

MARYLAND METRICS

TORQUE VALUES

The following Tables of Maximum Tightening Torques for both Metric, USA & Imperial threads are provided for general guidance in the absence of specific values, but it cannot be over-emphasized that where the recommended torque loads are available, they should be strictly adhered to.

Maximum recommended tightening torque

Imperial threads

Torque figures in (lbf)in

| Nominal thread dia | Quality (lbf in) | | | | | |
|--------------------|------------------|------|------|------|------|-------|
| | 'A' | 'P' | 'R' | 'S' | 'T' | 'X' |
| No. 2 | 1.8 | 2.7 | 4.1 | 4.6 | 5.3 | 7.6 |
| No. 3 | 2.8 | 4.1 | 6.3 | 7.0 | 8.1 | 11.6 |
| No. 4 | 3.9 | 5.7 | 8.9 | 9.9 | 11.5 | 16.4 |
| No. 5 | 5.5 | 8.1 | 12.5 | 14.0 | 16.2 | 23.1 |
| No. 6 | 7.5 | 11.0 | 17.0 | 19.0 | 22.0 | 31.5 |
| No. 8 | 12.9 | 18.9 | 29.2 | 32.6 | 37.8 | 54.0 |
| No. 10 | 20.3 | 29.8 | 46.1 | 51.5 | 59.6 | 85.4 |
| No. 12 | 29.9 | 43.8 | 67.7 | 75.6 | 87.5 | 125.0 |

British BA series

| Nominal thread dia | Quality (lbf in) | | | | | |
|--------------------|------------------|------|------|-------|-------|-------|
| | 'A' | 'P' | 'R' | 'S' | 'T' | 'X' |
| 8 BA | 1.9 | 2.8 | 4.4 | 4.9 | 5.6 | 8.1 |
| 7 BA | 2.7 | 4.0 | 6.2 | 6.9 | 8.0 | 11.5 |
| 6 BA | 3.9 | 5.6 | 8.7 | 10.0 | 11.3 | 16.1 |
| 5 BA | 5.9 | 8.6 | 13.4 | 14.9 | 17.3 | 24.8 |
| 4 BA | 8.4 | 12.3 | 19.0 | 21.3 | 24.6 | 35.3 |
| 3 BA | 12.5 | 18.3 | 28.2 | 31.6 | 36.6 | 52.4 |
| 2 BA | 19.1 | 28.0 | 43.3 | 48.4 | 56.0 | 80.2 |
| 1 BA | 27.4 | 40.2 | 62.1 | 69.4 | 80.0 | 115.0 |
| 0 BA | 40.2 | 59.0 | 91.1 | 101.9 | 118.0 | 169.0 |

Useful Conversions

lbf ft x 1.356 = Nm (Newton metres)
 lbf ft x 0.138 = Kgf m (Kilogram Force Metres)
 or Kpm (Kilopond Metres)

lbf ft x 12 = lbf in
 lbf in x 0.113 = Nm
 lbf in x 0.0115 = Kgf m
 Nm x 0.7376 = lbf ft
 Nm x 8.851 = lbf in

Nm x 0.102 = Kgf m
 Kgf m x 7.233 = lbf ft
 Kgf m x 86.8 = lbf in
 Kgf m x 9.807 = Nm

Steel Qualities

ISO Material Grades

In the ISO recommendation, the first figure in the grade* number is the ultimate tensile strength in kgf/mm² divided by 10, and the second figure is the proportion of yield to ultimate tensile strength, so that multiplying the two figures together and then multiplying by 10, gives the minimum yield stress.

Example

Material Grade 8.8
 Ultimate Tensile Strength of Material = 80 kgf/mm²
 Minimum Yield Stress of Material = 8 x 0.8 x 10 = 64 kgf/mm²

Strength class comparison (approximate).

| Metric (property class) | British (quality) | U.S.A. (grade) |
|-------------------------|-------------------|----------------|
| 6/6.6/8/6.9 | P | 3 |
| 8/8.8 | R & S | 5&A-449 |
| 9/9.8 | T | 6 |
| 10/10.9 | V | 8&A-354-BD |
| 12/12.9 | X | - |

Maximum recommended tightening torque - Metric threads

Standard series - Coarse & Fine
 All torque figures in Nm (Newton metres)

| Nominal Thread Dia mm | 4.6 property class | | 4.8 property class | | 5.6 property class | | 5.8 property class | | 6.6 property class | |
|-----------------------|--------------------|------|--------------------|------|--------------------|------|--------------------|------|--------------------|------|
| | Coarse | Fine | Coarse | Fine | Coarse | Fine | Coarse | Fine | Coarse | Fine |
| 1.5 | .08 | | .10 | | .10 | | .13 | | .11 | |
| 2 | .16 | | .21 | | .19 | | .26 | | .23 | |
| 2.5 | .32 | | .43 | | .40 | | .53 | | .48 | |
| 3 | .57 | | .76 | | .71 | | .95 | | .85 | |
| 4 | 1.3 | | 1.8 | | 1.7 | | 2.2 | | 2.0 | |
| 5 | 2.7 | | 3.6 | | 3.3 | | 4.5 | | 4.0 | |
| 6 | 4.5 | | 6.1 | | 5.7 | | 7.6 | | 6.8 | |
| 7 | 7.6 | | 10.2 | | 9.5 | | 12.7 | | 11.4 | |
| 8 | 11 | 11.8 | 14.7 | 15.7 | 13.8 | 14.8 | 18.4 | 19.7 | 16.5 | 17.7 |
| 10 | 21.8 | 23 | 29.1 | 30.7 | 27.3 | 28.8 | 36.4 | 38.4 | 32.9 | 34.6 |
| 12 | 38.1 | 41.6 | 50.8 | 55.5 | 47.6 | 52 | 64 | 69 | 57 | 62 |
| 14 | 60.6 | 66 | 81 | 88 | 76 | 82 | 101 | 110 | 91 | 99 |
| 16 | 95 | 101 | 126 | 134 | 118 | 126 | 159 | 168 | 142 | 151 |
| 18 | 130 | 146 | 174 | 195 | 163 | 183 | 217 | 244 | 195 | 220 |
| 20 | 185 | 205 | 246 | 273 | 231 | 256 | 308 | 342 | 277 | 307 |
| 22 | 251 | 276 | 335 | 368 | 314 | 345 | 419 | 460 | 377 | 414 |
| 24 | 319 | 347 | 425 | 463 | 399 | 434 | 532 | 579 | 479 | 521 |
| 27 | 467 | 504 | 622 | 672 | 583 | 630 | 778 | 841 | 700 | 757 |

Maximum recommended tightening torque - Metric threads

Standard series - Coarse & Fine
 All torque figures in Nm (Newton metres)

| Nominal Thread Dia mm | 8.8 property class | | 9.8 property class | | 10.9 property class | | 12.9 property class | | 14.9 property class | |
|-----------------------|--------------------|------|--------------------|------|---------------------|------|---------------------|------|---------------------|------|
| | Coarse | Fine | Coarse | Fine | Coarse | Fine | Coarse | Fine | Coarse | Fine |
| 1.6 | .20 | | .23 | | .29 | | .34 | | .40 | |
| 2 | .42 | | .47 | | .58 | | .70 | | .82 | |
| 2.5 | .85 | | .96 | | 1.2 | | 1.44 | | 1.7 | |
| 3 | 1.5 | | 1.7 | | 2.1 | | 2.6 | | 3.0 | |
| 4 | 3.5 | | 4.0 | | 5 | | 6 | | 7.0 | |
| 5 | 7.1 | | 8.0 | | 10 | | 12 | | 14 | |
| 6 | 12.1 | | 13.6 | | 17 | | 20.4 | | 23.8 | |
| 7 | 20.3 | | 22.8 | | 28.6 | | 34.3 | | 40.0 | |
| 8 | 29.4 | 31.5 | 33.1 | 35.4 | 41.3 | 44.3 | 49.6 | 53.2 | 57.9 | 62 |
| 10 | 58.3 | 61 | 66 | 69 | 82 | 86 | 98 | 104 | 115 | 121 |
| 12 | 102 | 111 | 114 | 125 | 143 | 156 | 171 | 187 | 200 | 219 |
| 14 | 162 | 176 | 182 | 198 | 227 | 247 | 273 | 297 | 318 | 346 |
| 16 | 252 | 268 | 284 | 302 | 355 | 377 | 426 | 453 | 497 | 528 |
| 18 | 347 | 391 | 391 | 439 | 488 | 549 | 586 | 659 | 683 | 769 |
| 20 | 492 | 546 | 554 | 615 | 693 | 768 | 830 | 922 | 969 | 1076 |
| 22 | 670 | 736 | 753 | 828 | 941 | 1035 | 1130 | 1241 | 1318 | 1448 |
| 24 | 851 | 926 | 957 | 1041 | 1196 | 1301 | 1436 | 1562 | 1675 | 1822 |
| 27 | 1245 | 1344 | 1401 | 1513 | 1750 | 1891 | 2100 | 2269 | 2450 | 2648 |

Maximum recommended tightening torques - Imperial threads

UNC, UNF, BSF & BSW
 All torque figures in lbf ft

| Nominal Thread Dia | 'P' Quality | | | | | | 'R' Quality | | | | | |
|--------------------|-------------|--------|--------|--------|--------|--------|-------------|--------|--------|--------|--------|--------|
| | BSW | | BSF | | UNC | | BSW | | BSF | | UNC | |
| | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft |
| 1/4 | 3.6 | 4 | 3.6 | 4 | 5.3 | 5.9 | 5.3 | 6 | 8.2 | 9.1 | 8.2 | 9.3 |
| 5/16 | 7.4 | 7.9 | 7.4 | 8.2 | 11 | 12 | 11 | 12 | 17 | 18 | 17 | 19 |
| 3/8 | 13 | 14 | 13 | 15 | 19 | 21 | 19 | 22 | 30 | 32 | 30 | 34 |
| 7/16 | 21 | 23 | 21 | 23 | 31 | 33 | 31 | 34 | 48 | 51 | 48 | 53 |
| 1/2 | 31 | 34 | 32 | 36 | 46 | 50 | 47 | 53 | 70 | 77 | 73 | 82 |
| 9/16 | 46 | 50 | 46 | 52 | 68 | 73 | 68 | 76 | 104 | 113 | 105 | 117 |
| 5/8 | 64 | 68 | 64 | 72 | 93 | 100 | 94 | 106 | 144 | 154 | 145 | 164 |
| 3/4 | 113 | 118 | 114 | 126 | 166 | 173 | 167 | 185 | 256 | 268 | 256 | 286 |
| 7/8 | 181 | 191 | 183 | 201 | 266 | 280 | 269 | 295 | 411 | 433 | 415 | 456 |
| 1 | 272 | 288 | 274 | 299 | 400 | 422 | 402 | 438 | 617 | 652 | 621 | 678 |
| 1 1/8 | 387 | 411 | 389 | 434 | 567 | 602 | 570 | 637 | 876 | 931 | 881 | 984 |

Maximum recommended tightening torque - Imperial threads

UNC, UNF, BSF & BSW
 All torque figures in lbf ft

| Nominal Thread Dia | 'S' Quality | | | | 'T' Quality | | | | 'X' Quality | | | |
|--------------------|-------------|--------|--------|--------|-------------|--------|--------|--------|-------------|--------|--------|--------|
| | BSW | | BSF | | BSW | | BSF | | BSW | | BSF | |
| | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft | lbf ft |
| 1/4 | 9.1 | 9.1 | 10 | 10 | 11 | 12 | 11 | 12 | 15 | 17 | 15 | 17 |
| 5/16 | 19 | 19 | 20 | 21 | 22 | 23 | 22 | 24 | 31 | 33 | 31 | 34 |
| 3/8 | 33 | 33 | 36 | 38 | 38 | 41 | 39 | 44 | 55 | 59 | 55 | 63 |
| 7/16 | 53 | 53 | 58 | 60 | 62 | 67 | 62 | 69 | 88 | 95 | 89 | 99 |
| 1/2 | 79 | 82 | 86 | 91 | 91 | 100 | 94 | 106 | 130 | 143 | 135 | 152 |
| 9/16 | 117 | 117 | 126 | 131 | 135 | 146 | 137 | 152 | 194 | 210 | 195 | 217 |
| 5/8 | 161 | 162 | 172 | 183 | 187 | 200 | 188 | 212 | 267 | 286 | 269 | 304 |
| 3/4 | 286 | 288 | 300 | 319 | 331 | 347 | 333 | 370 | 474 | 497 | 477 | 529 |
| 7/8 | 460 | 464 | 484 | 510 | 532 | 560 | 537 | 590 | 762 | 802 | 769 | 845 |
| 1 | 690 | 695 | 729 | 757 | 799 | 844 | 804 | 877 | 1144 | 1208 | 1152 | 1255 |
| 1 1/8 | 979 | 985 | 1041 | 1100 | 1134 | 1205 | 1140 | 1273 | 1624 | 1725 | 1632 | 1823 |

*grade may be also referred to as 'quality' or 'property class' in the charts on this page.