International Standards Organisation, that apply across most industrialized nations.The class indicates the material strength of the bolt.The higher the class, the stronger the bolt. The most common metric bolt classes are Class 8.8, Class 10.9, and Class 12.9. Lower and higher classes exist, but do not see as much use.For a rundown of the different grading systems and what they mean, check out this video from The Home Depot: You can tell which bolt you are working with by the markings on the head.Compare the bolts you have with the diagrams below, then refer to the appropriate chart to see the ideal tightening torque. Metric Bolt Torque ChartYou must use the correct torque when tightening bolts.If you properly torque the bolts, they will provide the maximum amount of clamping force under load. If you under torque the bolts, they can quickly come loose.If you over-torque them, they are liable to break.Refer to the charts below, which show the ideal tightening torque for each bolt grade for a variety of sizes.Identify the class by the embossed number on the head, then find the size of your bolt in the chart. The ideal tightening torque can be found listed in two columns to the right.The wet column indicates lubricated bolts, whereas the dry column indicated unlubricated bolts.Metric Class 8.8 Bolt Torque ChartMetric class 8.8 bolts are also known as structural grade bolts.They are made of quenched and tempered medium carbon steel and can be plated with a variety of materials, most commonly zinc.Class 8.8 bolts see common use in a wide range of industries.Depending on size, they have a proof load of 580-600 MPa, minimum yield strength of 640-660 MPa, and a minimum tensile strength of 800-830 MPa. Class 8.8 bolts come in all sizes ranging up to 72 mm.Table 1 Ideal tightening torque for dry and wet metric class 8.8 bolts SizeTightening Torque (Dry) / lb-ftTightening Torque (Wet) / lb-ft M4 x 0.72.31.7 M5 x 0.84.53.4 M6 x 17.75.8 M7 x 1139.7 M8 x 1.2518.814.1 M10 x 1.537.227.9 M12 x 1.7564.948.7 M14 x 2103.777.8 M16 x 2161121 M18 x 2.5222167 Metric Class 10.9 Bolt Torque ChartMetric class 10.9 bolts see common use in the automotive industry.They excel at bolting large parts, and many socket and countersunk buttons comply with the 10.9 grade.They are generally made from carbon or boron alloy steel, quenched and tempered.They have a proof load of 830 MPa, minimum yield strength of 940 MPa, and a minimum tensile strength of 1040 MPa. Class 10.9 bolts come in sizes ranging from 5 mm to 100 mm.Table 2 Ideal tightening torque for dry and wet metric class 10.9 bolts SizeTightening Torque (Dry) / lb-ftTightening Torque (Wet) / lb-ft M4 x 0.73.22.4 M5 x 0.86.54.9 M6 x 111.18.3 M7 x 118.513.9 M8 x 1.2526.920.2 M10 x 1.553.239.9 M12 x 1.7592.869.6 M14 x 2148.4111.3 M16 x 2230173 M18 x 2.5318239 Metric Class 12.9 Bolt Torque ChartMetric class 12.9 bolts are made from quenched and tempered alloy steel and see the most use in heavy-duty applications.They are often used to secure engines and drives, alongside a host of other demanding applications.They have a proof load of 970 MPa, minimum yield strength of 1100 MPa, and a minimum tensile strength of 1220 MPa. Class 12.9 bolts come in sizes ranging from 1.6 mm to 100 mm.Table 3 Ideal tightening torque for dry and wet metric class 12.9 bolts SizeTightening Torque (Dry) / lb-ftTightening Torque (Wet) / lb-ft M4 x 0.73.82.8 M5 x 0.87.65.7 M6 x 1139.7 M7 x 121.716.3 M8 x 1.2531.423.6 M10 x 1.562.246.7 M12 x 1.75108.581.4 M14 x 2173.4130 M16 x 2269202 M18 x 2.5372279 SummaryWe hope these metric bolt torque charts have helped you discover the correct tightening torque for the bolts you use.If you might need to look up the ideal tightening torque for metric class bolts again, why not bookmark this page so that you can refer to it more easily in the future? The Engineering ToolBox provides a wide range of free tools, calculators, and information resources aimed at engineers and designers. It offers detailed technical data and calculations for various fields such as fluid mechanics, material properties, HVAC systems, electrical engineering, and more.The site includes resources for common engineering tasks, such as calculating physical properties (e.g., density, viscosity, thermal conductivity), converting units, and designing systems like heating and water distribution. With sections on everything from acoustics to hydraulics, it serves as a comprehensive tool for both students and professionals in technical and engineering disciplines. There are several factors that determine a proper bolt torque specification. Some of them are listed below... Material containing the external thread (bolt)Most bolt torque charts, including this one, are based on the material strength of the bolt - the component containing the external thread.Reference 2 below recommends a fastener preload in the range of 60% - 90% of the bolt material proof load. This RepairEngineering bolt torque chart was created assuming a value at the mid-point of that range... at 75% of the material proof strength.Bolt proof load is defined as the maximum force that the material can support without experiencing permanent deformation. Although material properties vary, an approximate estimate of proof strength is 85% - 90% of its yield strength.As noted in the chart, bolt proof strength varies depending on the fastener grade and also upon its diameter in some cases. Material containing the internal thread (nut)In order to determine the torque value of a bolt and nut assembly based on just the material strength of the bolt itself, the materials of the assembly should follow this guideline... The proof strength of the nut (the material containing the internal thread)should be equal or greater than theultimate tensile strength of the bolt (the material with the external thread). If the nut material is the limiting factor in the fastening system, then obviously increasing the material strength of the bolt will have no effect on increasing the clamping capability of the assembly.Also, if the nut material is the limiting factor, the maximum clamping capability (and corresponding bolt torque) of the assembly needs to be de-rated accordingly.Unlike most bolt torque charts, this particular chart also lists clamp loads and torque values that correspond with bolt material stresses of 10,000 and 25,000 psi... regardless of fastener grade. This listing may be useful when determining an appropriate de-rated torque value when engaging with lower proof-strength materials. Thread EngagementObviously, regardless of the material strength of the bolt and the nut, an effective clamping system will not occur unless proper fastener thread engagement exists.The objective is to assure that the engaging threads will not strip under the loading that the bolt is able to apply.At first, it would seem logical to simply increase the length of thread engagement by as much as required to overcome the limitations of engaging with a material of limited proof strength. In reality, however, only the first few threads of a threaded connection are actually involved in sharing the fastener clamping force. This is due to thread form error and slight differences in thread size and pitch that result in an inconsistent make-up between the male and female threads. A common rule-of-thumb is to provide a minimum length of thread engagement equal to the (major) diameter of the fastener.A more conservative rule-of-thumb is to use a thread engagement length of 1-1/2 times diameter. Bolt Thread Tensile Stress AreaThe tensile stress area of the threaded portion of a fastener is determined by the size (diameter) of the bolt and by the thread pitch (spacing), as follows...As = 0.7854 x [d - (0.9743/n)]2where:As = Bolt Thread Tensile Stress Area (in2)d = Nominal Bolt Diameter (in.)n = Thread Pitch (Threads Per Inch) Bolt Clamp Pre-Load ForceBolt clamp pre-load force is calculated using the bolt material proof strength and its tensile stress area. It is calculated using the following formula...Fi = 0.75 x Sp x Aswhere:Fi = Bolt Clamp Pre-Load Force (lbf).75 = Percentage of bolt material proof strength... 75% in this exampleSp = Bolt material Proof Strength (lbf / in2)As = Bolt Thread Tensile Stress Area (in2) Nut "K Factor"There are several factors that affect the relationship between the applied bolt torque and the resulting bolt tension. All of those factors are summarized in single variable that is known as the nut "K Factor".The table below lists a typical range for the "K Factor" as well as the values used in calculating the RepairEngineering Bolt Torque Chart.Note that the "K Factor" values used to calculate the RepairEngineering Bolt Torque Chart were picked somewhat arbitrarily. Any other "K Factor" value in the range could be equally valid depending on the specific requirements of a particular application.Bolt Condition"K Factor" Typical Range"K Factor" value as used in theRepairEngineering Bolt Torque ChartLubricated0.12-0.160.15Zinc Plated0.17-0.220.18Plain-Dry0.19-0.250.20 Bolt Torque CalculationThe relationship between bolt torque and its corresponding pre-load force (tension) is given in the following formula...T = K Fi d where:T = Torque required to create a desired bolt pre-load (in-lb)K = Nut "K Factor" (dimensionless)Fi = Bolt Pre-Load Force (lbf)d = Bolt Nominal Diameter (in)Bolt torque provides only an indirect approximation of material stress. It is estimated that only about 10% of the tightening torque actually results in useful bolt tensioning. The remaining 90% is lost due various forms of friction that occur during the tightening process.In addition, a proper bolt torque value can be inconsistent from fastener-to-fastener due to several factors including variations in material, coatings, surface finishes, fit tolerances, installation method, etc.For these reasons, it is not practical to provide a single bolt torque chart or formula that is accurate for all situations. This information is voluntary, and is intended only for general-purpose reference as explained in this disclaimer.Testing of actual fastener components is recommended to determine appropriate torque values for all critical-use applications. This Bolt Torque Chart was created using reference information from various sources, including the following...1. Machinery's Handbook - 24th Edition2. Mechanical Engineering Design - 4th EditionReturn to Bolt Torque Chart Top Tightening torque table The tightening torque is the force used to tighten the metric fasteners during assembly with a tool. This torque is transmitted to the metric fasteners using an adjustable, suitable torque wrench. The corresponding values for the various screw sizes and strength classes for metric coarse threads can be found in the metric torque table below. The following table shows the tightening torque for metric thread fasteners. In the List metric bolt torque chart you find the metric torque unit in Nm and ft lbs. You can also made an conversion from the unit Nm to ft lbs and also from ft lbs to Nm. Please find all technical information in the following metric bolt torque chart. 5.6 Strehngth class - Aluminium screws 6.8 Strehngth class - V2A screws 8.8 Strehngth class - Titanium screws In the following table of torque specifications, you will find all the necessary torque values in Newton-meters (Nm) for common screw thread sizes and strength classes. Please note that the required torque may vary due to differences in screw strength classes and thread sizes. Recommended merticmetric bolttorque tightening torque (Nm) tightening torque (ft lbs) Metric Thread size Metric Strength class Torque Unit 4.6 5.6 6.8 8.8 10.9 12.9 M2 Nm 0,13 0,16 0,26 0,35 0,49 0,59 ft lbs 0,10 0,12 0,19 0,26 0,36 0,44 M2,5 Nm 0,27 0,34 0,54 0,72 1,01 1,21 ft lbs 0,20 0,25 0,40 0,53 0,74 0,89 M3 Nm 0,48 0,60 0,96 1,28 1,80 2,16 ft lbs 0,35 0,44 0,71 0,94 1,33 1,59 M4 Nm 1,12 1,39 2,23 2,97 4,18 5,02 ft lbs 0,83 1,03 1,64 2,19 3,08 3,70 M5 Nm 2,26 2,83 4,52 6,03 8,48 10,18 ft lbs 1,67 2,09 3,33 4,45 6,25 7,51 M6 Nm 3,84 4,80 7,69 10,25 14,41 17,29 ft lbs 2,83 3,54 5,67 7,56 10,63 12,75 M7 Nm 5,13 6,42 10,27 13,70 19,25 23,10 ft lbs 3,78 4,74 7,57 10,10 14,20 17,04 M8 Nm 9,35 11,69 18,70 24,93 35,06 42,07 ft lbs 6,90 8,62 13,79 18,39 25,86 31,03 M10 Nm 18 23 37 49 70 83 ft lbs 13 17 27 36 52 61 M12 Nm 32 40 65 86 121 146 ft lbs 24 30 48 63 89 108 M14 Nm 52 65 104 138 194 233 ft lbs 38 48 77 102 143 172 M16 Nm 81 101 161 215 302 363 ft lbs 60 74 119 159 223 268 M18 Nm 112 139 222 296 417 500 ft lbs 83 103 164 218 308 369 M20 Nm 157 197 315 420 590 709 ft lbs 116 145 232 310 435 523 M22 Nm 215 269 430 574 807 968 ft lbs 159 198 317 423 595 714 M24 Nm 272 340 544 726 1020 1224 ft lbs 201 251 401 535 752 903 M27 Nm 400 500 800 1067 1500 1800 ft lbs 295 369 590 787 1106 1328 M30 Nm 542 677 1083 1445 2032 2438 ft lbs 400 499 799 1066 1499 1798 M33 Nm 739 923 1477 1969 2770 3323 ft lbs 545 681 1089 1452 2043 2451 M36 Nm 948 1185 1896 2528 3555 4266 ft lbs 699 874 1398 1865 2622 3146 M39 Nm 1229 1536 2457 3276 4607 5529 ft lbs 906 1133 1812 2416 3398 4078 M42 Nm 1519 1899 3038 4050 5696 6835 ft lbs 1120 1401 2241 2987 4201 5041 M45 Nm 1898 2373 3796 5062 7118 8541 ft lbs 1400 1750 2800 3734 5250 6299 M48 Nm 2282 2853 4565 6086 8559 10271 ft lbs 1683 2104 3367 4489 6313 7575 M52 Nm 2954 3692 5907 7876 11076 13292 ft lbs 2179 2723 4357 5809 8169 9804 M56 Nm 3672 4591 7345 9793 13772 16526 ft lbs 2708 3386 5417 7223 10158 12189 M60 Nm 4582 5728 9164 12219 17183 20619 ft lbs 3379 4225 6759 9012 12673 15208 M64 Nm 5536 6920 11071 14762 20759 24911 ft lbs 4083 5104 8166 10888 15311 18373 M68 Nm 6720 8400 13440 17919 25199 30239 ft lbs 4956 6196 9913 13216 18586 22303 * All information without guarantee. Torque is a physical quantity that describes the strength of the rotational force applied to an object. The unit for torque M is obtained by multiplying the unit Newton for force F by the unit meter for the lever arm r. [M] = 1 Nm Hence, the unit is called Newton-meter. Torque M is obtained by multiplying the force F, which acts perpendicular to a lever arm, by the length r of the lever arm. [M] = F r Torque is measured in Newton-meters (Nm). 1 Nm is equivalent to when a force of 1 Newton is applied with a lever arm of 1 meter, resulting in 100 grams of force. Screws are marked with different strength classes so that it is very easy to determine the tensile strength (Rm) and the yield strength (Re). Example: Tensile strength class 5.6 1. Determination of Rm: Multiply the first number by 100 to obtain the tensile strength (Rm). => Rm = 5 x 100 = 500 N/mm 2. Determination of Re: The first number is multiplied by the second number and the result is multiplied by 10 gives the yield strength (Re). => Re = (5 x 6) x 10 = 300 N/mm Strength classes of screws 4.6 5.6 6.8 8.8 10.9 12.9 Tensile strength (Rm) 400 500 600 800 1000 1200 Yield strength (Re) 240 300 480 640 900 1080 * All information without guarantee. In a screw connection, two or more parts are joined together. The preload force is the force exerted by a screw or screw connection on the components. If the preload force is high enough and the screw connection is selected correctly, the screwed parts behave like one part and are therefore firmly connected. Preload force Table for regular threads Preload force in (N) Thread size Strength classes 4.6 5.6 6.8 8.8 10.9 12.9 M2 338 422 675 901 1267 1520 M2,5 563 703 1125 1500 2110 2532 M3 845 1056 1689 2253 3168 3801 M4 1463 1829 2927 3902 5487 6585 M5 2395 2994 4790 6387 8982 10778 M6 3379 4224 6758 9011 12671 15205 M8 6202 7753 12404 16539 23258 27909 M10 9876 12345 19752 26336 37034 44441 M12 14400 18000 28801 38401 54001 64801 M14 19775 24719 39551 52734 74158 88989 M16 27221 34027 54443 72591 102080 122497 M18 33078 41347 66155 88207 124041 148850 M20 42534 53167 85067 113423 159501 191401 M22 53175 66469 106350 141800 199406 239288 M24 61248 76560 122497 163329 229681 275617 M27 80670 100837 161339 215119 302512 363014 M30 98027 122533 196054 261405 367600 441120 M33 122241 152801 244482 325976 458404 550084 M36 143413 179266 286826 382434 537798 645358 M39 172420 215525 344839 459786 646574 775888 M42 197407 246758 394813 526417 740275 888329 M45 231206 289007 462412 616549 867022 1040426 M48 280008 325010 520015 693354 975029 1170035 M52 312056 390070 624112 832149 1170209 1404251 M56 359643 449804 719689 959581 1349411 1619293 M60 420651 525813 841301 1121735 1577440 1892928 M64 475860 594825 951720 1268960 1784476 2141371 M68 545427 681784 1090855 1454473 2045353 2454423 * All information without guarantee. When does a screw break? A screw can break when the allowable yield point is exceeded, causing it to deform and ultimately leading to the screw breaking. What can happen if the torque is too high? Excessive torque can damage threads and components, leading to malfunctions and safety risks. Therefore, proper torque application is crucial. How tight should you tighten wheel nuts? The recommended torque for wheel nuts of a vehicle can be found in the vehicle's manual and is typically between 80 and 160 Newton-meters. How much Nm is hand-tight? Hand-tight typically corresponds to a torque of approximately 30 Newton-meters (Nm) when manually applied with a standard screwdriver or similar tool. Where can you find torque specifications? Torque specifications for screws and components are usually available in the manufacturer's documentation or the vehicle's manuals. If you cannot find them there, you can look up the corresponding torque for the screw in a torque specification table. M2x0.4 M2.5x0.45 M3x0.5 M3.5x0.6 M4x0.7 M5x0.8 M6x1.0 M8x1.25 M10x1.5 M12x1.75 Thread Size Strength Class 0.17 0.36 0.57 1.0 1.3 2.7 4.5 11.0 21.8 38.1 4:6 4:8 5:6 5:8 6:6 8:8 9:8 10:9 12:9 0.17 0.36 0.76 1.0 1.8 3.6 6.0 14.0 29.0 50.8 0.17 0.36 0.71 1.0 1.7 3.3 5.7 13.8 27.3 47.6 0.17 0.36 0.95 1.0 2.2 4.5 7.6 18.4 36.4 64.0 0.17 0.36 0.85 1.0 2.0 4.0 6.8 16.5 32.8 57.0 0.31 0.65 1.5 1.8 3.5 7.1 12.1 29.4 58.3 101 0.31 0.65 1.7 1.8 4.0 8.0 13.6 33.1 66.0 114 0.42 0.86 2.1 2.4 5.0 10.0 17.0 41.3 82.0 143 0.42 0.86 2.6 2.4 6.0 12.0 20.4 49.6 98.0 171 This data relates to the metric coarse thread form only and are generic reference values that should be used as a starting point. Special attention should always be taken of any recommendations relating to the maximum tightening torque in the performance section of our product data. Tightening Torque values are in Nm NORTHERN PRECISION LTD Specialist Fasteners for Sheet Metal +44 (0) 1302 836010 +44 (0) 1302 831555 Tel: Fax: sales@npfasteners.com Home About Technical Quality Contact News Contact us You can contact us using any of the methods below. Unit 3 Durham Lane Armthorpe Doncaster South Yorkshire DN3 3FE England +44 (0)1302 836010 +44 (0)1302 831555 sales@npfasteners.com All rights reserved Northern Precision Ltd. Home About Technical Quality News Contact NORTHERN PRECISION LTD Accreditations Northern Precision Ltd operate a quality management system in accordance with ISO 9001. The ISO 9001 standard is recognised worldwide and you can be assured of the benefits of working with a certified company knowing that our management systems are constantly assessed and approved. Click here to download our current accreditation certificate. Regulatory RoHS|WEEE Compliance REACH Compliance Conflict Minerals Policy Environmental Policy Opening Hours Mon - Fri 08:00 - 17:00 Terms of use Registered in England & Wales Company number 3275391 V.A.T Registration number GB 684 1384 17 Privacy & Cookie Policy Jump to top of page Back How much torque is required for a bolt? To save time for calculation and variation, a torque value table is useful. In this article, well share the metric and imperial bolt torque chart with you, and also introduce torque measurement, calculation, and the differences between torque and tension.What Is the Bolt Torque?A bolt is a fastener that consists of a shaft and a head. The shaft features both threaded and unthreaded portions. The bolts often work with matching nuts to form a joint for holding two parts together. The main types of bolt joints are tension joints and shear joints.Bolt torque refers to the rotational force required to tighten a bolt to a specified level, measured as force multiplied by distance. It is used to create secure fastening, evenly distribute stress to reduce fatigue. Bolts with insufficient torque may deform or fail to provide sufficient clamping force, while excessive torque may lead to fracture. The selection of a proper torque value depends on the bolt size, material, and other factors.Torque vs Tension: What Are the Differences Between ThemTorque is the measurement of the force that causes something to rotate, such as the turning force needed to spin a nut around the threads of a bolt, while tension is the stretch or elongation of a bolt that provides the clamping force of a joint.Actually, the bolt torque is regarded as a way of generating bolt tension by stretching it, which is applied in both home and industrial applications. What is the process or principle of creating tension? When the operator is applying a torque using a wrench on the bolt and the bolt rotates relatively to the nut or the threaded hole, the wedging action will cause the bolt to stretch and then compress the clamped components.Although torque is a commonly used method for creating tension, its not very accurate because only approximately 10-15% of the input torque actually stretches the bolt, with the remaining 85-90% used to overcome friction between the mating threads and under the bolt head or nut. If the bolt diameter is too large for the torque method to be feasible, alternative methods should be considered, such as hydraulic tensioning and bolt heating.How to Check or Measure the Bolt Torque?Make sure to measure and record bolt torque immediately after tightening and before any heating, painting, or exposure to environmental conditions that could alter friction on the bolt threads or nut surfaces. Delaying torque measurement can lead to inaccurate readings.Loosening Torque MethodThis involves loosening the bolt using a torque wrench and reading the torque value when the bolt begins to move. The measured torque is approximately 60% to 90% of the real tightening torque, typically 80%. This method is relatively easy to measure but requires retightening the bolt afterward, often used for bolts with a size of M4 or smaller.Retightening Torque MethodAfter tightening the bolt, it is further tightened to determine the applied torque. Read the torque when the bolt starts moving again. The measured torque approximately equals to 90% to 120% of the tightening torque, with a common value of 1.05. This way provides accurate results if the point at which rotation begins is distinct, with no further work needed after the inspection.Marking MethodMark the position of the tightened bolt, then loosen it and retighten it to the marked position while reading the torque. The measured torque is approximately 90% to 110% of the tightening torque, with an approximate value of 1.0. This measurement takes a longer time, but after the inspection, the bolt maintains its original torque.T-point MethodWhen continuing to tighten a bolt that has already been tightened, read the torque when the bolt begins to turn again. This torque value can be calculated using the -t wave formula. The measured torque ranges from 90% to 110% of the tightening torque; 100% is typical. This is the most accurate one when the test piece is secured, and no individual variations will occur after the inspection is complete.How to Calculate Bolt Torque?The formula to calculate bolt torque is T = KFD. Each of the elements indicates the following meaning. However, there are lots of other variables that will have an impact on the torque, such as the surface finish, property grade, hardness, and more features. So there is another version of the torque formula: T = K x F x D x (1 l / 100), where the l refers to the lubrication factor (%).T = Tightening Torque (Nm or ft-lbs)K = A constant, typically refers to the nut factor or torque coefficientD = Nominal bolt diameter (mm or inches)P = Clamping force or load (kN or lbs)In addition, the common values of K include 0.2 (normal dry or zinc plated), 0.30 (non-plated black finish), 0.18 (slightly lubricated), 0.16 (cadmium-plated), 0.42 (HDG), and 0.22 (lightly oiled HDG), determined by the finish.A dry joint that has not been lubricated will have more friction between the fasteners, so more torque is generally needed to get the same result as lubricated joints. It is necessary to verify your calculated result of the bolt torque.Metric Bolt Tightening Torque Value ChartThe bolt grades applied in this table are according to ISO 898, and the nut factor is based on lightly oiled threads.Size (mm)Maximum Tightening Torque (Nm)Grade 8.8Grade 9.8Grade 10.9Grade 12.9M57.07.810.011.7M611.813.317.019.9M828.832.341.348.3M1057.364.181.895.7M1299.8112143167M16248277354413M20500690809M2486511951395M30171923772774 US Imperial Bolt Tightening Torque Value Chart The nut factor for the bolts applied in this table is based on a lightly oiled finish.Size (inch)Maximum Tightening Torque (lb-ft)SAE Grade 2SAE Grade 5SAE Grade 818-8 S/SCoarseFineCoarseFineCoarseFineCoarseFine1/444.76.37.39106.37.85/1689131418201111.83/8151723263337202271624273741525831331/2374157648090434591653598291115129576358738311212815018093104314115138200223282315128124781291443223555454501194193118821048354168276428728 9 Key TakeawaysDefinition of torque: Torque is a physical quantity that indicates how strongly a rotational movement acts on a body and is measured in Newton meters (Nm).Torque calculation: Torque (M) is calculated as the product of force (F) in Newtons and lever arm (l) in meters: M = F l. Torque is a measure of the rotational force applied to an object, often expressed in units like Newton-meters (N m) or foot-pounds (ft-lb). In the context of bolts, screws, and nuts, torque is crucial for ensuring proper assembly and maintaining the integrity of thejoint.However, not every screw has the same strength class or thread size, which is why the required torque also varies. The recommended tightening torques below are a great starting point for figuring out how much torque youneed. Keep in mind that you might need to adjust these numbers depending on the specific connection or how much lubrication is used on the fasteners. This Chart gives the suggested maximum torque values for threaded products, but its just a reference. Select thread size and bolt grade to display the tightening torque for standard threads in [Nm]. Select the thread size: -- Please select -- Select the boltgrade: -- Please select -- Torque is a physical force that indicates how strongly a rotational movement affects an object. The formula symbol for torque is M. For those without a reference book at hand, it is always possible to calculate the tightening torque yourself.The torque, or tightening moment, is expressed in Newton meters [Nm]. {Nm=1{\frac {kg * m^{2}} {s^{2}}}} To calculate the torque (M) in Newton meters [N m], you will need the force (F) in Newtons [N] and the lever arm distance (l) measured perpendicular to the line of action in meters [m]. The direction of the torque is indicated by + (counterclockwise) and (clockwise). The strength classes of screws determine their tensile strength {R_m} and yield strength {R_e}. The class is represented on the screw head by two numbers separated by adot. In this representation, the left number signifies the tensile strength, and the right number represents the yield strength. Thanks to the various number combinations, different types of bolts can be compared with eachother. To calculate tensile strength, simply multiply the left number of the strength class by100. {R_m}=leftNumber * 100 or {R_m}={\frac N {mm^2}} To calculate yield strength, multiply the left and right numbers, and then multiply the result by10. {R_e = leftNumber * rightNumber *10} The following table includes all the strength classes mentioned in the screw torque table, along with their corresponding tensile strength and yield strength. Screws made of aluminum, stainless steel, and titanium possess different properties due to their distinct materials.The following table is intended to assist in assigning them to their respective strength classes. When the permissible yield strength is exceeded, the screw begins to deform, eventually leading to the breaking of thescrew.What is the torque for steelrims?The correct torque for the wheel bolts of a steel rim on a vehicle can be found in the vehicle manual. However, it usually ranges between 80 and 160 Newton meters.How much N m can be applied byhand?Using a screwdriver, a minimum torque of 30N m can be achieved. The longer the lever, the greater the force that can be applied.Which screws should be tightened with how much Nm?To find out which screws should be tightened with how much torque, its worth taking a look at the screw torque table depicted above. There, screws with their respective strength classes and corresponding torques can be easily read.Where do I find the tightening torque?Normally, each manufacturer specifies the permissible tightening torque of the screws on the packaging. If thats not the case, it can be found in a screw torque table.Why do I need a torque testing device for nutrunner?Torque testing devices verify the accuracy of torque wrenches, electric nutrunner, and cordless nutrunner so that they can be calibrated accordingly. We have a solution for every applicationcase!Explore DSM Technology Property classes (grades) are defined by ISO 898 (Mechanical properties of fasteners made of carbon steel and alloy steel). This table shows values for threads that have been lightly oiled and the tension is 85% of the proof load.Size (mm)Recommended Maximum Tightening Torque (Nm)Grade 8.8Grade 9.8Grade 10.9Grade 12.9M57.07.810.011.7M611.813.317.019.9M828.832.341.348.3M1057.364.181.895.7M1299.8112143167M16248277354413M20500690809M2486511951395M30171923772774These values should only be used when the machine manufacturer has not provided their own. Fine pitch bolts also have different torque levels generally specified in the manufacturers documentation.US imperial bolt torque chart

What is the torque for a 8mm bolt. M8 torque spec. What is the torque spec on a 8mm bolt. How much torque can an m8 bolt take. M8 torque setting nm. What is the torque for m8 bolt.