Bolt Clamping Force Chart Metric

A bolt's function essentially boils down to applying a high enough clamp force that when external forces are applied, transverse movement and separation cannot occur. Using calibrated torque tools to tighten fasteners and apply that clamp force is far superior to going by the user's judgement or feeling. Formed into clamping force at worst, this might lead to the tension in the screw exceeding its tensile strength and breaking of the screw. On the other hand, if the screw is completely dry or lubricant-free, the clamping force might be too small to withstand the forces for which the joint is designed. With the risk that the screw becomes loose, Table 1 provides torque-tension relationships for A307A grade 5.8 amp 9 bolts. Locknut size threads per inch and steel hex locknut steel hex flange nut metric fasteners are shown in the table. The torque-tension relationship for A307A grade 5.8 amp 9 bolts is as follows:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M6</td>
<td>4</td>
<td>0.0730</td>
<td>0.0026</td>
<td>275</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
</tr>
<tr>
<td>M8</td>
<td>9</td>
<td>0.1500</td>
<td>0.0026</td>
<td>275</td>
<td>900</td>
<td>1800</td>
<td>3000</td>
</tr>
<tr>
<td>M10</td>
<td>20</td>
<td>0.3125</td>
<td>0.0026</td>
<td>275</td>
<td>1500</td>
<td>3000</td>
<td>6000</td>
</tr>
<tr>
<td>M12</td>
<td>35</td>
<td>0.6250</td>
<td>0.0026</td>
<td>275</td>
<td>2200</td>
<td>4400</td>
<td>8800</td>
</tr>
</tbody>
</table>

For anything not included on the chart, you can calculate the torque force of a fastener pretty easily with the formula:

\[ T = C F D \]

Where:
- \( T \) is the torque on the fastener
- \( C \) is the coefficient of friction (about 0.2 for bare steel or about 0.15 for lubricated threads)
- \( D \) is the diameter of the fastener
- \( F \) is the clamping force

This guide shows fastener torque values and clamping force for various sizes and specifications. It uses ft-lbs and nm as the standard units for fastener torque. The International Standard specifies the conditions for carrying out torque clamp force tests on threaded fasteners and related parts. It is applicable to bolts, screws, studs, and nuts made of carbon steel and alloy steel whose mechanical properties are specified in ISO 898.1 or ISO 898.2. Clamp loads estimated as 75% of proof load for specified bolts. Torque values listed in foot pounds. Torque values calculated from formula:

\[ T = K F D \]

Where:
- \( K \) is the constant (0.15 for lubricated condition, 0.17 for zinc plated, or as received for the 12.9 grade, 0.20 for plain and dry)

This torque calculator can be used to calculate the torque required to achieve the desired preload on a bolted joint. For more information, refer to the reference section for details on methodology and the equations used.
standards, metric bolt grades and strength calculator to show proof strength tensile strength vickers brinell hardness minimum breaking torque and stress area of metric bolts and screws made of carbon steel and alloy steel with designations 4 6 8 5 8 8 8 9 8 10 9 and 12 9 some notes from iso 898 metric screw threads standards, clamp load lb is calculated by arbitrarily assuming usable bolt strength is 75 of bolt proof load psi times tensile stress area sq in of threaded section of each bolt size higher or lower values of clamp load can be used depending on the application requirements and the judgement of the designer, 1 for bolts of property class 8 8 in diameters d 16 mm there is an increased risk of nut stripping in the case of inadvertent over tightening inducing a load in excess of proofing load reference to iso 8982 is recommended, clamp loads for the grade b lock nuts equal 75 of the bolt proof loads specified for sae j 429 grade 5 and astm a 449 bolts clamp loads for grade c lock nuts equal 75 of the bolt proof loads specified for sae j 429 grade 8 and astm a 354 grade bd bolts if 100 does not govern lock nuts above 1 the values shown in the chart are to, bolt fastening futek s donut thru hole load cells are major players when measuring the tightening of load directly our donut thru hole series lth offers a variety of capacities and inner diameter sizes making it ideal for bolt fastening applications, bolt k factor chart the below k factor chart is not for general use on bolted joints without understanding the variables you may have at your site and the materials that you are using this chart is from asme pcc 1 2019 and is a target torque index, torque specs in foot pounds or inch pounds this table is based on a torque coefficient k 0 20 for non plated steel fasteners and k 0 15 for plated fasteners these figures represent an estimate of torque force being the measurement of friction not tension required to induce given preload clamp load in a bolt for non critical, hardware torque vs tension bolts table chart sae j429 bolts ansi hardware design data torque design and applications the following chart estimates the applied tension clamp force at a defined torque and friction for sae j429 grade 2 5 and 8 bolts, bolt clamp load lb is calculated by arbitrarily assuming usable bolt strength is 75 of bolt proof load psi times tensile stress area sq in of threaded section of each bolt size higher or lower values of clamp load can be used depending on the application require ments and the judgement of the designer, bolts that are fully or partially threaded with washers and nuts are called as metric bolts they are of two types metric flange bolts and metric hex bolts the amount of force on a fastener is called as torque this online metric bolt torque calculator is used to find the torque of the ecoguard lubricated and dry metric bolts, high clamping force hollo bolt for structural connections the larger sizes m16 amp m20 5 8 amp 3 4 are optimised for structural connections and feature a patented high clamping force hcf mechanism to produce three times more clamping force than the same sized product without the mechanism, torque tension relationship the torque required to develop desired bolt preload ft lb bolt preload equivalent to clamping force fc d bolt nominal diameter mm k nut factor and k k 1 k 2 k 3 p rt, 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, clamping force 30 000 lbs k 0 45 reused u bolt with dry and damaged threads clamping force 13 300 lbs clamping force is reduced by over 55 even though the reading on the torque wrench is identical the importance of using new u bolts and nuts with lubricated threads is essential to maintain required clamping forces how to measure a, bolt clamping force vs tightening torque for unlubricated steel bolts 5 16 18 3 8 16 1 2 13 5 8 11 3 4 10 10 10 000 9 000 8 000 7 000 6 000 5 000 4 000 3 000 2 000 1 000 0 sae grade 2 bolts sae grade 5 bolts sae grade 73 sae grade 84 tensile size bolt stress tensile stress proof clamp2 tensile proof clamp2 clamp2 2 dia area strength load load, aluminum bolts metric steel bolt torques hex brass amp bronze bolts torque specifications metric bolt torque table cncexpo com june 17th 2018 metric bolt torque table specs estimated with clamp load as 75 of proof load as specified in iso 898 1 property class 8 8 10 9 12 9 socket head 6 10, 1 enter thread diameter nominal value in section thread size click on info button for more info 2 in section head size and type either select one fastener iso with the select standard for type option or enter manually the type and whether the fastener is socket or not in the right part of the page once you have selected custom option 3 enter strength class of the fastener, find the bolt torque chart for the astm a449 and sae grade 5 sae j429 grade 5 bolts astm a449 covers headed bolts ranging from 1 4 inch to 3 inches in diameter astm a449 is identical in chemical properties and is used in
general engineering applications this type of bolt has medium strength bolt manufactured from a medium carbon or alloy, bolt torque calculator the calculator below can be used to calculate the torque required to achieve a given axial bolt force or load the calculator is generic an can used for imperial and metric units as long as the use of units are consistent k constant d diameter of bolt m in f axial bolt force or load n lb, clamping force as a rule of thumb a stretch of 001 inch per inch length of a fastener develops about 30 000 psi clamping force in steel and 15 000 in titanium the best way to determine the correct torque is to run tests on the particular joint by tightening five bolts until they just begin to yield the optimum torque is 80 of this value, for bolt joint loaded in shear three stress areas result the below chart shows the single shear strength of 4 6 8 10 9 grade 2 grade 5 and grade 8 bolts the bolts are loaded in shear depending on the joint design the bolt can be in single or double shear refer to your engineering, metric bolt torque table cncexpo com may 11th 2018 metric bolt torque table torque specs estimated with clamp load as 75 of proof load as specified in iso 898 1 property class 8 8 10 9 12 9 socket head notes on nuts and bolts, the third pass would be another 90 degree angle at this point the bolt has changed its form and if loosened or removed it must be replaced with a new torque to yield bolt this answer could be correct if the tty bolt passes all of the manufacturer s required specifications be careful when clamping cylinder heads with these bolts, stripper bolt made of 4137 alloy steel 33 to 38 hrc strength class 10 9 by finding a value greater than the allowable load of 1960n 200 kgf in the strength class 10 9 column in the table on right m8 3116 n 318 kgf should be selected, our metric stud bolt to nut table is meant to help determine the correct size bolt or nut for your purpose definitions of terms are located below the chart use the dimensions of your bolt to determine the appropriate size nut the bolt chart provides both us and metric stud sizes download printable version coarse thread bolts, will determine the tightening given a clamp force preload will work in both metric and inch units the program accesses extensive databases supplied with the program containing thread size details and bolt material properties for both inch and metric sizes, lubricating the bolts is the suggested method lubed means cleaned dry bolts lubricated with standard medium viscosity machine oil lubricate all contact areas of the bolts and washers lubricating the bolts is the suggested method nom dia pitch nom size x pitch inch bolt torque table sae j429 and asme 574 metric bolt torque table iso 898, force reducing clamp force on the joint 99172 49 n force increasing the fasteners tension 18637 51 n tensile stress due to preload 380 06 n mm s u m m a r y o f t h e r e s u l t s fastener clamp force analysis fastener preload 310403 76 n, this amount of tightening a rule of thumb is suitable for many joints but in some cases external tensile loads can reduce bolt clamping force to zero thus for some joints values other than, 60 p bolt tension lbf d bolt dia ins or for metric sizes m p x d m torque n m 5000 p bolt tension newtons d bolt dia mm these formulae may be used for bolts outside the range of the tables overleaf, d for structural bolting 70000 n m12 95500 n m14 and 130000 n m16 mass and weight the difference bolt torque calculator us bolts tensile strength and proof loads proof load proof load is defined as the maximum tensile force that can be applied to a bolt that will not result in plastic deformation, the bolted joint works by inducing an initial clamping force preload on the joint by threading the fastener into either a nut or into threads that have been tapped into one of the parts in the case of metric threads the thread profile is based on a parameter h shigley provides a table of torque coefficients based on bolt