



KWALITY FORGE

Rajiv Garg Group

AN ISO 9001 : 2015 CERTIFIED COMPANY



Manufacturers of :

M.S. High Tensile & SS Bolts, Nuts, Studs, Drop Forging
& Turning Components

www.kwalityforge.net



Dear Sir / Madam

We take the opportunity to introduce ourselves as one of the leading Manufacturer of Nuts, Bolts, Studs & Drop Forging hammer products etc. in all grades (S.S, High Tensile, Mild Steel) for last over five decades and our products are being supplied to almost all the leading OEM's through out the country. A commitment to live up to its clients' expectations, the dedication to provide the best quality and the vision to be known as one of the leading fastener manufacturer in the country, has made **KWALITY FORGE**, come this far. Today, Kwaliti Forge is capable of not just producing even large batches of standard as well as non-standard, tailor made fasteners; but also specializes in manufacturing critical fasteners. Further, it has its pulse on the technological up-gradations and innovations of its upcoming projects. Hence **KWALITY FORGE** is able to cater to its customer's emerging needs.

The company has modified production shop & R&D section equipped with latest equipment to judge, look after the quality products before forward.

Somnath Garg
(Founders) Chairman

Rajiv Garg
Director

Varun Garg
Managing Director

Karan Garg
Managing Director

Heena Garg
Proprietor





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|---|------------|
| 1. Infrastructure | Page 1-4 |
| 2. Products | Page 5-7 |
| 3. Introduction | Page 8-9 |
| 4. Thread Size Comparision | Page 10 |
| 5. M.s Hex Bolts F.T. (Nos. Per 50 Kgs.) | Page 11-12 |
| 6. Bolts with nuts (Nos. Per 50 Kgs.) | Page 13 |
| 7. M.s Hex Bolts Only Half Thread | Page 14 |
| 8. Nuts as Per Is & Fastener Items | Page 15 |
| 9. M.s. Hex Bolts Full thread to bs :916/53 | Page 16 |
| 10. M.s. Hex Bolts only to bs :916/53 | Page 17 |
| 11. Weight Count Chart M.s. Hex Bolts Full Thread | Page 18 |
| 12. M.s Hex Nuts & Carriage Bolts | Page 19 |
| 13. Heavy Hex Structural Bolts ASTM A325M, A563M, F436M | Page 20-24 |
| 14. Count Chart for heavy Hex Bolts and heavy hex nuts | Page 25 |
| 15. Weight count chart for B7 Studs with Nuts | Page 26 |
| 16. Dimensions For Hex Bolts, Nuts & Lock Nuts | Page 27-31 |
| 17. Chemical Composition Requirements of Bolts, Screws, Studs ^A | Page 32 |
| 18. Mechanical Properties of Bolts, Screws And Studs | Page 33-34 |
| 19. Chemical Composition & Hardness Requirements of Nuts ^A | Page 35 |
| 20. Proof Load Stress (Mpa) And Proof Load Values For Nuts, kn ^A | Page 36-37 |
| 21. Chemical composition of Fasteners | Page 38 |
| 22. Chemical and Mechanical Properties For bolts, Screws | Page 39 |
| 23. Approvals/ Our Clients | Page 40 |

Office Block



UTE



Microscope

Lab



Spectrometer



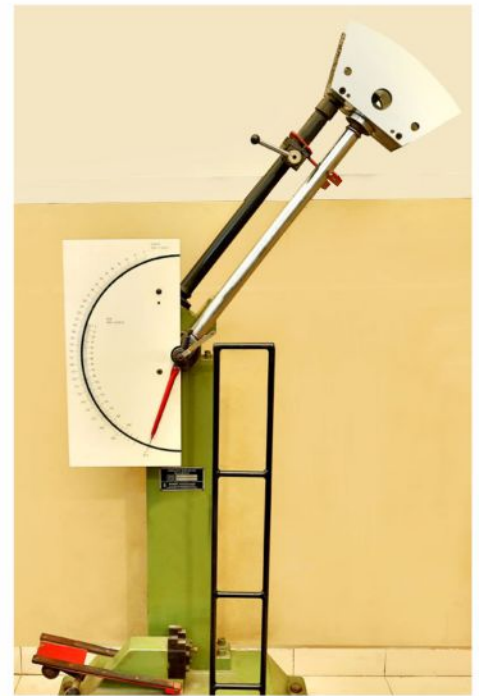
Crack Detector



Brinell Hardness Tester



Vicker Hardness Tester



Impact Tester



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Anti Theft With Key



U Bolt



V Bolt

Foundation Bolt



Anti Theft Nut

Allen CSK Screw <<



>> Hex Bolt <<



H
E
X
N
U
T



Serrated Washer



Allen Bolt



Flange Bolt



Slotted Round Head Bolts



F
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A
N
G
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U
T





Anti Theft Bolt With Nuts

« Nails



Plain Washer

Carriage Bolt



DTI Washer



Machined Component & Forged Component



HSFG Bolts and Nuts



Wire Rope Clump



Machines & Equipments

To ensure state of the art production of nuts bolts has installed latest machinery and plant, capable of producing high quality even production KWALITY FORGE has its own workshop equipped with best machinery and skilled staff.

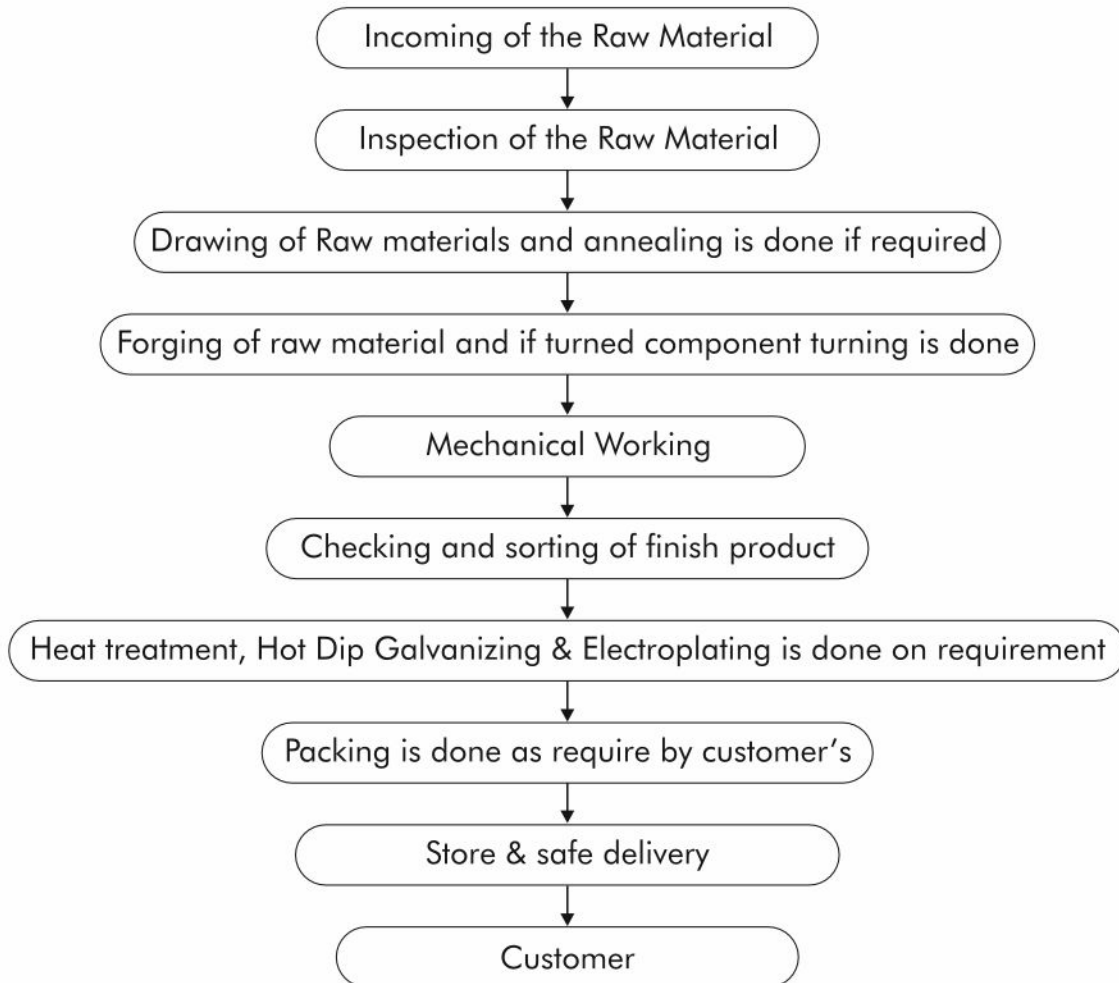
Quality control is of highest standards. Each and every piece undergoes strict checking by quality control department before despatch.

- Automatic Nuts Former
- Heat Treatment plant
- Automatic Tapping Machines
- In House Tools & Equipments Making Machines
- Hydraulic Power Press
- CNC Turning Machine
- Automatic Bolt Mater
- In House Die Making
- Turned Component Machines

Merely quality straightening production is not the sole aim at KWALITY FORGE Delivers well before the committed dates, first class packing as specifically required by the clients and appropriate transportation is what has brought commendation and credibility to KWALITY FORGE

Processing Working Systems

Our Company Iso 9001 : 2008 Certified company
We have adopted and maximising systems for manufacturing best quality under timely delivery.



•Dome Nuts •Flange Nuts •Lock/Jam •Nuts Square •Weld Nuts •Hex Weld Nuts •Hex Nuts • Nylon Insert Lock Nuts •Round Nuts • Self Locking Hex Nuts • Slotting Hex Nuts • Wing Nuts • Castle Nuts • Cap Nuts • Cage Nuts SCREWS • Self Tapping Screws • Philips Head Screws • Hex Head Screw • Pan Head Screw • Spring Washers • Plain Washers • Hex Bolts • Carriage Bolts Eye Bolts • Hex Flange Bolts • Round Head Square Neck Bolts • T-Head Bolts • U-Bolts • Wheel Bolts • Rivets • Threaded Rods Studs



Packing & Forwarding

Best quality materials are used for packing the materials to ensure smooth transport the materials to ensure smooth transport till its destination.

Material is also available in small packing.

Good quality card board packing is used as specific requirements of the procurement agencies

Raw Material

KWALITY FORGE believes in the principle Quality Production out of Quality Raw Materials to achieve this, we procure total quality Raw Materials.

About Customers

Client's Ultimate satisfaction is a motto at KWALITY FORGE and we believe in total quality in total quality.

So, our company & dealing with more than 600 customers in indian and international Marketing including OEM, importers & importers Domestic Market.

To Provide Quality Fastners

- As per Din, ASTM, SAFE & JIS standard.
- Mechanical & Chemical Analysis
- Load Testing, Microstructure Analysis etc.
- Salt Spray testing if Required.
- Third party independent inspection upon request.
- Automation for Mass Production.
- Rates at per with the global market.

Hot dip & Electro Galvanized Fastners From 2 mm to 44 mm and high tensile fastners (grade 4.6, 8.8, 10.9, 12.9) is a specialization at KWALITY FORGE and is followed up with constant and development by committed technicians.

KWALITY FORGE Work is equipped with best available fully automated machines, equipments by and professionals to ensure highest standards in manufacturing. KWALITY FORGE has its own tool house and all the jobs are accomplished indigenously



THREAD SIZE COMPARISON

| Size | METRIC PRODUCTS | | | | | | Size | T.P.I | | Major Dia Inch | Size | T.P.I | | Major Dia Inch | T.P.I BA | Major Dia Inch |
|--------------|-----------------|-------|----------|-------|------------|-------|--------------|-------|-----|----------------|--------------------------|-------|-----|----------------|----------|----------------|
| | COARSE | | FINE | | Metric Dia | | | UNC | UNF | | | BSW | BSF | | | |
| | Pitch mm | T.P.I | Pitch mm | T.P.I | mm | Inch | | | | | | | | | | |
| M3 | 0.50 | 51 | - | - | 3.00 | 0.118 | #5 | 40 | 44 | 0.125 | 1/8 | 40 | - | 0.125 | | |
| | | | - | - | | | #6 | 32 | 40 | 0.138 | 5BA 4BA | | | 43.1 | 0.126 | |
| M4 | 0.70 | 36 | - | - | 4.00 | 0.157 | #8 | 32 | 36 | 0.164 | 3BA | | | 34.8 | 0.161 | |
| M5 | 0.80 | 32 | - | - | 5.00 | 0.197 | #10 | 24 | 32 | 0.190 | 3/16 | 24 | 32 | 0.187 | | |
| | | | - | - | | | | | | | 2BA | | | 31.3 | 0.185 | |
| | | | - | - | | | | | | | 1BA | | | 28.2 | 0.209 | |
| M6 | 1.0 | 25 | - | - | 6.00 | 0.236 | 1/4 | 20 | 28 | 0.250 | 1/4 | 20 | 26 | 0.250 | | |
| | | | 1.00 | 25 | | | | | | | 0BA | | | 25.4 | 0.236 | |
| M8 | 1.25 | 20 | 1.25 | 20 | 8.00 | 0.315 | 5/16 | 18 | 24 | 0.313 | 5/16 | 18 | 22 | 0.313 | | |
| M10 | 1.50 | 17 | | | 10.00 | 0.394 | 3/8 | 16 | 24 | 0.375 | 3/8 | 16 | 20 | 0.375 | | |
| | | | 1.25 | 20 | | | | | | | 7/16 | 14 | 18 | 0.438 | | |
| M12 | 1.75 | 14.50 | 1.50 | 17 | 12.00 | 0.472 | 1/2 | 13 | 20 | 0.500 | 1/2 | 12 | 16 | 0.500 | | |
| (M14) | 2.00 | 12.50 | 1.50 | 17 | 14.00 | 0.551 | | | | | | | | | | |
| M16 | 2.00 | 12.50 | 1.50 | 17 | 16.00 | 0.630 | 5/8 | 11 | 18 | 0.625 | 5/8 | 11 | 14 | 0.625 | | |
| (M18) | 2.50 | 10 | 1.50 | 17 | 18.00 | 0.709 | | | | | | | | | | |
| M20 | 2.50 | 10 | 1.50 | 17 | 20.00 | 0.787 | 3/4 | 10 | 16 | 0.750 | 3/4 | 10 | 12 | 0.750 | | |
| (M22) | 2.50 | 10 | 2.00 | 13 | 22.00 | 0.866 | 7/8 | 9 | 14 | 0.875 | 7/8 | 9 | 11 | 0.875 | | |
| M24 | 3.00 | 8.5 | | | 24.00 | 0.945 | 1 | 8 | 12 | 1.000 | 1 | 8 | 10 | 1.000 | | |
| | | | 2.00 | 13 | | | 1.1/8 | 7 | 12 | 1.125 | 1.1/8 | 7 | 9 | 1.125 | | |
| (M27) | 3.00 | 8.50 | 2.00 | 13 | 27.00 | 1.063 | | | | | | | | | | |
| M30 | 3.50 | 7.25 | 2.00 | 13 | 30.00 | 1.181 | 1.1/4 | 7 | 12 | 1.250 | 1.1/4 | 7 | 9 | 1.250 | | |
| (M33) | 3.50 | 7.25 | 3.00 | 8.5 | 33.00 | 1.299 | | | | | | | | | | |
| M36 | 4.00 | 6.40 | 3.00 | 8.5 | 36.00 | 1.417 | 1.1/2 | 6 | 12 | 1.500 | 1.1/2 | 6 | 8 | 1.500 | | |
| (M39) | 4.00 | 6.40 | 3.00 | 8.5 | 39.00 | 1.417 | | | | | | | | | | |
| M42 | 4.50 | 5.60 | | | 42.00 | 1.653 | | | | | | | | | | |



M.S HEX BOLTS F.T.(NOS.PER 50 KGS.)

| L \ D | M1.6 | M1.7 | M2 | M2.3 | M2.5 | M2.6 | M3 | M3.5 | M4 | M5 | M6 | M7 | M8 | M10 | M12 |
|-------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|------|------|------|------|
| 2 | 526315 | 400000 | | | | | | | | | | | | | |
| 3 | 476190 | 370370 | 248756 | 172413 | 135135 | 130548 | | | | | | | | | |
| 4 | 434782 | 344827 | 236966 | 161290 | 125000 | 121065 | 105263 | | | | | | | | |
| 5 | 400000 | 322580 | 216450 | 147058 | 116279 | 112866 | 95238 | 59523 | 39682 | | | | | | |
| 6 | 370370 | 285714 | 199203 | 138888 | 108695 | 105708 | 88495 | 55555 | 37593 | 22935 | 14705 | 9208 | | | |
| 7 | 344827 | 270270 | 184501 | 128205 | 102040 | 97465 | 81300 | 52083 | 35460 | 22123 | 14005 | 8802 | | | |
| 8 | 322580 | 256410 | 171821 | 121951 | 96153 | 92081 | 76335 | 49019 | 33557 | 21008 | 13368 | 8431 | 5847 | 2906 | |
| 9 | 303030 | 232558 | 160771 | 113636 | 90909 | 81260 | 71942 | 46942 | 32051 | 19920 | 12787 | 8090 | 5649 | 2824 | |
| 10 | 285714 | 222222 | 151057 | 106382 | 86206 | 82918 | 67114 | 43859 | 30487 | 19011 | 12254 | 7776 | 5494 | 2747 | 1937 |
| 12 | 256410 | 196078 | 138504 | 96153 | 78125 | 74294 | 59880 | 39682 | 27777 | 17421 | 11312 | 7225 | 5102 | 2604 | 1824 |
| 14 | | 175438 | 127877 | 87719 | 71428 | 67567 | 54347 | 36231 | 25641 | 16025 | 10482 | 6765 | 4807 | 2475 | 1736 |
| 16 | | 158730 | 118764 | 80645 | 65789 | 62034 | 50000 | 33333 | 23809 | 14836 | 9784 | 6361 | 4504 | 2358 | 1655 |
| 18 | | | | 74626 | 60975 | 57273 | 45871 | 31055 | 22123 | 13812 | 9157 | 5945 | 4273 | 2252 | 1587 |
| 20 | | | | 69444 | 56818 | 53590 | 42372 | 28901 | 20746 | 12919 | 8620 | 5611 | 4065 | 2155 | 1515 |
| 22 | | | | | 53191 | 50000 | 39370 | 27027 | 19455 | 12135 | 8143 | 5313 | 3875 | 2066 | 1453 |
| 25 | | | | | 49019 | 45871 | 35714 | 24630 | 17857 | 11135 | 7518 | 4950 | 3597 | 1945 | 1366 |
| 28 | | | | | | | 32679 | 22624 | 17006 | 10288 | 6983 | 4629 | 3378 | 1838 | 1291 |
| 30 | | | | | | | | | 15673 | 9784 | 6657 | 4385 | 3225 | 1773 | 1243 |
| 35 | | | | | | | | | 14005 | 8726 | 5973 | 3968 | 2923 | 1628 | 1141 |
| 40 | | | | | | | | | 12626 | 7874 | 5417 | 3597 | 2673 | 1506 | 1054 |
| 45 | | | | | | | | | 11520 | 7153 | 4950 | 3311 | 2463 | 1400 | 980 |
| 50 | | | | | | | | | 10570 | 6587 | 4545 | 3048 | 2293 | 1308 | 917 |
| 55 | | | | | | | | | 9765 | 6090 | 4201 | 2840 | 2136 | 1228 | 860 |
| 60 | | | | | | | | | 9090 | 5662 | 3937 | 2659 | 2000 | 1154 | 810 |
| 65 | | | | | | | | | 8488 | 5291 | 3676 | 2487 | 1879 | 1091 | 765 |
| 70 | | | | | | | | | 7961 | 4950 | 3472 | 2347 | 1773 | 1035 | 725 |
| 75 | | | | | | | | | | 4672 | 3267 | 2212 | 1677 | 984 | 689 |
| 80 | | | | | | | | | | 4424 | 3086 | 2100 | 1592 | 938 | 659 |
| 85 | | | | | | | | | | | 2941 | 1992 | 1515 | 896 | 627 |
| 90 | | | | | | | | | | | 2793 | 1901 | 1445 | 857 | 600 |
| 90 | | | | | | | | | | | | 1811 | 1385 | 822 | 575 |
| 100 | | | | | | | | | | | | 1736 | 1326 | 789 | 522 |
| 110 | | | | | | | | | | | | | 1222 | 730 | 511 |
| 120 | | | | | | | | | | | | | | 681 | 476 |
| 130 | | | | | | | | | | | | | | 637 | 446 |
| 140 | | | | | | | | | | | | | | 599 | 420 |
| 150 | | | | | | | | | | | | | | 565 | 396 |



M.S HEX BOLTS F.T.(Nos.per 50 Kgs.)

| L \ D | M14 | M16 | M18 | M20 | M22 | M24 | M37 | M30 | M33 | M36 | M39 | M42 | M45 | M48 | M52 |
|-------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 10 | 1315 | | | | | | | | | | | | | | |
| 12 | 1250 | 945 | | | | | | | | | | | | | |
| 14 | 1190 | 899 | | | | | | | | | | | | | |
| 16 | 1136 | 857 | 604 | 467 | 375 | 289 | 203 | | | | | | | | |
| 18 | 1086 | 821 | 584 | 446 | 364 | 280 | 197 | | | | | | | | |
| 20 | 1041 | 787 | 563 | 431 | 349 | 271 | 191 | | | | | | | | |
| 22 | 1000 | 755 | 538 | 416 | 337 | 263 | 185 | | | | | | | | |
| 25 | 943 | 712 | 518 | 396 | 322 | 251 | 178 | | | | | | | | |
| 28 | 894 | 673 | 495 | 378 | 310 | 240 | 171 | | | | | | | | |
| 30 | 863 | 650 | 476 | 367 | 297 | 233 | 161 | | | | | | | | |
| 35 | 794 | 598 | 442 | 340 | 276 | 218 | 156 | 117 | 92 | 73 | 57 | | | | |
| 40 | 736 | 554 | 416 | 318 | 259 | 204 | 147 | 111 | 87 | 69 | 54 | 45 | 37 | 31 | |
| 45 | 685 | 514 | 387 | 299 | 242 | 193 | 139 | 105 | 83 | 65 | 52 | 44 | 36 | 30 | |
| 50 | 641 | 485 | 364 | 280 | 228 | 182 | 132 | 100 | 79 | 63 | 50 | 42 | 34 | 29 | 23 |
| 55 | 603 | 454 | 342 | 265 | 215 | 173 | 125 | 96 | 75 | 60 | 48 | 40 | 33 | 28 | 23 |
| 60 | 569 | 427 | 324 | 251 | 204 | 164 | 120 | 92 | 72 | 58 | 46 | 39 | 32 | 27 | 22 |
| 65 | 538 | 406 | 308 | 239 | 194 | 156 | 114 | 88 | 69 | 55 | 45 | 38 | 31 | 26 | 21 |
| 70 | 511 | 384 | 294 | 228 | 185 | 149 | 110 | 84 | 67 | 53 | 43 | 36 | 30 | 25 | 20 |
| 75 | 490 | 364 | 280 | 218 | 177 | 143 | 105 | 81 | 64 | 51 | 41 | 35 | 29 | 24 | 20 |
| 80 | 467 | 347 | 264 | 208 | 169 | 137 | 101 | 78 | 62 | 50 | 40 | 34 | 28 | 24 | 19 |
| 85 | 446 | 333 | 256 | 200 | 162 | 132 | 97 | 75 | 59 | 48 | 39 | 33 | 27 | 236 | 19 |
| 90 | 427 | 318 | 246 | 192 | 155 | 127 | 94 | 72 | 57 | 46 | 37 | 32 | 26 | 22 | 18 |
| 95 | 409 | 304 | 236 | 184 | 150 | 122 | 90 | 70 | 56 | 45 | 36 | 31 | 26 | 22 | 18 |
| 100 | 393 | 294 | 228 | 177 | 144 | 118 | 87 | 68 | 54 | 43 | 35 | 30 | 25 | 21 | 17 |
| 110 | 364 | 271 | 211 | 165 | 134 | 110 | 82 | 64 | 51 | 41 | 33 | 28 | 23 | 20 | 16 |
| 120 | 340 | 253 | 198 | 155 | 125 | 103 | 77 | 60 | 48 | 39 | 32 | 27 | 22 | 19 | 16 |
| 130 | 318 | 238 | 185 | 145 | 118 | 97 | 72 | 57 | 45 | 37 | 30 | 25 | 21 | 18 | 15 |
| 140 | 299 | 223 | 175 | 137 | 111 | 92 | 69 | 54 | 43 | 35 | 28 | 24 | 20 | 17 | 14 |
| 150 | 282 | 210 | 166 | 130 | 105 | 87 | 65 | 51 | 41 | 33 | 27 | 23 | 19 | 17 | 14 |
| 160 | | | 157 | 123 | 100 | 83 | 62 | 49 | 39 | 32 | 26 | 22 | 19 | 16 | 13 |
| 170 | | | 150 | 117 | 95 | 79 | 59 | 47 | 37 | 30 | 25 | 21 | 18 | 15 | 12 |
| 180 | | | 143 | 112 | 91 | 75 | 57 | 45 | 35 | 29 | 24 | 20 | 17 | 15 | 12 |
| 190 | | | 136 | 107 | 87 | 72 | 54 | 43 | 34 | 28 | 23 | 20 | 16 | 14 | 12 |
| 200 | | | 131 | 103 | 83 | 69 | 52 | 41 | 33 | 27 | 22 | 19 | 16 | 14 | 11 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |



M.S. HEX BOLTS ONLY HALF THREAD, (STD. THREAD) TO BS : 916/53

DIMENSIONS IN INCHES

APPROX. COUNT PER 50 KG.

| Length | D I A M E T E R | | | | | | | | | | | | |
|--------|-----------------|------|------|------|-----|-----|-----|-----|-----|-----|-----|----|----|
| | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 27 | 30 | 33 |
| 25 | 7000 | | | | | | | | | | | | |
| 30 | 6080 | 3150 | | | | | | | | | | | |
| 35 | 5350 | 2810 | 1590 | | | | | | | | | | |
| 40 | 4830 | 2530 | 1455 | 1013 | | | | | | | | | |
| 45 | 4350 | 2310 | 1335 | 940 | | 506 | | | | | | | |
| 50 | 4000 | 2120 | 1235 | 875 | | 470 | | | | | | | |
| 55 | 3700 | 1960 | 1145 | 820 | 588 | 437 | | 360 | | | | | |
| 60 | 3420 | 1825 | 1075 | 770 | 550 | 408 | 312 | 244 | 200 | | | | |
| 65 | 3170 | 1700 | 1010 | 725 | 500 | 384 | 296 | 230 | 188 | 154 | | | |
| 70 | 2990 | 1650 | 955 | 687 | 471 | 361 | 276 | 218 | 179 | 146 | 109 | | |
| 80 | 2650 | 1425 | 853 | 620 | 425 | 325 | 254 | 197 | 162 | 132 | 100 | 76 | |
| 90 | 2400 | 1300 | 780 | 568 | 408 | 296 | 227 | 180 | 148 | 121 | 92 | 71 | 57 |
| 100 | 2200 | 1190 | 715 | 522 | 367 | 271 | 208 | 166 | 136 | 112 | 85 | 66 | 53 |
| 120 | 1800 | 972 | 617 | 400 | 305 | 232 | 185 | 143 | 115 | 97 | 74 | 58 | 47 |
| 140 | 1585 | 880 | 540 | 345 | 264 | 203 | 150 | 125 | 103 | 85 | 65 | 52 | 42 |
| 160 | 1400 | | 478 | 310 | | 180 | | 111 | 92 | 76 | 58 | 46 | 37 |
| 180 | | | 434 | 295 | | 162 | | 100 | 83 | 68 | 53 | 41 | 33 |
| 200 | | | 380 | 365 | | 148 | | 91 | 75 | 62 | 49 | 38 | 30 |
| 225 | | | | | | 132 | | 83 | 68 | 57 | 43 | 35 | 28 |
| 250 | | | | | | 120 | | 75 | 62 | 51 | 39 | 32 | 25 |
| 275 | | | | | | 109 | | 69 | 57 | 47 | 37 | 30 | 24 |
| 300 | | | | | | 101 | | 63 | 52 | 43 | 34 | 27 | 23 |



NUTS AS PER IS : 1363/67 & IS : 3138/66 AND DIN - 555

| Weight in kgs per 100 Nos. | | No. of pcs. per 50 kgs | | Weight in kgs per 100 Nos. | | No. of pcs. per 50 kgs | |
|-------------------------------|--------|---------------------------|--|-------------------------------|---------|---------------------------|--|
| 2 mm | 0.011 | 454,550 | | 33 mm | 27.100 | 184 | |
| 3 mm | 0.033 | 151,500 | | 36 mm | 36.900 | 135 | |
| 4 mm | 0.067 | 74,075 | | 39 mm | 47.200 | 105 | |
| 5 mm | 0.111 | 45,045 | | 42 mm | 57.400 | 87 | |
| 6 mm | 0.232 | 21,551 | | 45 mm | 73.000 | 68 | |
| 7 mm | 0.294 | 17,000 | | 48 mm | 92.400 | 54 | |
| 8 mm | 0.482 | 10,373 | | 52 mm | 108.000 | 46 | |
| 10 mm | 1.090 | 4,587 | | 56 mm | 132.000 | 38 | |
| 12 mm | 1.590 | 3,144 | | 60 mm | 160.000 | 31 | |
| 14 mm | 2.400 | 2,083 | | 64 mm | 184.000 | 27 | |
| 16 mm | 3.080 | 1,623 | | 72 mm | 239.000 | 21 | |
| 18 mm | 4.450 | 1,124 | | 80 mm | 331.000 | 15 | |
| 20 mm | 6.030 | 829 | | 90 mm | 455.000 | 11 | |
| 22 mm | 7.150 | 700 | | 100 mm | 634.000 | 8 | |
| 24 mm | 10.300 | 485 | | 0BA | 0.270 | 18,5000 | |
| 27 mm | 15.400 | 324 | | 2BA | 0.126 | 39,7000 | |
| 30 mm | 21.600 | 231 | | | | | |

OTHER FASTENER ITEMS - WEIGHT IN KGS. PER 100 NOS.

| M5 | M6 | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 | M33 | M36 | M39 | M42 | M45 | M48 | M52 |
|------------------------------------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| PLAIN WASHER IS : 2016 | | | | | | | | | | | | | | | | |
| 0.04 | 0.11 | 0.20 | 0.39 | 0.58 | 1.06 | 1.64 | 3.11 | 3.94 | 5.05 | 7.10 | 8.73 | 12.60 | 17.50 | 21.20 | 28.40 | 31.90 |
| TAPER WASHER IS : 5372 | | | | | | | | | | | | | | | | |
| | | 0.95 | 0.88 | 1.83 | 3.14 | 5.70 | 12.80 | 11.90 | 15.20 | 19.00 | 24.30 | 28.30 | | | | |
| TAPER WASHER IS : 5374 | | | | | | | | | | | | | | | | |
| | | 1.02 | 0.94 | 2.01 | 3.56 | 6.70 | 14.30 | 13.30 | 17.40 | 22.10 | 28.40 | 33.90 | | | | |
| HEAVY WASHER IS : 6610 | | | | | | | | | | | | | | | | |
| | | | 0.60 | 1.90 | 2.90 | 4.40 | 6.30 | 8.00 | 10.00 | 12.00 | 14.60 | 16.70 | 20.10 | 22.20 | 26.00 | |
| HEX LOCK NUT IS : 1364 - 84 | | | | | | | | | | | | | | | | |
| 0.08 | 0.16 | 0.32 | 0.72 | 1.90 | 2.05 | 4.02 | 6.95 | 10.10 | 13.90 | 18.30 | 24.40 | 31.60 | 40.30 | 50.00 | 61.70 | 75.50 |
| MACHINED WASHER | | | | | | | | | | | | | | | | |
| 0.04 | 0.11 | 0.21 | 0.40 | 0.62 | 1.13 | 1.72 | 3.30 | 4.23 | 5.36 | 7.54 | 9.20 | 13.30 | 18.30 | 22.00 | 29.40 | 33.00 |
| SPRING WASHER IS : 3063 | | | | | | | | | | | | | | | | |
| 0.03 | 0.08 | 0.16 | 0.25 | 0.38 | 0.89 | 1.52 | 2.62 | 2.87 | 4.43 | 6.30 | 6.73 | 6.73 | 11.10 | 11.70 | 12.30 | 18.20 |



M.S. HEX BOLTS FULL THREAD TO BS : 916/53

DIMENSIONS IN INCHES

APPROX. COUNT PER 50 KG.

| Length | D I A M E T E R | | | | | | | | |
|--------|-----------------|-------|------|-------|------|------|------|------|-----|
| | 1/4" | 5/16" | 3/8" | 7/16" | 1/2" | 5/8" | 3/4" | 7/8" | 1" |
| 1/2" | 9000 | 5500 | | | | | | | |
| 5/8" | 8000 | 5000 | 3250 | | | | | | |
| 3/4" | 7300 | 4470 | 2950 | 1785 | 1240 | | | | |
| 1" | 6124 | 3868 | 2423 | 1537 | 1120 | 640 | | | |
| 1.1/4" | 5351 | 3382 | 2137 | 1389 | 1009 | 582 | 365 | 276 | |
| 1.1/2" | 4752 | 3004 | 1910 | 1260 | 917 | 533 | 337 | 253 | 176 |
| 1.3/4" | 4272 | 2702 | 1727 | 1143 | 841 | 492 | 312 | 234 | 164 |
| 2" | 3882 | 2455 | 1577 | 1053 | 776 | 458 | 291 | 218 | 154 |
| 2.1/4" | 3556 | 2251 | 1451 | 975 | 720 | 427 | 273 | 204 | 145 |
| 2.1/2" | 3280 | 2076 | 1342 | 909 | 672 | 401 | 257 | 191 | 136 |
| 2.3/4" | 3045 | 1928 | 1250 | 851 | 630 | 377 | 242 | 180 | 129 |
| 3" | 2841 | 1798 | 1169 | 800 | 592 | 356 | 229 | 170 | 122 |
| 3.1/4" | 2662 | 1686 | 1098 | 755 | 560 | 338 | 218 | 161 | 116 |
| 3.1/2" | 2505 | 1587 | 1035 | 715 | 530 | 320 | 207 | 154 | 111 |
| 3.3/4" | 2365 | 1498 | 979 | 678 | 504 | 305 | 198 | 146 | 106 |
| 4" | 2240 | 1418 | 929 | 646 | 479 | 291 | 189 | 140 | 101 |
| 4.1/4" | 2128 | 1347 | 883 | 616 | 458 | 279 | 181 | 133 | 97 |
| 4.1/2" | 2026 | 1284 | 842 | 589 | 438 | 267 | 173 | 128 | 94 |
| 5" | 1852 | 1174 | 771 | 541 | 403 | 246 | 160 | 118 | 87 |
| 5.1/2" | 1704 | 1081 | 710 | 501 | 373 | 228 | 150 | 109 | 81 |
| 6" | 1580 | 1001 | 658 | 466 | 347 | 214 | 140 | 102 | 76 |



M.S. HEX BOLTS ONLY TO BS : 916/53

DIMENSIONS IN INCHES

APPROX. COUNT PER 50 KG.

| Length | D I A M E T E R | | | | | | | | | | | |
|--------|-----------------|-------|------|-------|------|------|------|------|-----|--------|--------|--|
| | 1/4" | 5/16" | 3/8" | 7/16" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | 1.1/8" | 1.1/4" | |
| 3/4" | 6835 | | | | | | | | | | | |
| 7/8" | 6290 | 3570 | | | | | | | | | | |
| 1" | 5760 | 3380 | 2520 | | | | | | | | | |
| 1.1/4" | 4670 | 2920 | 2155 | 1200 | 965 | 568 | | | | | | |
| 1.1/2" | 4310 | 2570 | 1880 | 1090 | 862 | 510 | 324 | | | | | |
| 1.3/4" | 3825 | 2290 | 1665 | 1000 | 780 | 463 | 303 | 222 | | | | |
| 2" | 3430 | 2075 | 1495 | 928 | 713 | 423 | 279 | 204 | 148 | | | |
| 2.1/4" | 3120 | 1890 | 1360 | 863 | 65 | 390 | 258 | 189 | 137 | | | |
| 2.1/2" | 2855 | 1740 | 1245 | 807 | 607 | 362 | 240 | 176 | 128 | 97 | | |
| 2.3/4" | 2630 | 1660 | 1148 | 757 | 565 | 337 | 225 | 165 | 120 | 91 | | |
| 3" | 2450 | 1495 | 1065 | 713 | 530 | 316 | 211 | 155 | 115 | 86 | 69 | |
| 3.1/2" | 2140 | 1310 | 930 | 640 | 470 | 281 | 188 | 138 | 101 | 77 | 62 | |
| 4" | 1900 | 1170 | 825 | 580 | 420 | 251 | 170 | 124 | 92 | 70 | 57 | |
| 4.1/2" | 1710 | 1052 | 743 | 530 | 380 | 236 | 160 | 115 | 85 | 66 | 52 | |
| 5" | 1560 | 960 | 675 | 488 | 362 | 216 | 147 | 106 | 78 | 61 | 49 | |
| 5.1/2" | 1430 | 880 | 620 | 453 | 347 | 199 | 136 | 98 | 72 | 57 | 45 | |
| 6" | 1310 | 813 | 572 | 422 | 335 | 185 | 126 | 91 | 67 | 53 | 42 | |
| 7" | | | | | | | 110 | 80 | 59 | 45 | 37 | |
| 8" | | | | | | | 98 | 72 | 53 | 41 | 33 | |
| 9" | | | | | | | 89 | 65 | 50 | 39 | 30 | |
| 10" | | | | | | | 81 | 59 | 45 | 36 | 28 | |
| 11" | | | | | | | 74 | 54 | 41 | 33 | 26 | |
| 12" | | | | | | | 68 | 50 | 38 | 31 | 24 | |



WEIGHT COUNT CHART

M.S. HEX BOLTS WITH NUTS FULL THREAD TO BS : 916/53

DIMENSIONS IN INCHES

APPROX. COUNT PER 50 KG.

| Length | D I A M E T E R | | | | | | | | | | | | |
|--------|-----------------|-------|------|-------|------|------|------|------|-----|--------|--------|--------|--|
| | 1/4" | 5/16" | 3/8" | 7/16" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | 1.1/8" | 1.1/4" | 1.1/2" | |
| 3/4" | 4500 | | | | | | | | | | | | |
| 1" | 3994 | 2450 | 1601 | 1010 | | | | | | | | | |
| 1.1/4" | 3568 | 2192 | 1446 | 928 | 650 | 358 | | | | | | | |
| 1.1/2" | 3213 | 1982 | 1317 | 851 | 602 | 335 | 210 | 167 | | | | | |
| 1.3/4" | 2932 | 1810 | 1210 | 790 | 562 | 314 | 198 | 157 | 108 | | | | |
| 2" | 2682 | 1665 | 1119 | 736 | 526 | 295 | 186 | 149 | 102 | | | | |
| 2.1/4" | 2494 | 1541 | 1036 | 690 | 494 | 279 | 177 | 141 | 97 | 68 | | | |
| 2.1/2" | 2316 | 1435 | 972 | 649 | 467 | 265 | 168 | 133 | 93 | 65 | 49 | 30 | |
| 2.3/4" | 2165 | 1342 | 912 | 612 | 442 | 251 | 160 | 127 | 89 | 63 | 47 | 29 | |
| 3" | 2033 | 1261 | 860 | 580 | 419 | 239 | 154 | 121 | 86 | 60 | 45 | 28 | |
| 3.1/2" | 1810 | 1125 | 771 | 524 | 381 | 219 | 140 | 111 | 79 | 56 | 42 | 26 | |
| 4" | 1626 | 1015 | 699 | 478 | 349 | 201 | 130 | 102 | 73 | 52 | 40 | 25 | |
| 4.1/2" | 1485 | 925 | 640 | 440 | 322 | 186 | 122 | 95 | 68 | 47 | 37 | 24 | |
| 5" | 1368 | 847 | 590 | 407 | 298 | 173 | 114 | 88 | 64 | 46 | 35 | 22 | |
| 5.1/2" | 1267 | 783 | 547 | 380 | 279 | 162 | 106 | 83 | 60 | 43 | 32 | 21 | |
| 6" | 1180 | 728 | 510 | 355 | 261 | 153 | 99 | 78 | 57 | 41 | 31 | 20 | |
| 7" | | | | | 232 | 136 | 91 | 70 | 51 | 37 | 29 | 19 | |
| 8" | | | | | 209 | 123 | 82 | 63 | 46 | 34 | 26 | 17 | |
| 9" | | | | | 189 | 112 | 75 | 58 | 42 | 31 | 24 | 16 | |
| 10" | | | | | 173 | 102 | 69 | 53 | 39 | 29 | 22 | 15 | |
| 11" | | | | | 160 | 94 | 64 | 49 | 36 | 27 | 21 | 14 | |
| 12" | | | | | 149 | 89 | 60 | 45 | 33 | 25 | 19 | 13 | |



M.S. HEX NUTS

DIMENSIONS IN INCHES

APPROX. COUNT PER 50 KG.

| | | | | | | | | | |
|---------------------------|--------------------------|--------------------------|-------------------------|------------------------|-----------------------|------------------------|-----------------------|-----------------------|----------------------|
| $\frac{1}{8}$ 1,22,000 | $\frac{5}{32}$ 94,300 | $\frac{3}{16}$ 37,600 | $\frac{1}{4}$ 15,500 | $\frac{5}{16}$ 9800 | $\frac{3}{8}$ 6121 | $\frac{7}{16}$ 3600 | $\frac{1}{2}$ 2250 | $\frac{5}{8}$ 1150 | $\frac{3}{4}$ 696 |
| $\frac{7}{8}$ 580 | 1 385 | $1\frac{1}{8}$ 275 | $1\frac{1}{4}$ 192 | $1\frac{3}{8}$ 132 | $1\frac{3}{8}$ 112 | $1\frac{3}{4}$ 70 | 2 61 | $2\frac{1}{4}$ 45 | $2\frac{1}{2}$ 30 |

M.S. SQUARE NUTS BS 916

DIMENSIONS IN INCHES

APPROX. COUNT PER 50 KG.

| | | | | | | | | | | |
|------------------------|------------------------|-----------------------|------------------------|-----------------------|----------------------|----------------------|----------------------|------------|-----------------------|-----------------------|
| $\frac{1}{4}$ 14700 | $\frac{5}{16}$ 7650 | $\frac{3}{8}$ 5175 | $\frac{7}{16}$ 2971 | $\frac{1}{2}$ 1868 | $\frac{5}{8}$ 992 | $\frac{3}{4}$ 567 | $\frac{7}{8}$ 458 | 1 324 | $1\frac{1}{8}$ 214 | $1\frac{1}{4}$ 156 |
|------------------------|------------------------|-----------------------|------------------------|-----------------------|----------------------|----------------------|----------------------|------------|-----------------------|-----------------------|

M.S. ROUND HEAD SQUARE NECK CARRIAGE BOLTS & NUTS

| Length | D I A M E T E R | | | | |
|--------|-----------------|------------------|-----------------|------------------|-----------------|
| | $\frac{1}{4}$ " | $\frac{5}{16}$ " | $\frac{3}{8}$ " | $\frac{7}{16}$ " | $\frac{1}{2}$ " |
| 1" | 4672 | 2689 | 1758 | 1157 | 811 |
| 1.1/4" | 4023 | 2439 | 1600 | 1062 | 750 |
| 1.1/2" | 3579 | 2141 | 1432 | 980 | 698 |
| 1.3/4" | 3223 | 1937 | 1300 | 888 | 643 |
| 2" | 2930 | 1770 | 1191 | 818 | 593 |
| 2.1/4" | 2682 | 1628 | 1098 | 759 | 552 |
| 2.1/2" | 2471 | 1508 | 1019 | 707 | 517 |
| 2.3/4" | 2291 | 1404 | 951 | 661 | 485 |
| 3" | 2137 | 1314 | 891 | 622 | 457 |
| 3.1/2" | 1885 | 1164 | 797 | 556 | 409 |
| 4" | 1683 | 1045 | 712 | 502 | 371 |
| 4.1/2" | 1521 | 948 | 647 | 458 | 340 |
| 5" | 1387 | 867 | 592 | 420 | 313 |
| 5.1/2" | 1275 | 799 | 546 | 389 | 290 |
| 6" | 1179 | 741 | 507 | 362 | 270 |
| 7" | | | | 319 | 239 |
| 8" | | | | 284 | 214 |

ASTM A325M HEAVY HEX STRUCTURAL BOLTS (Metric)

A325M Bolt Dimensions

| Thread size <i>d'</i> | M16 | M20 | M22 | M24 | M27 | M30 | M36 |
|--------------------------|------------|-------|-------|-------|-------|-------|-------|
| P pitch of thread | 2 | 2.5 | 2.5 | 3 | 3 | 3.5 | 4 |
| b | Bolt ≤ 100 | 31 | 38 | 41 | 44 | 49 | 56 |
| | Bolt > 100 | 38 | 43 | 45 | 48 | 51 | 56 |
| ds | min. | 15.30 | 19.16 | 21.16 | 23.16 | 26.16 | 29.16 |
| | max. | 16.70 | 20.84 | 22.84 | 24.84 | 27.84 | 30.84 |
| s | min. | 26.16 | 33.00 | 35.00 | 40.00 | 45.00 | 58.80 |
| | max. | 27.00 | 34.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| e | min. | 29.56 | 37.29 | 39.55 | 45.20 | 50.85 | 66.44 |
| | max. | 31.18 | 39.26 | 41.57 | 47.34 | 53.12 | 69.28 |
| k | min. | 9.25 | 11.60 | 13.10 | 14.10 | 16.10 | 17.65 |
| | max. | 10.75 | 13.40 | 14.90 | 15.90 | 17.90 | 19.75 |
| k' | min. | 6.5 | 8.1 | 9.2 | 9.9 | 11.3 | 12.4 |
| | max. | 24.9 | 31.4 | 33.3 | 38.0 | 42.8 | 46.5 |
| dw' | min. | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | max. | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| da | min. | 18.2 | 22.4 | 24.4 | 26.4 | 30.4 | 33.4 |
| | max. | 0.6 | 0.8 | 0.8 | 1.0 | 1.2 | 1.5 |

1) The maximum value of **dw** shall not exceed the actual width across flats

Materials

Medium carbon, carbon boron, medium carbon alloy or alloy boron steel in accordance with ASTM A325M

Characteristic

| Characteristic | Standard |
|-------------------------------|--------------------------------|
| Materials & Manufacture | ASTM A325M |
| Finish / Self Colour / Black | ASTM A325M |
| Coatings / Hot Dip Galvanized | ASTM A153 / A153M Class C |
| Mechanical Properties | ASTM A325M |
| Dimensions & Tolerances | ASME B18.2.3.7M |
| Threads | ASME B1.13M tolerance class 6g |
| Workmanship | ASTM F788 / F788M |
| Product Making | ASTM A325 |

A325M Bolt Length Tolerances for Bolt Diameters M16-M36 inc.

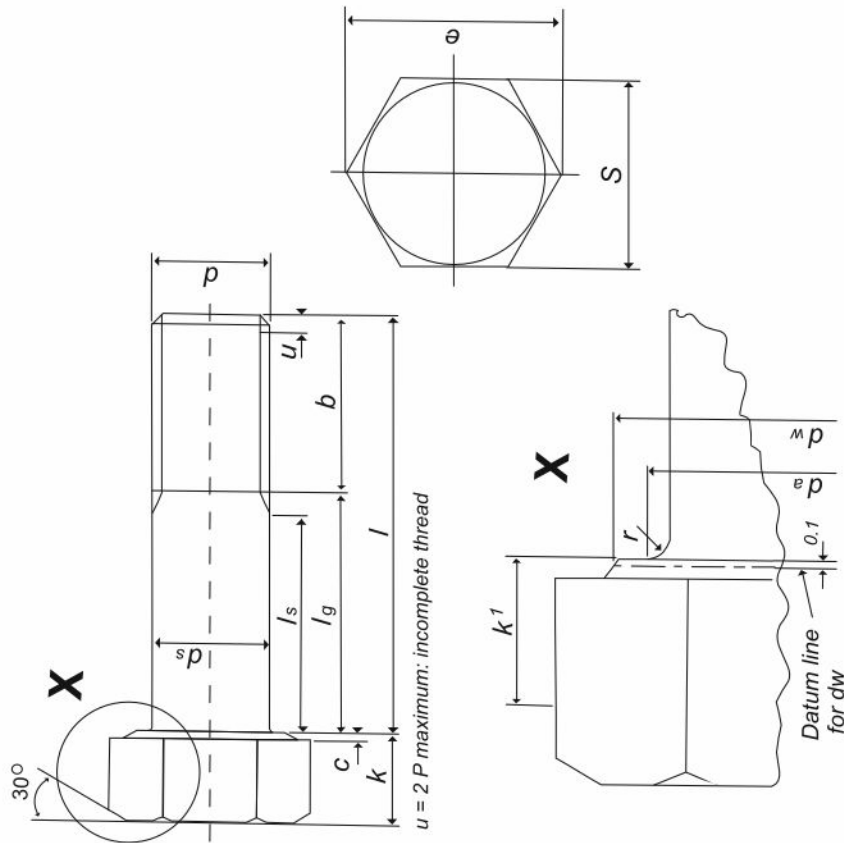
| Nominal Length | Length Tolerance |
|----------------------------------|------------------|
| Up to and including 50 | ± 1.2 |
| Over 50 up to and including 80 | ± 1.5 |
| Over 80 up to and including 120 | ± 1.8 |
| Over 120 up to and including 150 | ± 2.0 |
| Over 150 | ± 4.0 |

ASTM A325M HEAVY HEX STRUCTURAL BOLTS (Metric)

A325M Tensile Load and Proof Load Requirements for Full-Size Bolts

| Nominal Dia. & Thread Pitch | Stress Area mm ² | Tensile Load min. kN | Proof Load # kN | Alternative Proof Load* kN | Hardness Rockwell HRC | |
|-----------------------------|--------------------------------|-------------------------|--------------------|-------------------------------|-----------------------|-----|
| | | | | | min | max |
| M16 x 2 | 157 | 130 | 94.2 | 104 | 25 | 34 |
| M20 x 2.5 | 245 | 203 | 147 | 162 | 25 | 34 |
| M22 x 2.5 | 303 | 251 | 182 | 200 | 25 | 34 |
| M24 x 3 | 353 | 293 | 212 | 233 | 25 | 34 |
| M27 x 3 | 459 | 381 | 275 | 303 | 19 | 30 |
| M30 x 3.5 | 561 | 466 | 337 | 370 | 19 | 30 |
| M36 x 4 | 817 | 678 | 490 | 539 | 19 | 30 |

Proof load determined by length measurement method
* Alternative Proof load determined by yield strength method



A325M Tensile Strength Requirements for Specimens Machined from Bolts

| Nominal Dia. | Tensile Strength min | Yield Strength min | Elongation in 4D min | Reduction of Area min |
|--------------|----------------------|--------------------|----------------------|-----------------------|
| | M16 to M36 inc | MPa 830 | MPa 660 | % 14 |

ASTM A325M Bolt Finish Weight - Kilos/100

| Bolt Length | Bolt Dia | | M12 | M16 | M20 | M22 | M24 | M27 | M30 | M36 |
|-------------|----------|--|-------|-------|-------|-------|--------|--------|--------|--------|
| | | | | | | | | | | |
| 45 | | | 5.80 | 10.71 | 17.60 | 23.04 | 29.41 | 39.44 | 46.78 | 96.54 |
| 50 | | | 6.24 | 11.38 | 18.85 | 24.31 | 30.86 | 41.68 | 49.56 | 100.53 |
| 55 | | | 6.69 | 12.04 | 20.10 | 25.58 | 32.31 | 43.92 | 52.33 | 104.53 |
| 60 | | | 7.13 | 12.70 | 21.40 | 26.85 | 33.76 | 46.16 | 55.11 | 108.52 |
| 65 | | | 7.58 | 13.36 | 22.60 | 28.12 | 35.21 | 48.40 | 57.88 | 112.52 |
| 70 | | | 8.02 | 14.02 | 23.87 | 29.39 | 36.66 | 50.64 | 60.66 | 116.51 |
| 75 | | | 8.46 | 14.68 | 25.13 | 30.44 | 38.11 | 52.88 | 63.43 | 120.51 |
| 80 | | | 8.91 | 15.34 | 26.40 | 31.93 | 39.56 | 55.12 | 66.21 | 124.50 |
| 85 | | | 9.35 | 16.00 | 27.69 | 33.20 | 41.01 | 57.36 | 68.98 | 128.50 |
| 90 | | | 9.80 | 16.66 | 28.90 | 34.47 | 42.46 | 59.60 | 71.76 | 132.50 |
| 95 | | | 10.24 | 17.32 | 30.15 | 35.74 | 43.91 | 61.84 | 74.53 | 135.40 |
| 100 | | | 10.68 | 17.98 | 31.50 | 37.01 | 45.36 | 64.08 | 77.30 | 141.30 |
| 110 | | | 11.56 | 19.55 | 34.00 | 39.99 | 48.91 | 68.57 | 82.84 | 149.29 |
| 120 | | | 12.45 | 21.13 | 36.44 | 42.97 | 52.46 | 73.06 | 88.39 | 157.28 |
| 130 | | | 13.34 | 22.71 | 38.95 | 45.96 | 56.01 | 77.56 | 93.94 | 165.27 |
| 140 | | | 14.23 | 24.29 | 41.50 | 48.94 | 59.56 | 82.05 | 99.49 | 173.26 |
| 150 | | | 15.11 | 25.87 | 44.00 | 51.93 | 63.11 | 86.55 | 105.04 | 181.25 |
| 160 | | | 16.00 | 27.44 | 46.50 | 54.91 | 66.66 | 91.04 | 110.59 | 189.24 |
| 170 | | | 16.89 | 29.02 | 49.02 | 57.89 | 70.21 | 95.54 | 116.15 | 197.23 |
| 180 | | | 17.78 | 30.60 | 51.53 | 60.88 | 73.77 | 100.03 | 121.69 | 205.22 |
| 190 | | | 18.67 | 32.18 | 54.40 | 63.86 | 77.32 | 104.53 | 127.23 | 213.21 |
| 200 | | | 19.55 | 33.76 | 56.60 | 66.85 | 80.87 | 109.02 | 132.78 | 221.20 |
| 210 | | | 20.44 | 35.34 | 59.10 | 69.83 | 84.42 | 113.52 | 138.32 | 229.19 |
| 220 | | | 21.37 | 36.91 | 61.70 | 72.81 | 87.97 | 118.01 | 143.87 | 237.18 |
| 230 | | | 22.22 | 38.49 | 64.11 | 75.80 | 91.52 | 122.50 | 149.42 | 245.17 |
| 240 | | | 23.10 | 40.07 | 66.65 | 78.78 | 95.07 | 127.00 | 154.97 | 253.16 |
| 250 | | | 23.99 | 41.65 | 69.20 | 81.77 | 98.62 | 131.49 | 160.52 | 261.15 |
| 260 | | | 24.88 | 43.23 | 71.70 | 84.75 | 102.18 | 135.99 | 166.07 | 269.14 |
| 270 | | | 25.77 | 44.81 | 74.20 | 87.73 | 105.73 | 140.48 | 171.62 | 277.13 |
| 280 | | | 26.66 | 46.38 | 76.70 | 90.72 | 109.28 | 144.98 | 177.17 | 285.12 |
| 290 | | | 27.54 | 47.96 | 79.25 | 93.70 | 112.83 | 149.47 | 182.71 | 293.11 |
| 300 | | | 28.43 | 49.54 | 81.90 | 96.69 | 116.38 | 153.97 | 188.26 | 301.10 |

Weights are for guidance only and may vary in line with product tolerances

ASTM A325M

**Heavy Hex
Structural Bolts
(Metric)**

All dimensions are in millimetres

Heavy Hex Nuts(Metric) for use with ASTM A325M Bolts

ASTM A563M

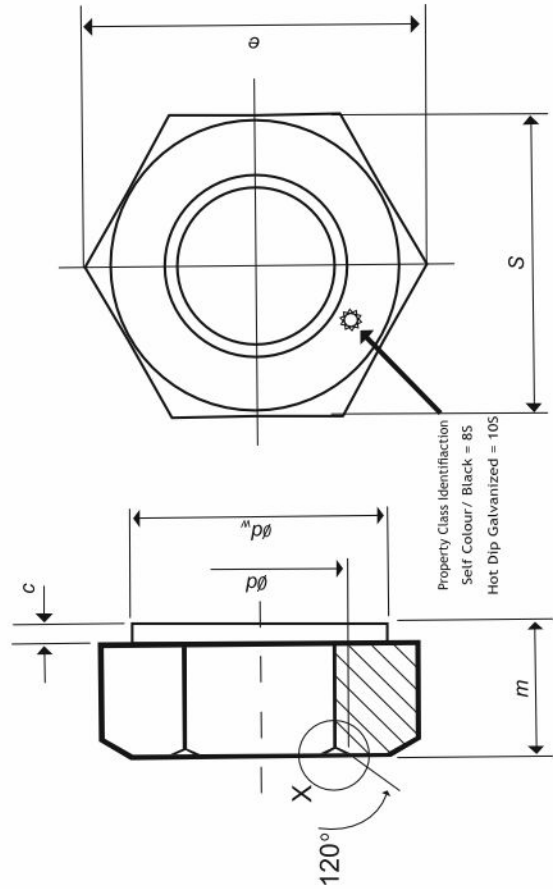
A563M Nut Proof Loads & Nut Hardness

| Nominal size and thread pitch | Proof Loads | | Hardness | | | |
|-------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|-----|-----|
| | 8S | 10S | 8S | | 10S | |
| | Self Colour / Black (6H fit) | Hot Dip Galvanised Overlapped | Self Colour / Black (6H fit) | Hot Dip Galvanised Overlapped | min | max |
| M16 x 2 | 169 | 183 | HRB | HRC | HRC | HRC |
| M20 x 2.5 | 263 | 285 | 89 | 26 | 26 | 38 |
| M22 x 2.5 | 326 | 353 | 89 | 26 | 26 | 38 |
| M24 x 3 | 379 | 411 | 89 | 26 | 26 | 38 |
| M27 x 3 | 493 | 535 | 89 | 26 | 26 | 38 |
| M30 x 3.5 | 603 | 654 | 89 | 26 | 26 | 38 |
| M36 x 4 | 878 | 952 | 89 | 26 | 26 | 38 |

A563M Nut Dimension Classes 8S & 10S

| Nominal size and thread pitch d | s | | e | | m | | dw' | | c | | Total runoff of bearing surface | |
|-----------------------------------|-------|-------|-------|-------|------|------|-------|-----|-----|-----|---------------------------------|--|
| | max | min | max | min | max | min | max | min | max | min | max | |
| M16 x 2 | 27.00 | 26.16 | 31.18 | 29.56 | 17.1 | 16.4 | 24.9 | 0.4 | 0.8 | 0.4 | 0.47 | |
| M20 x 2.5 | 34.00 | 33.00 | 39.26 | 37.29 | 20.7 | 19.4 | 31.4 | 0.4 | 0.8 | 0.4 | 0.58 | |
| M22 x 2.5 | 36.00 | 35.00 | 41.57 | 39.55 | 23.6 | 22.3 | 33.3 | 0.4 | 0.8 | 0.4 | 0.63 | |
| M24 x 3 | 41.00 | 40.00 | 47.34 | 45.20 | 24.2 | 22.9 | 38.0 | 0.4 | 0.8 | 0.4 | 0.72 | |
| M27 x 3 | 46.00 | 45.00 | 53.12 | 50.85 | 27.6 | 26.3 | 42.8 | 0.4 | 0.8 | 0.4 | 0.80 | |
| M30 x 3.5 | 50.00 | 49.00 | 57.74 | 55.37 | 30.7 | 29.1 | 46.6 | 0.4 | 0.8 | 0.4 | 0.87 | |
| M36 x 4 | 60.00 | 58.80 | 69.28 | 66.44 | 36.6 | 35.0 | 55.9 | 0.4 | 0.8 | 0.4 | 1.05 | |

1) The maximum dw shall not exceed the actual width across flats.



ASTM A563M Nut finish weight - Kilos/100

| M12 | M16 | M20 | M22 | M24 | M27 | M30 | M36 |
|------|------|------|-------|-------|-------|-------|-------|
| 2.80 | 5.20 | 9.99 | 10.64 | 17.65 | 22.90 | 29.39 | 49.90 |

Weights are for guidance only and may vary in line with product tolerance

Hardened Steel Washers (Metric) for use with ASTM A325M Bolts

ASTM F436M

F436M Washer Dimensions

| Nominal Washer Size | M16 | M20 | M22 | M24 | M27 | M30 | M36 |
|---------------------|-----|------|------|------|------|------|------|
| | max | 18.4 | 22.5 | 24.5 | 26.5 | 30.5 | 33.6 |
| d_1 | min | 18.0 | 22.0 | 26.0 | 30.0 | 33.0 | 39.0 |
| | max | 34.0 | 42.0 | 44.0 | 50.0 | 56.0 | 72.0 |
| d_2 | min | 32.4 | 40.0 | 42.4 | 48.4 | 54.1 | 70.1 |
| | max | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| h | min | 3.1 | 3.1 | 3.4 | 3.4 | 3.4 | 3.4 |
| | max | | | | | | |

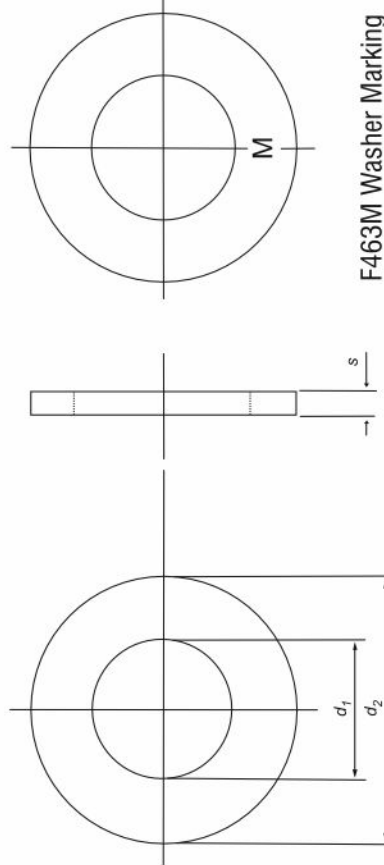
Materials

Carbon steel in accordance with ASTM F436M

Characteristic

Standard

| | |
|-------------------------|---------------------|
| Materials & Manufacture | ASTM F436M |
| Finish / Coatings | Self Colour / Black |
| | Hot Dip Galvanized |
| Mechanical Properties | ASTM F436M |
| Dimensions & Tolerances | ASME F436M |
| Workmanship | ASTM F436M |
| Product Making | ASTM F436M |



F436M Washer Marking

ASTM F436M Washer finish weight - Kilos/100

| M12 | M16 | M20 | M22 | M24 | M27 | M30 | M36 |
|------|------|------|------|------|------|------|-------|
| 1.20 | 2.15 | 3.20 | 4.55 | 5.90 | 6.60 | 7.55 | 13.30 |

Weights are for guidance only and may vary in line with product tolerance

F436M Washer Mechanical Properties

| Nominal Washer Size | Hardness (HRC) | |
|----------------------|---------------------|--------------------|
| | Self Colour / Black | Hot Dip Galvanized |
| M16 to M36 inclusive | min | min |
| | max | max |
| | 38 | 26 |
| | 45 | 45 |

All dimensions are in millimetres



**COUNT CHART FOR HEAVY HEX BOLTS AND HEAVY HEX NUTS - DIMENSIONS
BASED ON BS : 1769 - UNC SERIES**

| SIZE | 1/2" | 5/8" | 3/4" | 7/8" | 1" | 1-1/8" | 1-1/4" | 1-3/8" | 1-1/2" | 1-3/4" | 2" |
|-----------------|------------------------|------|------|------|-----|--------|--------|--------|--------|--------|----|
| LENGTH | HEAVY HEX BOLTS | | | | | | | | | | |
| 1" | 990 | 574 | | | | | | | | | |
| 1-1/4" | 897 | 525 | 335 | | | | | | | | |
| 1-1/2" | 820 | 484 | 310 | 212 | 151 | | | | | | |
| 1-3/4" | 744 | 447 | 288 | 198 | 141 | | | | | | |
| 2" | 677 | 410 | 269 | 185 | 133 | | | | | | |
| 2-1/4" | 625 | 379 | 250 | 175 | 126 | 96 | 72 | 60 | 48 | 32 | 23 |
| 2-1/2" | 577 | 352 | 233 | 163 | 119 | 91 | 69 | 57 | 46 | 31 | 22 |
| 2-3/4" | 538 | 329 | 218 | 154 | 112 | 87 | 66 | 55 | 44 | 30 | 22 |
| 3" | 505 | 309 | 205 | 145 | 106 | 82 | 63 | 52 | 42 | 29 | 21 |
| 3-1/4" | 473 | 292 | 194 | 137 | 101 | 78 | 60 | 50 | 40 | 27 | 20 |
| 3-1/2" | 445 | 276 | 184 | 130 | 95 | 74 | 57 | 47 | 38 | 27 | 19 |
| 3-3/4" | 422 | 261 | 175 | 124 | 91 | 71 | 55 | 45 | 37 | 26 | 19 |
| 4" | 401 | 248 | 166 | 118 | 87 | 68 | 52 | 43 | 35 | 25 | 18 |
| 4-1/2" | 363 | 226 | 152 | 107 | 80 | 62 | 48 | 37 | 32 | 23 | 17 |
| 5" | 332 | 207 | 140 | 99 | 74 | 58 | 45 | 35 | 30 | 21 | 16 |
| 5-1/2" | 306 | 191 | 129 | 92 | 69 | 54 | 42 | 33 | 28 | 20 | 15 |
| 6" | 284 | 178 | 120 | 86 | 64 | 50 | 39 | 32 | 26 | 19 | 14 |
| 6-1/2" | 266 | 167 | 113 | 81 | 61 | 47 | 37 | 30 | 25 | 18 | 13 |
| 7" | 249 | 156 | 106 | 76 | 57 | 45 | 35 | 29 | 23 | 17 | 12 |
| 7-1/2" | 234 | 147 | 100 | 72 | 54 | 42 | 33 | 27 | 22 | 16 | 12 |
| 8" | 221 | 139 | 95 | 68 | 51 | 40 | 32 | 26 | 21 | 15 | 11 |
| 8-1/2" | 209 | 132 | 90 | 64 | 49 | 38 | 30 | 24 | 20 | 14 | 11 |
| 9" | 198 | 125 | 85 | 61 | 46 | 36 | 29 | 23 | 19 | 14 | 10 |
| 9-1/2" | 189 | 119 | 81 | 59 | 44 | 35 | 27 | 22 | 18 | 13 | 10 |
| 10" | 180 | 114 | 78 | 56 | 42 | 33 | 26 | 21 | 18 | 13 | 9 |
| 10-1/2" | 172 | 109 | 74 | 54 | 41 | 32 | 25 | 20 | 17 | 12 | 9 |
| 11" | 165 | 105 | 71 | 51 | 39 | 31 | 24 | 20 | 16 | 12 | 9 |
| 11-1/2" | 158 | 100 | 68 | 50 | 37 | 29 | 23 | 19 | 16 | 11 | 8 |
| 12" | 152 | 96 | 66 | 47 | 36 | 28 | 22 | 18 | 15 | 11 | 8 |
| H.H. NUT | 1667 | 852 | 516 | 430 | 285 | 204 | 142 | 98 | 83 | 52 | 45 |



WEIGHT COUNT CHART FOR B7/STUDS WITH NUTS

COUNT CHART FOR FULLY THREADED STUDS AND HEAVY HEX NUTS - DIMENSIONS BASED ON
ASTM - A193/A194 - UNC SERIES

APPROX. QUANTITY IN NOS. PER 50 Kg.

| SIZE | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" | 1-1/8" | 1-1/4" | 1-3/8" | 1-1/2" | 1-3/4" | 2" | 2-1/4" | 2-1/2" | 2-3/4" | 3" |
|---------------|--------------|------|------|------|------|-----|--------|--------|--------|--------|--------|----|--------|--------|--------|----|
| LENGTH | STUDS | | | | | | | | | | | | | | | |
| 2" | 2274 | | | | | | | | | | | | | | | |
| 2-1/4" | 2022 | 1087 | 678 | | | | | | | | | | | | | |
| 2-1/2" | 1820 | 978 | 610 | | | | | | | | | | | | | |
| 2-3/4" | 1654 | 889 | 555 | | | | | | | | | | | | | |
| 3" | 1516 | 815 | 509 | 357 | 258 | | | | | | | | | | | |
| 3-1/4" | 1400 | 752 | 469 | 350 | 238 | | | | | | | | | | | |
| 3-1/2" | 1300 | 699 | 436 | 306 | 221 | 167 | 133 | 107 | 89 | 73 | 54 | 41 | 32 | 26 | 21 | 18 |
| 3-3/4" | 1213 | 652 | 407 | 286 | 206 | 156 | 124 | 100 | 83 | 68 | 51 | 39 | 30 | 24 | 20 | 16 |
| 4" | 1137 | 611 | 381 | 268 | 193 | 146 | 117 | 94 | 78 | 64 | 48 | 36 | 28 | 23 | 19 | 15 |
| 4-1/4" | 1070 | 575 | 359 | 252 | 182 | 138 | 110 | 88 | 73 | 60 | 45 | 34 | 26 | 21 | 18 | 15 |
| 4-1/2" | 1011 | 543 | 339 | 238 | 172 | 130 | 104 | 83 | 69 | 57 | 42 | 32 | 25 | 20 | 17 | 14 |
| 4-3/4" | 958 | 515 | 321 | 225 | 163 | 123 | 98 | 79 | 66 | 54 | 40 | 30 | 23 | 19 | 16 | 13 |
| 5" | 910 | 489 | 305 | 214 | 155 | 117 | 93 | 75 | 62 | 51 | 38 | 29 | 22 | 18 | 15 | 12 |
| 5-1/4" | 866 | 466 | 291 | 204 | 147 | 112 | 89 | 71 | 59 | 49 | 36 | 28 | 21 | 17 | 14 | 12 |
| 5-1/2" | 827 | 445 | 277 | 195 | 141 | 106 | 85 | 68 | 57 | 47 | 35 | 26 | 20 | 17 | 14 | 11 |
| 5-3/4" | 791 | 425 | 265 | 186 | 135 | 102 | 81 | 65 | 54 | 45 | 33 | 25 | 19 | 16 | 13 | 11 |
| 6" | 758 | 408 | 254 | 179 | 129 | 98 | 78 | 62 | 52 | 43 | 32 | 24 | 19 | 15 | 12 | 10 |
| 6-1/4" | 728 | 391 | 244 | 171 | 124 | 94 | 75 | 60 | 50 | 41 | 30 | 23 | 18 | 15 | 12 | 10 |
| 6-1/2" | 700 | 376 | 235 | 165 | 119 | 90 | 72 | 58 | 48 | 39 | 29 | 22 | 17 | 14 | 11 | 10 |
| 6-3/4" | 674 | 362 | 226 | 159 | 115 | 87 | 69 | 55 | 46 | 38 | 28 | 21 | 17 | 14 | 11 | 9 |
| 7" | 650 | 349 | 218 | 153 | 111 | 84 | 67 | 53 | 45 | 37 | 27 | 21 | 16 | 13 | 11 | 9 |
| 7-1/2" | 607 | 326 | 203 | 143 | 103 | 78 | 62 | 50 | 42 | 34 | 25 | 19 | 15 | 12 | 10 | 8 |
| 8" | 569 | 306 | 191 | 134 | 97 | 73 | 58 | 47 | 39 | 32 | 24 | 18 | 14 | 11 | 9 | 8 |
| 8-1/2" | 535 | 288 | 179 | 126 | 91 | 69 | 55 | 44 | 37 | 30 | 22 | 17 | 13 | 11 | 9 | 7 |
| 9" | 505 | 272 | 170 | 119 | 86 | 65 | 52 | 42 | 35 | 28 | 21 | 16 | 12 | 10 | 8 | 7 |
| 9-1/2" | 479 | 257 | 161 | 113 | 81 | 62 | 49 | 39 | 33 | 27 | 20 | 15 | 12 | 10 | 8 | 7 |
| 10" | 455 | 245 | 153 | 107 | 77 | 59 | 47 | 37 | 31 | 26 | 19 | 14 | 11 | 9 | 7 | 6 |
| 10-1/2" | 433 | 233 | 145 | 102 | 74 | 56 | 44 | 36 | 30 | 24 | 18 | 14 | 11 | 9 | 7 | 6 |
| 11" | 414 | 222 | 139 | 97 | 70 | 53 | 42 | 34 | 28 | 23 | 17 | 13 | 10 | 8 | 7 | 6 |
| 11-1/2" | 396 | 213 | 133 | 93 | 67 | 51 | 41 | 33 | 27 | 22 | 17 | 13 | 10 | 8 | 6 | 5 |
| 12" | 379 | 204 | 127 | 89 | 64 | 49 | 39 | 31 | 26 | 21 | 16 | 12 | 9 | 8 | 6 | 5 |
| H.H. NUT | 4534 | 1667 | 852 | 516 | 430 | 285 | 204 | 142 | 98 | 83 | 52 | 45 | 37 | 26 | 15 | 11 |



DIMENSIONS FOR HEX BOLTS, NUTS & LOCK NUTS

| Sr. No | Basic Dia | Equivalent Inch | Thread | Specification | SHANK | | A/F of Bolts & Nut | | Bolts Head Thickness | | Std. Nut Thickness | | Lock Nut Thickness | | | | | | | |
|--------|-----------|-----------------|---------|---------------|--------|-------|--------------------|--------|----------------------|--------|--------------------|-------|--------------------|-------|-------|-------|-------|-------|--------|-------|
| | | | | | Metric | Inch | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | | | |
| 1 | 1.6 mm | 0.063 | Metric | IS : 2389-68 | 1.600 | 0.057 | 0.063 | 0.057 | 3.200 | 3.0800 | 0.125 | 0.121 | 1.300 | 1.050 | 0.051 | 0.041 | 1.000 | 0.750 | 0.039 | 0.029 |
| 2 | 10 BA | 0.067 | BA | BS : 57-51 | - | - | - | - | 2.972 | 2.896 | 0.117 | 0.114 | 1.626 | 1.448 | 0.064 | 0.057 | - | - | - | - |
| 3 | 2 mm | 0.079 | Metric | IS : 2389-68 | 2.000 | 0.073 | 0.079 | 0.073 | 4.000 | 3.880 | 0.157 | 0.153 | 1.600 | 1.350 | 0.063 | 0.053 | 1.200 | 0.950 | 0.047 | 0.037 |
| 4 | 2.2 mm | 0.087 | Metric | IS : 2389-68 | 2.200 | 0.081 | 0.087 | 0.081 | 4.500 | 4.380 | 0.177 | 0.172 | 1.800 | 1.550 | 0.071 | 0.061 | 1.200 | 0.950 | 20.047 | 0.037 |
| 5 | 8 BA | 0.087 | BA | BS : 57-51 | - | - | - | - | 3.861 | 3.785 | 0.152 | 0.149 | 2.083 | 1.905 | 0.082 | 0.075 | 1.473 | 1.295 | 0.058 | 0.051 |
| 6 | 2.5 mm | 0.098 | Metric | IS : 2389-68 | 2.500 | 0.093 | 0.098 | 0.093 | 5.000 | 4.880 | 0.197 | 0.192 | 2.000 | 1.750 | 0.079 | 0.069 | 1.600 | 1.350 | 0.063 | 0.053 |
| 7 | 6 BA | 0.110 | BA | BS : 57-51 | - | - | - | - | 4.902 | 4.801 | 0.193 | 0.189 | 2.108 | 1.981 | 0.105 | 0.095 | 1.854 | 1.600 | 0.073 | 0.063 |
| 8 | 3 mm | 0.118 | Metric | IS : 2389-68 | 3.000 | 0.112 | 0.118 | 0.112 | 5.500 | 5.380 | 0.216 | 0.212 | 2.400 | 2.150 | 0.094 | 0.085 | 1.600 | 1.350 | 0.063 | 0.053 |
| 9 | | | | IS : 1364-83 | 3.000 | 0.112 | 0.118 | 0.112 | 5.500 | 5.320 | 0.216 | 0.209 | 2.400 | 2.150 | 0.094 | 0.085 | 1.800 | 1.550 | 0.071 | 0.061 |
| 10 | 3.5 mm | 0.138 | Metric | IS : 2389-68 | 3.500 | 0.131 | 0.138 | 0.131 | 6.000 | 5.880 | 0.236 | 0.231 | 2.800 | 2.550 | 0.110 | 0.100 | 1.800 | 1.550 | 0.071 | 0.061 |
| 11 | 4 BA | 0.142 | BA | BS : 57-51 | - | - | - | - | 6.299 | 6.172 | 0.248 | 0.243 | 2.692 | 2.540 | 0.135 | 0.125 | 2.388 | 2.134 | 0.094 | 0.084 |
| 12 | 4 mm | 0.157 | Metric | IS : 2389-68 | 4.000 | 0.150 | 0.157 | 0.150 | 7.000 | 6.850 | 0.275 | 0.270 | 3.200 | 2.900 | 0.126 | 0.114 | 2.000 | 1.750 | 0.079 | 0.069 |
| 13 | | | | IS : 1364-83 | 4.000 | 0.150 | 0.157 | 0.150 | 7.000 | 6.780 | 0.275 | 0.267 | 3.200 | 2.900 | 0.126 | 0.114 | 2.200 | 1.950 | 0.087 | 0.077 |
| 14 | 4.5 mm | 0.177 | Metric | IS : 2389 | 4.500 | 0.170 | 0.177 | 0.170 | 8.000 | 7.850 | 0.315 | 0.309 | 3.600 | 3.300 | 0.142 | 0.130 | 2.300 | 2.050 | 0.090 | 0.081 |
| 15 | 2 BA | 0.185 | BA | BS : 57-51 | - | - | - | - | 8.230 | 8.103 | 0.324 | 0.319 | 3.531 | 3.353 | 0.167 | 0.157 | 3.124 | 2.870 | 0.123 | 0.113 |
| 16 | 5 mm | 0.197 | Metric | IS : 2389-68 | 5.000 | 0.190 | 0.197 | 0.190 | 8.000 | 7.850 | 0.315 | 0.309 | 4.000 | 3.700 | 0.157 | 0.146 | 2.500 | 2.250 | 0.098 | 0.088 |
| 17 | | | | IS : 1364-83 | 5.000 | 0.190 | 0.197 | 0.190 | 8.000 | 7.780 | 0.315 | 0.306 | 4.700 | 4.400 | 0.185 | 0.173 | 2.700 | 2.450 | 0.106 | 0.096 |
| 18 | 0BA | 0.236 | BA | BS : 57-51 | - | - | - | - | 10.490 | 10.363 | 0.413 | 0.408 | 4.496 | 4.293 | 0.213 | 0.203 | 3.988 | 3.734 | 0.157 | 0.147 |
| 19 | 6 MM | 0.236 | Metric | IS : 1363-67 | 6.480 | 0.224 | 0.255 | 0.224 | 10.000 | 9.640 | 0.394 | 0.379 | 4.380 | 4.020 | 0.212 | 0.182 | 3.300 | 2.700 | 0.130 | 0.106 |
| 20 | | | | IS : 1363-84 | 6.480 | 0.217 | 0.255 | 0.217 | 10.000 | 9.640 | 0.394 | 0.379 | 4.380 | 4.020 | 0.212 | 0.182 | - | - | - | - |
| 21 | | | | IS : 1364-67 | 6.000 | 0.229 | 0.236 | 0.229 | 10.000 | 9.780 | 0.394 | 0.385 | 4.150 | 3.850 | 0.163 | 0.151 | - | - | - | - |
| 22 | | | | IS : 1364-83 | 6.000 | 0.229 | 0.236 | 0.229 | 10.000 | 9.780 | 0.394 | 0.385 | 4.150 | 3.850 | 0.163 | 0.151 | 3.000 | 2.750 | 0.118 | 0.108 |
| 23 | 1/4" | 0.250 | BSW-BSF | BS : 916-57 | 7.112 | ... | 0.280 | ... | 11.303 | 11.049 | 0.445 | 0.435 | 4.724 | 4.216 | 0.220 | 0.200 | 3.200 | 2.900 | 0.216 | 0.114 |
| 24 | | | | BS : 1083-65 | 6.350 | 0.246 | 0.250 | 0.246 | 11.303 | 11.125 | 0.445 | 0.438 | 4.470 | 4.216 | 0.220 | 0.200 | 4.700 | 4.57 | 0.185 | 0.180 |
| 25 | | | | UNC-UNF | 6.350 | 0.246 | 0.250 | 0.246 | 11.100 | 10.922 | 0.437 | 0.430 | 4.140 | 3.886 | 0.200 | 0.190 | 4.089 | 3.835 | 0.161 | 0.151 |
| 26 | | | | UNC-UNF | 6.604 | 0.260 | 11.125 | 10.795 | 0.438 | 0.425 | 4.775 | 3.810 | 5.740 | 5.385 | 0.224 | 0.214 | 4.089 | 3.835 | 0.161 | 0.151 |
| 27 | 7 mm | 0.275 | Metric | IS : 1363-67 | 7.580 | 0.261 | 0.298 | 0.261 | 11.000 | 10.570 | 0.433 | 0.416 | 5.880 | 5.120 | 0.256 | 0.244 | 3.300 | 2.700 | 0.130 | 0.106 |
| 28 | | | | IS : 1364-67 | 7.000 | 0.267 | 0.275 | 0.267 | 11.000 | 10.730 | 0.433 | 0.422 | 6.500 | 6.200 | 0.256 | 0.244 | 3.000 | 2.750 | 0.118 | 0.108 |
| 29 | 5/16" | 0.312 | BSW-BSF | BS : 916-57 | 8.687 | 0.342 | 0.342 | 0.342 | 13.335 | 13.081 | 0.525 | 0.515 | 6.858 | 6.350 | 0.270 | 0.250 | 5.334 | 5.080 | 0.210 | 0.200 |
| 30 | | | | BS : 1083-65 | 7.925 | 0.309 | 0.312 | 0.309 | 13.335 | 13.157 | 0.525 | 0.518 | 6.350 | 6.096 | 0.250 | 0.240 | 4.877 | 4.623 | 0.192 | 0.182 |
| 31 | | | | UNC-UNF | 7.925 | 0.309 | 0.312 | 0.309 | 12.700 | 12.522 | 0.500 | 0.493 | 5.637 | 5.283 | 0.218 | 0.208 | 4.877 | 4.623 | 0.192 | 0.182 |
| 32 | | | | UNC-UNF | 8.230 | 0.324 | 0.324 | 0.324 | 12.700 | 12.524 | 0.500 | 0.484 | 5.969 | 5.493 | 0.235 | 0.225 | 4.953 | 4.572 | 0.195 | 0.180 |



DIMENSIONS FOR HEX BOLTS, NUTS & LOCK NUTS

| Sr. No | Basic Dia | Equivalent Inch | Thread | Specification | SHANK | | A/F of Bolts & Nut | | Bolts Head Thickness | | Std. Nut Thickness | | Lock Nut Thickness | |
|--------|-----------|-----------------|---------|---------------|---------------|---------------|--------------------|-------------|----------------------|-------------|--------------------|-------------|--------------------|-------------|
| | | | | | Metric | Inch | Metric | Inch | Max | Min | Metric | Inch | Max | Min |
| 33 | 8mm | 0.315 8.000 | Metric | IS : 1363/67 | 8.900 7.640 | 0.350 0.301 | 13.000 12.570 | 0.512 0.495 | 5.880 5.120 | 0.231 0.201 | 6.950 6.050 | 0.274 0.238 | 4.380 3.620 | 0.172 0.142 |
| 34 | | | Metric | IS : 1363/84 | 8.580 7.420 | 0.338 0.292 | 13.000 12.570 | 0.512 0.495 | 5.680 4.920 | 0.224 0.194 | 7.900 6.400 | 0.311 0.252 | | |
| 35 | | | Metric | IS : 1364/67 | 8.000 7.780 | 0.315 0.306 | 13.000 12.730 | 0.512 0.501 | 5.650 5.350 | 0.222 0.211 | 6.500 6.140 | 0.256 0.242 | 4.000 3.700 | 0.157 0.146 |
| 36 | | | Metric | IS : 1364/83 | 8.000 7.780 | 0.315 0.306 | 13.000 12.730 | 0.512 0.501 | 5.450 5.150 | 0.214 0.203 | 6.800 6.440 | 0.268 0.253 | 4.000 3.700 | 0.157 0.146 |
| 37 | 3/8" | 0.375 9.525 | BSW-BSF | BS : 916/57 | 10.287 9.405 | 15.240 14.859 | 0.600 0.585 | 6.858 6.350 | 0.270 0.250 | 8.433 7.925 | 0.332 0.312 | 6.604 6.350 | 0.260 0.250 | |
| 38 | | | BSW-BSF | BS : 1083/65 | 9.525 9.423 | 0.375 0.371 | 15.240 15.037 | 0.600 0.592 | 6.604 6.350 | 0.260 0.250 | 7.925 7.671 | 0.312 0.302 | 5.690 5.436 | 0.224 0.214 |
| 39 | | | UNC-UNF | BS : 1768/63 | 9.525 9.423 | 0.375 0.371 | 14.275 14.072 | 0.582 0.544 | 6.172 5.918 | 0.243 0.233 | 80.458 8.204 | 0.333 0.323 | 5.690 5.436 | 0.224 0.214 |
| 40 | | | UNC-UNF | ANSI | 9.855 | 0.388 | 14.275 13.818 | 0.552 0.544 | 6.807 6.700 | 0.268 0.226 | 8.560 8.128 | 0.337 0.320 | 5.766 5.334 | 0.227 0.210 |
| 41 | | | Metric | IS : 1363/67 | 10.900 9.640 | 0.429 0.379 | 17.000 16.570 | 0.669 0.652 | 7.450 6.550 | 0.293 0.258 | 8.450 7.550 | 0.333 0.297 | 5.380 4.620 | 0.212 0.182 |
| 42 | | | Metric | IS : 1363/84 | 10.580 9.420 | 0.416 0.371 | 16.000 15.570 | 0.630 0.613 | 6.850 5.950 | 0.270 0.234 | 9.500 8.000 | 0.374 0.315 | | |
| 43 | | | Metric | IS : 1364/67 | 10.000 9.780 | 0.394 0.385 | 17.000 16.730 | 0.669 0.659 | 7.180 6.820 | 0.283 0.268 | 8.000 7.640 | 0.315 0.301 | 5.000 4.700 | 0.197 0.185 |
| 44 | | | Metric | IS : 1364/83 | 10.000 9.780 | 0.394 0.385 | 16.000 15.730 | 0.630 0.619 | 6.580 6.220 | 0.259 0.245 | 8.400 8.040 | 0.331 0.316 | 5.000 4.700 | 0.197 0.185 |
| 45 | 7/16" | 0.437 11.112 | BSW-BSF | BS : 916/57 | 11.887 | 0.468 0.433 | 18.034 17.653 | 0.710 0.695 | 7.925 7.417 | 0.312 0.292 | 9.395 9.525 | 0.395 0.375 | 6.985 6.731 | 0.275 0.265 |
| 46 | | | BSW-BSF | BS : 1083/65 | 11.00 10.998 | 0.437 0.433 | 18.034 17.831 | 0.710 0.702 | 7.671 7.417 | 0.302 0.292 | 9.525 9.271 | 0.375 0.365 | 6.350 6.096 | 0.250 0.240 |
| 47 | | | UNC-UNF | BS : 1768/63 | 11.100 10.998 | 0.437 0.433 | 15.875 15.672 | 0.625 0.617 | 7.391 7.137 | 0.291 0.281 | 9.652 9.398 | 0.380 0.370 | 6.477 6.223 | 0.255 0.245 |
| 48 | | | UNC-UNF | ANSI | 11.481 | 0.452 | 15.875 15.46 | 0.625 0.603 | 8.026 6.901 | 0.316 0.272 | 9.779 9.271 | 0.385 0.365 | 6.604 6.096 | 0.260 0.240 |
| 49 | 12mm | 0.472 12.00 | Metric | IS : 1363-67 | 13.100 11.570 | 0.516 0.455 | 19.000 18.480 | 0.748 0.727 | 8.450 7.550 | 0.333 0.297 | 10.450 9.550 | 0.411 0.376 | 7.450 6.550 | 0.293 0.258 |
| 50 | | | Metric | IS : 1363-84 | 12.700 11.300 | 0.500 0.445 | 18.000 17.570 | 0.709 0.692 | 7.950 7.050 | 0.313 0.277 | 12.200 10.400 | 0.480 0.409 | | |
| 51 | | | Metric | IS : 1364-67 | 12.000 11.730 | 0.472 0.462 | 19.000 18.670 | 0.748 0.735 | 8.180 7.820 | 0.322 0.308 | 10.000 9.640 | 0.394 0.379 | 7.000 6.640 | 0.275 0.261 |
| 52 | | | Metric | IS : 1364-83 | 12.000 11.730 | 0.472 0.462 | 18.000 17.730 | 0.709 0.698 | 7.680 7.320 | 0.302 0.288 | 10.800 10.370 | 0.425 0.408 | 6.000 5.700 | 0.236 0.224 |
| 53 | 1/2" | 0.500 12.70 | BSW-BSF | BS : 916/57 | 13.462 | 0.530 ... | 20.828 20.320 | 0.820 0.800 | 9.220 8.458 | 0.363 0.333 | 11.862 11.100 | 0.467 0.437 | 7.620 7.366 | 0.300 0.290 |
| 54 | | | BSW-BSF | BS : 1083/65 | 12.700 12.598 | 0.500 0.496 | 20.828 20.630 | 0.820 0.812 | 8.712 8.458 | 0.343 0.333 | 11.100 10.846 | 0.437 0.427 | 7.391 7.137 | 0.291 0.281 |
| 55 | | | UNC-UNF | BS : 1768/63 | 12.700 12.598 | 0.500 0.496 | 0.950 18.847 | 0.750 0.742 | 8.204 7.950 | 0.323 0.313 | 11.227 10.973 | 0.442 0.432 | 8.052 7.798 | 0.317 0.307 |
| 56 | | | UNC-UNF | ANSI | 13.081 | 0.515 ... | 19.050 18.415 | 0.750 0.725 | 9.246 7.671 | 0.364 0.302 | 11.379 10.846 | 0.448 0.427 | 8.204 7.671 | 0.323 0.302 |
| 57 | 14mm | 0.551 14.000 | Metric | IS : 1363-67 | 15.100 13.570 | 0.594 0.534 | 22.000 21.160 | 0.866 0.833 | 9.450 8.550 | 0.372 0.337 | 11.550 10.450 | 0.455 0.411 | 8.450 7.550 | 0.333 0.297 |
| 59 | 9/16" | 0.562 14.290 | BSW-BSF | BS : 916-57 | 15.037 | 0.592 | 23.368 22.860 | 0.920 0.900 | 10.287 9.525 | 0.405 0.375 | 13.462 12.700 | 0.230 0.500 | 8.458 8.204 | 0.333 0.323 |
| 60 | | | BSW-BSF | BS : 1083-65 | 14.275 14.173 | 0.562 0.558 | 23.368 23.165 | 0.920 0.912 | 9.525 9.271 | 0.375 0.365 | 12.700 12.446 | 0.500 0.490 | 8.458 8.204 | 0.333 0.323 |
| 61 | | | UNC-UNF | BS : 1768-63 | 14.275 14.173 | 0.562 0.558 | 20.625 20.422 | 0.812 0.804 | 9.423 9.169 | 0.371 0.361 | 12.421 12.167 | 0.489 0.479 | 8.865 8.611 | 0.349 0.339 |
| 62 | | | UNC-UNF | ANSI | - | - | - | - | - | - | 12.598 12.014 | 0.496 0.473 | 8.230 7.645 | 0.324 0.301 |
| 63 | 5/8" | 0.625 15.875 | BSW-BSF | BS : 916-57 | 16.891 | 0.665 | 25.654 25.019 | 1.010 0.985 | 11.354 10.592 | 0.447 0.417 | 15.291 14.275 | 0.602 0.562 | 10.414 9.525 | 0.410 0.375 |
| 64 | | | BSW-BSF | BS : 1083-65 | 15.875 15.723 | 0.625 0.619 | 25.654 25.400 | 1.010 1.000 | 10.592 10.338 | 0.417 0.407 | 15.291 14.275 | 0.562 0.552 | 9.525 9.271 | 0.375 0.365 |
| 65 | | | UNC-UNF | BS : 1768-63 | 15.875 15.723 | 0.625 0.619 | 23.800 23.597 | 0.937 0.929 | 10.236 9.982 | 0.403 0.393 | 14.275 14.021 | 0.552 0.542 | 9.625 9.398 | 0.375 0.365 |



DIMENSIONS FOR HEX BOLTS, NUTS & LOCK NUTS

| Sr. No | Basic Dia | Equivalent Inch | Thread | Specification | SHANK | | A/F of Bolts & Nut | | Bolts Head Thickness | | Std. Nut Thickness | | Lock Nut Thickness | | | | | | | | | | |
|--------|-----------|-----------------|---------|---------------|--------|-------|--------------------|--------|----------------------|-------|--------------------|--------|--------------------|-------|--------|--------|--------|-------|--------|--------|-------|-------|-------|
| | | | | | Metric | Inch | Metric | Inch | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | | | | |
| 66 | | | UNC-UNF | ANSI | 16.307 | 0.624 | 23.800 | 23597 | 0.938 | 0.906 | 11.278 | 9.601 | 0.444 | 0.378 | 14.199 | 13.589 | 0.559 | 0.535 | 9.830 | 9.220 | 0.387 | 0.363 | |
| 67 | 16 mm | 0.629 | Metric | IS : 1363/67 | 17.100 | 0.673 | 23825 | 23012 | 0.945 | 0.912 | 10.450 | 9.550 | 0.411 | 0.376 | 13.550 | 12.450 | 0.533 | 0.490 | 8.450 | 7.550 | 0.333 | 0.297 | |
| 68 | | | Metric | IS : 1363/64 | 16.700 | 0.657 | 24.000 | 23.160 | 0.945 | 0.912 | 10.750 | 9.250 | 0.423 | 0.364 | 15.900 | 14.100 | 0.626 | 0.555 | - | - | - | - | |
| 69 | | | Metric | IS : 1364/67 | 16.000 | 0.630 | 24.000 | 23.670 | 0.945 | 0.932 | 10.180 | 9.820 | 0.401 | 0.387 | 13.000 | 12.570 | 0.512 | 0.495 | 7.640 | 0.315 | 0.315 | 0.301 | |
| 70 | 18 mm | 0.709 | Metric | IS : 1364/63 | 16.000 | 0.630 | 24.000 | 23.670 | 0.945 | 0.932 | 10.180 | 9.820 | 0.401 | 0.387 | 14.800 | 14.100 | 0.583 | 0.555 | 8.000 | 7.420 | 0.315 | 0.292 | |
| 71 | | | Metric | IS : 1363/67 | 19.100 | 0.752 | 27.000 | 26.160 | 1.063 | 1.030 | 12.550 | 11.450 | 0.494 | 0.451 | 15.500 | 14.450 | 0.612 | 0.569 | 9.450 | 8.550 | 0.372 | 0.337 | |
| 72 | | | Metric | IS : 1364/67 | 18.000 | 0.709 | 27.000 | 26.670 | 1.063 | 1.050 | 12.220 | 11.780 | 0.481 | 0.464 | 15.000 | 14.570 | 0.590 | 0.574 | 9.000 | 8.640 | 0.354 | 0.340 | |
| 73 | 3/4" | 0.750 | BSW-BSF | BS : 916-57 | 20.066 | 0.790 | 30.480 | 29.845 | 1.200 | 1.175 | 13.462 | 12.700 | 0.530 | 0.500 | 18.491 | 17.450 | 0.728 | 0.587 | 12.446 | 11.633 | 0.490 | 0.458 | |
| 74 | | | BSW-BSF | BS : 1080-65 | 19.050 | 0.750 | 30.480 | 30.226 | 1.200 | 1.190 | 12.700 | 12.192 | 0.500 | 0.480 | 17.450 | 17.196 | 0.687 | 0.677 | 11.633 | 11.379 | 0.458 | 0.448 | |
| 75 | | | UNC-UNF | BS : 1768-63 | 19.050 | 0.750 | 28.575 | 28.321 | 1.125 | 1.115 | 12.268 | 11.760 | 0.483 | 0.463 | 16.535 | 16.027 | 0.651 | 0.631 | 10.973 | 10.465 | 0.432 | 0.412 | |
| 76 | | | UNC-UNF | ANSI | 19.507 | 0.768 | 28.575 | 27.635 | 1.125 | 1.088 | 13.310 | 11.557 | 0.524 | 0.455 | 16.891 | 15.672 | 0.665 | 0.617 | 11.328 | 10.109 | 0.446 | 0.398 | |
| 77 | 20 mm | 0.787 | Metric | IS : 1363/67 | 21.300 | 0.838 | 30.000 | 29.160 | 1.181 | 1.148 | 13.550 | 12.450 | 0.533 | 0.490 | 16.550 | 15.450 | 0.651 | 0.608 | 9.450 | 8.550 | 0.372 | 0.337 | |
| 78 | | | Metric | IS : 1363/64 | 20.840 | 0.820 | 30.000 | 29.160 | 1.181 | 1.148 | 13.400 | 11.600 | 0.527 | 0.457 | 18.700 | 16.600 | 0.736 | 0.653 | - | - | - | - | |
| 79 | | | Metric | IS : 1364/67 | 20.000 | 0.787 | 30.000 | 29.160 | 1.181 | 1.148 | 13.350 | 12.650 | 0.525 | 0.498 | 16.000 | 14.900 | 0.630 | 0.587 | 9.000 | 8.100 | 0.345 | 0.319 | |
| 80 | | | Metric | IS : 1364/64 | 20.000 | 0.787 | 30.000 | 29.670 | 1.181 | 1.148 | 12.720 | 12.280 | 0.501 | 0.483 | 18.000 | 16.900 | 0.709 | 0.665 | 10.000 | 9.100 | 0.394 | 0.358 | |
| 81 | 22 mm | 0.866 | Metric | IS : 1363/67 | 23.300 | 0.917 | 32.000 | 31.000 | 1.260 | 1.220 | 14.550 | 13.450 | 0.573 | 0.529 | 18.550 | 18.550 | 17.450 | 0.687 | 10.450 | 9.550 | 0.411 | 0.376 | |
| 82 | | | Metric | IS : 1364/67 | 22.000 | 0.866 | 32.000 | 31.000 | 1.260 | 1.220 | 14.350 | 13.650 | 0.565 | 0.537 | 18.000 | 18.000 | 16.900 | 0.665 | 10.000 | 9.100 | 0.394 | 0.358 | |
| 83 | 7/8" | 0.866 | BSW-BSF | BS : 916-57 | 23.241 | 0.915 | 33.020 | 32.258 | 1.300 | 1.270 | 15.825 | 14.808 | 0.623 | 0.583 | 20.574 | 20.574 | 19.050 | 0.750 | 13.970 | 12.700 | 0.550 | 0.500 | |
| 84 | | | BSW-BSF | BS : 1083-65 | 22.225 | 0.875 | 33.020 | 32.715 | 1.300 | 1.288 | 14.808 | 14.300 | 0.583 | 0.563 | 19.050 | 19.050 | 18.796 | 0.740 | 12.700 | 12.446 | 0.500 | 0.490 | |
| 85 | | | UNC-UNF | BS : 1768-63 | 22.225 | 0.875 | 33.325 | 33.020 | 1.312 | 1.300 | 14.300 | 14.792 | 0.563 | 0.543 | 19.304 | 19.304 | 18.796 | 0.740 | 12.548 | 12.040 | 0.494 | 0.474 | |
| 86 | | | UNC-UNF | ANSI | 22.733 | 0.895 | 33.325 | 32.233 | 1.312 | 1.269 | 15.342 | 13.487 | 0.640 | 0.531 | 19.710 | 19.710 | 18.390 | 0.724 | 12.954 | 11.633 | 0.510 | 0.458 | |
| 87 | 24mm | 0.945 | Metric | IS : 1363-67 | 25.300 | 0.996 | 36.000 | 35.000 | 1.417 | 1.378 | 15.550 | 14.450 | 0.612 | 0.569 | 19.650 | 18.350 | 0.774 | 0.722 | 10.450 | 0.411 | 0.376 | 0.376 | |
| 88 | | | Metric | IS : 1363-64 | 24.840 | 0.978 | 36.000 | 35.000 | 1.417 | 1.378 | 15.000 | 14.100 | 0.590 | 0.555 | 22.300 | 20.200 | 0.878 | 0.795 | 10.000 | 0.394 | 0.368 | 0.358 | |
| 89 | | | Metric | IS : 1364-67 | 24.000 | 0.945 | 36.000 | 35.000 | 1.417 | 1.378 | 15.350 | 14.650 | 0.604 | 0.577 | 19.000 | 17.700 | 0.878 | 0.697 | 12.000 | 0.472 | 0.429 | 0.429 | |
| 90 | | | Metric | IS : 1364-63 | 24.000 | 0.945 | 36.000 | 35.380 | 1.417 | 1.393 | 15.220 | 14.780 | 0.599 | 0.582 | 21.500 | 20.200 | 0.846 | 0.795 | 12.000 | 0.472 | 0.429 | 0.429 | |
| 91 | 1" | 1.000 | BSW-BSF | BS : 916-57 | 26.416 | 1.040 | 36.830 | 37.592 | 1.480 | 1.468 | 16.916 | 16.154 | 0.666 | 0.636 | 22.225 | 21.971 | 22.225 | 0.935 | 0.878 | 14.808 | 0.583 | 0.583 | |
| 92 | | | BSW-BSF | BS : 1083-65 | 25.400 | 1.000 | 37.592 | 37.287 | 1.480 | 1.468 | 16.916 | 16.154 | 0.666 | 0.636 | 22.225 | 21.971 | 22.225 | 0.935 | 0.878 | 14.808 | 0.583 | 0.583 | 0.583 |
| 93 | | | UNC-UNF | BS : 1768-63 | 25.400 | 1.000 | 38.100 | 37.795 | 1.500 | 1.488 | 15.926 | 15.764 | 0.627 | 0.597 | 22.200 | 21.438 | 0.874 | 0.844 | 14.808 | 0.583 | 0.573 | 0.573 | |
| 94 | | | UNC-UNF | ANSI | 29.959 | 1.022 | 38.100 | 36.830 | 1.500 | 1.450 | 17.780 | 15.011 | 0.700 | 0.591 | 22.530 | 21.107 | 0.887 | 0.831 | 14.275 | 0.562 | 0.532 | 0.532 | |
| 95 | 27mm | 1.063 | Metric | IS : 1363-67 | 28.300 | 1.114 | 41.000 | 40.000 | 1.611 | 1.574 | 17.550 | 16.450 | 0.69 | 0.648 | 22.650 | 21.350 | 0.892 | 0.840 | 14.605 | 0.575 | 0.519 | 0.519 | |
| 96 | | | Metric | IS : 1364-67 | 27.000 | 1.063 | 41.000 | 40.000 | 1.611 | 1.574 | 17.550 | 16.450 | 0.69 | 0.648 | 22.650 | 21.350 | 0.892 | 0.840 | 14.605 | 0.575 | 0.519 | 0.519 | |
| 97 | 1.18" | 1.125 | BSW-BSF | BS : 916-57 | 29.845 | 1.175 | 42.418 | 41.656 | 1.670 | 1.640 | 20.066 | 19.050 | 0.790 | 0.750 | 26.924 | 25.400 | 1.060 | 1.000 | 18.288 | 0.720 | 0.666 | 0.666 | |



DIMENSIONS FOR HEX BOLTS, NUTS & LOCK NUTS

| Sr. No | Basic Dia | Equivalent Inch | Thread | Specification | SHANK | | A/F of Bolts & Nut | | Bolts Head Thickness | | Std. Nut Thickness | | Lock Nut Thickness | | | | | | | | | | | | | | |
|--------|-----------|-----------------|---------|---------------|--------|--------|--------------------|-------|----------------------|--------|--------------------|-------|--------------------|--------|-------|-------|--------|--------|--------|--------|-------|-------|--------|--------|-------|-------|-----|
| | | | | | Metric | Inch | Max | Min | Metric | Inch | Max | Min | Metric | Inch | Max | Min | Metric | Inch | Max | Min | | | | | | | |
| 98 | | | BSW-BSF | BS : 1083-65 | 28.575 | 28.372 | 1.125 | 1.117 | 42.418 | 42.656 | 1.670 | 1.640 | 19.050 | 18.034 | 0.750 | 0.710 | 25.400 | 24.146 | 16.916 | 0.666 | 1.000 | 0.990 | 16.916 | 0.666 | 0.656 | 0.656 | |
| 99 | | | UNC-UNF | BS : 1766-63 | 28.575 | 28.372 | 1.125 | 1.117 | 42.850 | 42.088 | 1.687 | 1.657 | 18.237 | 17.221 | 0.718 | 0.678 | 25.121 | 24.105 | 15.977 | 0.629 | 0.989 | 0.949 | 15.977 | 0.629 | 0.589 | 0.589 | |
| 100 | | | UNC-UNF | ANSI | 28.185 | ... | 1.149 | ... | 42.875 | 41.427 | 1.688 | 1.631 | 19.813 | 16.713 | 0.780 | 0.658 | 25.375 | 23.815 | 16.321 | 0.639 | 0.999 | 0.939 | 16.321 | 0.639 | 0.579 | 0.579 | |
| 101 | 30mm | 1.181 30.000 | | | 31.300 | 29.480 | 1.232 | 1.161 | 46.000 | 45.000 | 1.811 | 1.772 | 19.650 | 18.350 | 0.774 | 0.722 | 24.650 | 23.350 | 12.550 | 0.494 | 0.970 | 0.919 | 12.550 | 0.494 | 0.451 | 0.451 | |
| 102 | | | Metric | IS : 1363-67 | 30.840 | 29.160 | 1.214 | 1.148 | 46.000 | 45.000 | 1.811 | 1.772 | 19.750 | 17.650 | 0.777 | 0.695 | 26.400 | 24.300 | ... | ... | ... | ... | 1.039 | 0.957 | ... | ... | |
| 103 | | | Metric | IS : 1363-84 | 30.000 | 29.670 | 1.181 | 1.168 | 46.000 | 45.000 | 1.811 | 1.772 | 19.420 | 18.580 | 0.764 | 0.731 | 24.000 | 22.700 | 12.000 | 0.472 | 0.945 | 0.894 | 12.000 | 0.472 | 0.429 | 0.429 | |
| 104 | | | Metric | IS : 1364-67 | 30.000 | 29.670 | 1.181 | 1.168 | 46.000 | 45.000 | 1.811 | 1.772 | 19.420 | 18.580 | 0.764 | 0.731 | 24.000 | 22.700 | 15.000 | 0.590 | 1.008 | 0.957 | 15.000 | 0.590 | 0.547 | 0.547 | |
| 105 | 1.1/4" | 1.250 31.750 | | | 33.020 | ... | 1.300 | ... | 47.224 | 46.101 | 1.860 | 1.815 | 22.606 | 21.082 | 0.890 | 0.807 | 28.575 | 1.205 | 19.050 | 0.810 | 1.125 | 1.105 | 19.050 | 0.810 | 0.750 | 0.750 | |
| 106 | | | BSW-BSF | BS : 916-57 | 31.750 | 31.547 | 1.250 | 1.242 | 47.244 | 46.101 | 1.860 | 1.815 | 21.082 | 20.066 | 0.830 | 0.790 | 28.575 | 28.067 | 19.050 | 0.750 | 1.125 | 1.105 | 19.050 | 0.750 | 0.730 | 0.730 | |
| 107 | | | BSW-BSF | BS : 1083-65 | 31.750 | 31.547 | 1.250 | 1.242 | 47.625 | 46.482 | 1.875 | 1.830 | 20.250 | 19.634 | 0.813 | 0.773 | 27.610 | 26.340 | 18.898 | 0.744 | 1.087 | 1.037 | 18.898 | 0.744 | 0.694 | 0.694 | |
| 108 | | | UNC-UNF | BS : 1766-63 | 32.436 | ... | 1.277 | ... | 47.625 | 46.025 | 1.875 | 1.812 | 22.250 | 19.025 | 0.876 | 0.749 | 27.788 | 26.162 | 19.075 | 0.751 | 1.094 | 1.030 | 19.075 | 0.751 | 0.687 | 0.687 | |
| 109 | 33mm | 1.299 33.000 | | | 34.600 | 32.380 | 1.362 | 1.275 | 50.000 | 49.000 | 1.968 | 1.929 | 21.650 | 20.350 | 0.852 | 0.801 | 26.650 | 25.350 | 14.550 | 0.573 | 1.049 | 0.998 | 14.550 | 0.573 | 0.529 | 0.529 | |
| 110 | | | UNC-UNF | ANSI | 33.000 | 32.610 | 1.300 | 1.284 | 50.000 | 49.000 | 1.968 | 1.929 | 21.420 | 20.580 | 0.843 | 0.810 | 26.000 | 24.700 | 14.000 | 0.508 | 1.024 | 0.972 | 14.000 | 0.508 | 0.508 | 0.508 | |
| 111 | 1.3/8" | 1.375 34.925 | | | 36.195 | 34.671 | 1.425 | ... | 52.070 | 50.927 | 2.050 | 2.005 | 24.892 | 23.368 | 0.990 | 0.920 | 33.782 | 31.750 | 22.606 | 1.158 | 1.330 | 1.250 | 22.606 | 1.158 | 0.833 | 0.833 | |
| 112 | | | Metric | IS : 1364-65 | 34.925 | ... | 1.375 | 1.365 | 52.070 | 50.927 | 2.050 | 2.005 | 23.368 | 22.352 | 0.880 | 0.880 | 31.750 | 31.242 | 21.158 | 0.650 | 1.250 | 1.230 | 21.158 | 0.650 | 0.813 | 0.813 | |
| 113 | | | BSW-BSF | BS : 916-57 | 34.925 | 34.671 | 1.375 | 1.365 | 52.375 | 51.232 | 2.062 | 2.017 | 22.301 | 21.285 | 0.838 | 0.838 | 30.404 | 29.134 | 20.472 | 1.202 | 1.197 | 1.147 | 20.472 | 1.202 | 0.756 | 0.756 | |
| 114 | | | BSW-BSF | BS : 1083-65 | 34.925 | 34.671 | 1.375 | 1.365 | 52.375 | 50.648 | 2.062 | 1.994 | 23.876 | 20.574 | 0.810 | 0.810 | 30.632 | 28.905 | 20.701 | 1.8974 | 1.206 | 1.138 | 20.701 | 1.8974 | 0.747 | 0.747 | |
| 115 | 36mm | 1417 36.000 | | | 36.600 | 35.380 | 1.480 | 1.393 | 55.000 | 53.800 | 2.165 | 2.118 | 23.650 | 22.350 | 0.931 | 0.880 | 29.650 | 28.350 | 14.550 | 1.3450 | 1.167 | 1.116 | 14.550 | 1.3450 | 0.573 | 0.529 | |
| 116 | | | Metric | ANSI | 37.000 | 35.000 | 1.457 | 1.378 | 55.000 | 53.800 | 2.165 | 2.118 | 23.550 | 21.450 | 0.927 | 0.844 | 31.500 | 29.400 | 14.000 | 1.2900 | 1.240 | 1.157 | 14.000 | 1.2900 | 0.551 | 0.508 | |
| 117 | | | Metric | | 36.000 | 35.610 | 1.417 | 1.402 | 55.000 | 53.800 | 2.165 | 2.118 | 23.420 | 22.580 | 0.922 | 0.889 | 29.000 | 27.700 | 18.000 | 1.6900 | 1.142 | 1.090 | 18.000 | 1.6900 | 0.709 | 0.66 | |
| 118 | | | Metric | | 36.000 | 35.610 | 1.417 | 1.402 | 55.000 | 53.800 | 2.165 | 2.118 | 22.920 | 22.080 | 0.902 | 0.869 | 31.000 | 29.400 | 18.000 | 1.6900 | 1.220 | 1.157 | 18.000 | 1.6900 | 0.980 | 0.916 | |
| 119 | 1.1/2" | 1.500 38.100 | | | 39.37 | ... | 1.55 | ... | 56.388 | 55.245 | 2.220 | 2.175 | 26.924 | 25.400 | 1.060 | 1.000 | 36.957 | 34.925 | 24.892 | 2.266 | 1.455 | 1.375 | 24.892 | 2.266 | 0.916 | 0.896 | |
| 120 | | | BSW-BSF | | 38.100 | 37.846 | 1.500 | 1.490 | 56.388 | 55.245 | 2.220 | 2.175 | 25.400 | 24.384 | 1.000 | 0.960 | 34.925 | 34.417 | 23.266 | 2.758 | 1.375 | 1.355 | 23.266 | 2.758 | 0.916 | 0.896 | |
| 121 | | | UNC-UNF | | 38.100 | 37.846 | 1.500 | 1.490 | 57.150 | 56.007 | 2.250 | 2.205 | 24.740 | 23.724 | 0.974 | 0.934 | 33.299 | 31.775 | 22.200 | 2.676 | 1.311 | 1.251 | 22.200 | 2.676 | 0.874 | 0.814 | |
| 122 | | | UNC-UNF | | 38.887 | ... | 1.531 | ... | 57.150 | 55.245 | 2.250 | 2.175 | 26.184 | 22.911 | 1.010 | 0.902 | 33.452 | 31.623 | 22.352 | 2.523 | 1.317 | 1.245 | 22.352 | 2.523 | 0.880 | 0.808 | |
| 123 | 39mm | 1.535 39.000 | | | 40.600 | 38.380 | 1.598 | 1.511 | 60.000 | 58.800 | 2.362 | 2.315 | 25.650 | 24.350 | 1.010 | 0.959 | 31.800 | 30.200 | 16.550 | 1.5450 | 1.252 | 1.189 | 16.550 | 1.5450 | 0.651 | 0.608 | |
| 124 | | | Metric | | 39.000 | 38.610 | 1.535 | 1.520 | 60.000 | 58.800 | 2.362 | 2.315 | 25.420 | 24.580 | 1.001 | 0.968 | 31.000 | 29.400 | 16.000 | 1.4900 | 1.220 | 1.157 | 16.000 | 1.4900 | 0.630 | 0.587 | |
| 125 | 42mm | 1.653 42.000 | | | 45.974 | ... | 1.81 | ... | 65.000 | 63.800 | 2.559 | 2.512 | 26.420 | 24.580 | 1.040 | 1.007 | 34.000 | 33.000 | 29.464 | 2.7508 | 1.388 | 1.300 | 29.464 | 2.7508 | 1.160 | 1.083 | |
| 126 | 1.3/4" | 1.750 44.450 | | | 44.450 | 44.196 | 1.750 | 1.740 | 65.532 | 64.008 | 2.580 | 2.520 | 32.258 | 29.718 | 1.270 | 1.170 | 43.815 | 41.275 | 27.508 | 2.7000 | 1.725 | 1.625 | 27.508 | 2.7000 | 1.083 | 1.063 | |
| 127 | | | BSW-BSF | | 44.450 | 44.196 | 1.750 | 1.740 | 65.532 | 64.008 | 2.580 | 2.520 | 29.718 | 28.194 | 1.170 | 1.110 | 41.275 | 40.767 | 25.375 | 2.3851 | 1.625 | 1.605 | 25.375 | 2.3851 | 0.999 | 0.939 | |
| 128 | | | UNC-UNF | | 44.450 | 44.196 | 1.750 | 1.740 | 66.675 | 65.151 | 2.625 | 2.565 | 28.804 | 27.280 | 1.134 | 1.074 | 38.862 | 37.338 | 25.375 | 2.3851 | 1.530 | 1.470 | 25.375 | 2.3851 | 0.999 | 0.939 | |
| 129 | | | UNC-UNF | | 45.339 | ... | 1.785 | ... | 66.675 | 64.465 | 2.625 | 2.538 | 30.378 | 26.772 | 1.196 | 1.054 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |



DIMENSIONS FOR HEX BOLTS, NUTS & LOCK NUTS

| Sr. No | Basic Dia | Equivalent | | Thread | Specification | SHANK | | A/F of Bolts & Nut | | | Bolts Head Thickness | | | Std. Nut Thickness | | | Lock Nut Thickness | | |
|--------|-----------|------------|--------|---------|---------------|--------|--------|--------------------|--------|-------|----------------------|-------|-------|--------------------|--------|-------|--------------------|--------|--------|
| | | Inch | Metric | | | Metric | Inch | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min |
| 130 | 45mm | 1.771 | 45.000 | Metric | IS : 1338-66 | ... | ... | 70.000 | 68.800 | 2756 | 2.709 | 1.196 | 1.086 | 36.000 | 35.000 | 1.417 | 1.378 | ... | ... |
| 131 | 48mm | 1.889 | 48.000 | Metric | IS : 3138-66 | ... | ... | 75.000 | 73.800 | 2.953 | 2.905 | 1.198 | 1.164 | 38.000 | 37.000 | 1.496 | 1.457 | ... | ... |
| 132 | 2" | 2.000 | 50.800 | BSW-BSF | BS : 916-57 | 52.324 | 2.06 | 70.104 | 68.580 | 2.760 | 2.700 | 1.430 | 1.330 | 46.990 | 44.450 | 1.850 | 1.750 | 31.750 | 29.616 |
| 133 | | | | BSW-BSF | BS : 108365 | 50.800 | 50.546 | 70.104 | 68.580 | 2.760 | 2.700 | 1.330 | 1.270 | 44.450 | 43.942 | 1.750 | 1.730 | 29.616 | 29.108 |
| 134 | | | | UNC-UNF | BS : 1768-63 | 50.800 | 50.547 | 76.200 | 74.676 | 3.000 | 2.940 | 1.263 | 1.203 | 44.552 | 42.774 | 1.754 | 1.684 | 28.677 | 26.899 |
| 135 | | | | UNC-UNF | ANSI | 51.791 | 2.039 | 76.200 | 73.660 | 3.000 | 2.900 | 1.388 | 1.175 | ... | ... | ... | ... | ... | ... |
| 136 | 52mm | 2.047 | 52.000 | Metric | IS : 3138-66 | ... | ... | 80.000 | 78.800 | 3.150 | 3.102 | 1.319 | 1.279 | 42.000 | 41.000 | 1.653 | 1.614 | ... | ... |
| 137 | 56mm | 2.204 | 56.000 | Metric | IS : 3138-66 | ... | ... | 85.000 | 83.600 | 3.346 | 3.291 | 1.398 | 1.358 | 45.000 | 44.000 | 1.772 | 1.732 | ... | ... |
| 138 | 2.1/4" | 2.250 | 57.150 | BSW-BSF | BS : 916-57 | ... | ... | 80.100 | 78.486 | 3.150 | 3.090 | 1.600 | 1.500 | 50.165 | 47.625 | 1.975 | 1.875 | 36.322 | 31.750 |

CHEMICAL COMPOSITION REQUIREMENT OF BOLTS, SCREWS, STUDS^A TABLE - SP-003T/1

| PROPERTY CLASS | NOMINAL PRODUCT DIAMETER, mm. | MATERIAL AND TREATMENT | PRODUCT ANALYSIS ELEMENT (% BY WEIGHT) ^B | | | | | | | | | | RECOMMENDED GRADE | TEMPERING TEMP ^o | | | |
|----------------|-------------------------------|---|---|-----------|-----------|-----------|-------|-------------|-----------|------|-----------|-----------|-------------------|-----------------------------|--------------------|--------------|-----|
| | | | C | Mn | Si | P | S | B | Cr | Ni | Cu | | | | | | |
| 3.6 | M5-M100 | LOW CARBON STEEL | 0.20 | 0.70 | 0.10 | 0.070 | 0.300 | --- | --- | --- | --- | --- | --- | --- | --- | En-1A | --- |
| 4.6 | M5-M100 | LOW OR MEDIUM CARBON STEEL | 0.25 | 0.90 | 0.35 | 0.048 | 0.058 | --- | --- | --- | --- | --- | --- | --- | --- | En-3 | --- |
| 4.8 | M1.6-M100 | LOW OR MEDIUM CARBON STEEL, PARTIALLY OR FULLY ANNEALED AS REQUIRED | 0.15-0.25 | 0.60-0.90 | 0.10-0.35 | 0.048 | 0.058 | --- | --- | --- | --- | --- | --- | --- | --- | En-3B | --- |
| 5.6 | M5-M100 | LOW OR MEDIUM CARBON STEEL | 0.35 | 0.90 | 0.35 | 0.048 | 0.058 | --- | --- | --- | --- | --- | --- | --- | --- | En-5 | --- |
| 5.8 | M5-M24 | LOW OR MEDIUM CARBON STEEL, COLD WORKED | 0.13-0.55 | 0.60-0.90 | 0.10-0.35 | 0.048 | 0.058 | --- | --- | --- | --- | --- | --- | --- | --- | En-5D | --- |
| 6.8 | M1.6-M100 | MEDIUM CARBON STEEL, COLD DRAWN & NORMALISED | 0.35-0.45 | 0.60-0.90 | 0.10-0.35 | 0.048 | 0.058 | --- | --- | --- | --- | --- | --- | --- | --- | En-8.8D | --- |
| 8.8 | M1.6-M16 | LOW CARBON MARTENSITE STEEL, QUENCHED AND TEMPERED | 0.15-0.40 | 0.70-1.00 | 0.15-0.35 | 0.048 | 0.058 | 0.0005 MIN. | --- | --- | --- | --- | --- | --- | --- | 15B21, 15B35 | 425 |
| 8.8 | M18-M100 | MEDIUM CARBON LOW ALLOY STEEL, QUENCHED AND TEMPERED | 0.35-0.55 | 0.60-1.70 | 0.10-0.35 | 0.048 | 0.058 | --- | 1.20 | 0.20 | 0.20 | 0.35 Mo | --- | --- | En-15.16, En-18.19 | 425 | |
| 8.8.3 | M1.6-M100 | ATMOSPHERIC CORROSION RESISTANCE STEEL, QUENCHED AND TEMPERED | 0.38-0.48 | 0.70-0.90 | 0.30-0.50 | 0.06-0.12 | 0.050 | --- | 0.50-0.75 | 0.80 | 0.50-0.80 | 0.20-0.40 | --- | --- | --- | --- | 425 |
| 9.8 | M1.6-M16 | MEDIUM CARBON ALLOY STEEL, QUENCHED AND TEMPERED | 0.35-0.55 | 0.60-1.70 | 0.10-0.35 | 0.048 | 0.058 | --- | 1.20 | 0.20 | 0.20 | 0.35 Mo | --- | --- | En-16, En-18.19 | 425 | |
| 9.8 | M1.6-M16 | LOW CARBON MARTENSITE STEEL, QUENCHED AND TEMPERED | 0.15-0.40 | 0.70-1.00 | 0.15-0.35 | 0.048 | 0.058 | 0.0005 MIN. | --- | --- | --- | --- | --- | --- | 15B21, 15B35 | 425 | |
| 10.9 | M5-M20 | MEDIUM CARBON ALLOY STEEL, QUENCHED AND TEMPERED | 0.35-0.55 | 0.60-1.70 | 0.10-0.35 | 0.048 | 0.058 | --- | 1.20 | 0.20 | 0.20 | 0.35 Mo | --- | --- | En-18.19 | 425 | |
| 10.9 | M5-M20 | MEDIUM CARBON ALLOY STEEL, QUENCHED AND TEMPERED | 0.35 | 0.70 | 0.10-0.35 | 0.048 | 0.058 | --- | 1.20 | 0.20 | 0.20 | 0.80 Mo | --- | --- | En-19, En-20A | 425 | |
| 10.9 | M5-M36 | LOW CARBON MARTENSITE STEEL, QUENCHED AND TEMPERED | 0.15-0.40 | 0.70-1.00 | 0.15-0.35 | 0.048 | 0.058 | 0.0005 MIN. | --- | --- | --- | --- | --- | --- | 15B21, 15B35 | 340 | |
| 10.9.3 | M1.6-M36 | ATMOSPHERIC CORROSION RESISTANCE STEEL, QUENCHED AND TEMPERED | 0.15-0.25 | 0.40-1.20 | 0.25-0.50 | 0.040 | 0.050 | --- | 0.50-1.00 | 0.80 | 0.50-0.80 | 0.30-0.50 | --- | --- | --- | --- | 425 |
| 12.9 | M1.6-M100 | ALLOY STEEL, QUENCHED AND TEMPERED | 0.35-0.55 | 0.45-0.70 | 0.10-0.35 | 0.048 | 0.050 | --- | 0.90-1.40 | 1.80 | 1.30-1.80 | 0.35 Mo | --- | --- | En-24, En-110 | 380 | |

^AThe chemical composition limits are mandatory for only those fasteners which are not subject to testing.

^BThe values are maximum, unless otherwise specified.

Alloy steel shall be used. Steel is considered to be alloy when the maximum of the range given for the content of alloying elements exceeds one or more of the following limits: Manganese - 1.65% ; Silicon - 0.60% ; Copper - 0.60% ; or in which a definite range or a definite minimum quantity of any of the following elements is specified or required within the limits of the recognised field of constructional steels : Aluminium, Chromium up to 3.99% ; Cobalt, Columbium, Molybdenum, Nickel, Titanium, tungsten, Vanadium, Zirconium, or any ^CThe minimum tempering temperatures are mandatory for property classes 8.8 to 12.9 in all cases.



MECHANICAL PROPERTIES OF BOLTS, SCREWS AND STUDS TABLE - SP-003T/3

| MECHANICAL TEST DETAILS | PROPERTY CLASS | | | | | | | | | | | | |
|--|---|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------|
| | 3.6 | | 4.6 | | 4.8 | | 5.6 | | 5.8 | | 6.8 | | |
| | N/mm ² | Kgf/mm ² | N/mm ² | Kgf/mm ² | N/mm ² | Kgf/mm ² | N/mm ² | Kgf/mm ² | N/mm ² | Kgf/mm ² | N/mm ² | Kgf/mm ² | |
| TENSILE STRENGTH ⁰⁰¹ , R _m | NOM. | 300 | 30.59 | 400 | 40.79 | 400 | 40.79 | 500 | 50.99 | 500 | 50.99 | 600 | 61.18 |
| | MIN. | 300 | 30.59 | 400 | 40.79 | 400 | 40.79 | 500 | 50.99 | 500 | 50.99 | 600 | 61.18 |
| VICKERS HARDNESS, HV | MIN. | 95 | | 120 | | 130 | | 155 | | 160 | | 190 | |
| | MAX. | 250 | | 250 | | 250 | | 250 | | 250 | | 250 | |
| BRINELL HARDNESS, HB | MIN. | 90 | | 114 | | 124 | | 147 | | 152 | | 181 | |
| | MAX. | 238 | | 238 | | 238 | | 238 | | 238 | | 238 | |
| ROCKWELL HARDNESS, HRB | MIN. | 52 | | 67 | | 71 | | 79 | | 82 | | 89 | |
| | MAX. | 100 | | 100 | | 100 | | 100 | | 100 | | 100 | |
| ROCKWELL HARDNESS, HRC | MIN. | *** | | *** | | *** | | *** | | *** | | *** | |
| | MAX. | *** | | *** | | *** | | *** | | *** | | *** | |
| SURFACE HARDNESS, HV | MIN. | *** | | *** | | *** | | *** | | *** | | *** | |
| | MAX. | *** | | *** | | *** | | *** | | *** | | *** | |
| LOWER YIELD STRESS ⁰⁰² , R _{el} | NOM. | 180 | 18.35 | 240 | 24.47 | 320 | 32.63 | 300 | 30.59 | 400 | 40.79 | 480 | 48.95 |
| | MIN. | 190 | 19.37 | 240 | 24.47 | 340 | 34.67 | 300 | 30.59 | 420 | 42.83 | 480 | 48.95 |
| PROOF STRESS OR _{0.2} | MIN. | *** | | *** | | *** | | *** | | *** | | *** | |
| | MAX. | *** | | *** | | *** | | *** | | *** | | *** | |
| STRESS UNDER PROOFING LOAD, S _p | S _p /R _{el} or S _p /R _{0.2} | 0.94 | | 0.94 | | 0.91 | | 0.93 | | 0.90 | | 0.92 | |
| | MIN. | 180 | 18.35 | 225 | 22.94 | 310 | 31.61 | 280 | 28.55 | 380 | 38.75 | 440 | 44.87 |
| ELONGATION AFTER FRACTURE, A | MIN. | 25 | | 22 | | 14 | | 20 | | 10 | | 8 | |
| STRENGTH UNDER WEDGE LOADING The values for full size Bolts and Screws (not Studs) shall not be smaller than the minimum values for tensile strength. | | | | | | | | | | | | | |
| IMPACT STRENGTH, J | MIN. | *** | | *** | | *** | | 25 | | *** | | *** | |
| HEAD SOUNDNESS | | NO FRACTURE | | | | | | | | | | | |
| MIN. HEIGHT OF NON CARBURIZED THREAD ZONE, E | | *** | | | | | | | | | | | |
| MAX. DEPTH OF COMPLETE DECARBURIZATION, G | | *** | | | | | | | | | | | |

- 1) Minimum tensile properties apply to products of nominal length $l \geq 2.5 d$. Minimum hardness applies to products of length $l < 2.5 d$ and other products which cannot be tensile tested (i.e. due to head configuration).
- 2) For testing of full size Bolts, Screws and Studs, the loads given in Table - SP-003T/4 shall be applied.
- 3) In cases where the lower yield stress R_{el} cannot be determined, it is permissible to measure the Proof stress R_{0.2}

203 A HANDBOOK OF STEEL AND INDL., FASTENERS

CONTD.

MECHANICAL PROPERTIES OF BOLTS, SCREWS AND STUDS TABLE - SP-003T/3 (Contd.)

| MECHANICAL TEST DETAILS | PROPERTY CLASS | | | | | | | | | | | | |
|---|--|---------------------|----------------------------------|---------------------|--------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|--------|
| | 8.8 & 8.8.3 ≤ M16 ⁽⁴⁾ | | 8.8 & 8.8.3 > M16 ⁽⁵⁾ | | 9.8 ⁽⁶⁾ | | 10.9 | | 10.9.3 | | 12.9 | | |
| | N/mm ² | Kgf/mm ² | N/mm ² | Kgf/mm ² | N/mm ² | Kgf/mm ² | N/mm ² | Kgf/mm ² | N/mm ² | Kgf/mm ² | N/mm ² | Kgf/mm ² | |
| TENSILE STRENGTH ⁽¹⁾ , R _m | NOM. | 800 | 81.58 | 800 | 81.58 | 900 | 91.77 | 1000 | 101.97 | 1000 | 101.97 | 1200 | 122.36 |
| | MIN. | 800 | 81.58 | 800 | 81.58 | 900 | 91.77 | 1000 | 101.97 | 1000 | 101.97 | 1200 | 122.36 |
| VICKERS HARDNESS, HV | MIN. | 250 | | 255 | | 290 | | 320 | | 320 | | 385 | |
| | MAX. | 320 | | 335 | | 360 | | 380 | | 380 | | 435 | |
| BRINELL HARDNESS, HB | MIN. | 238 | | 242 | | 276 | | 304 | | 304 | | 366 | |
| | MAX. | 304 | | 318 | | 342 | | 361 | | 361 | | 414 | |
| ROCKWELL HARDNESS, HRB | MIN. | --- | | --- | | --- | | --- | | --- | | --- | |
| | MAX. | --- | | --- | | --- | | --- | | --- | | --- | |
| ROCKWELL HARDNESS, HRC | MIN. | 22 | | 23 | | 28 | | 32 | | 32 | | 39 | |
| | MAX. | 32 | | 34 | | 37 | | 39 | | 39 | | 44 | |
| SURFACE HARDNESS, HV | MAX. | | | | | | | | | | | | |
| LOWER YIELD STRESS ⁽²⁾ , R _{el} | NOM. | --- | | --- | | --- | | --- | | --- | | --- | |
| | MIN. | --- | | --- | | --- | | --- | | --- | | --- | |
| PROOF STRESS 0 _{Rp0.2} | NOM. | 640 | 65.26 | 640 | 65.26 | 720 | 73.42 | 900 | 91.77 | 900 | 91.77 | 1080 | 110.13 |
| | MIN. | 640 | 65.26 | 660 | 67.30 | 720 | 73.42 | 940 | 95.85 | 940 | 95.85 | 1100 | 112.17 |
| STRESS UNDER PROOFING LOAD, S _p | S _p /R _{el} or S _p /R _{p0.2} | 0.91 | | 0.91 | | 0.9 | | 0.88 | | 0.88 | | 0.88 | |
| | MIN. | 580 | 59.14 | 600 | 61.18 | 650 | 66.28 | 830 | 84.64 | 830 | 84.64 | 970 | 98.91 |
| ELONGATION AFTER FRACTURE, A | MIN. | 12 | | 12 | | 10 | | 9 | | 9 | | 8 | |
| STRENGTH UNDER WEDGE LOADING | The values for full size Bolts and Screws (not Studs) shall not be smaller than the minimum values for tensile strength. | | | | | | | | | | | | |
| IMPACT STRENGTH, J | MIN. | 30 | | 30 | | 25 | | 20 | | 20 | | 15 | |
| HEAD SOUNDNESS | NO FRACTURE | | | | | | | | | | | | |
| MIN. HEIGHT OF NON CARBURIZED THREAD ZONE, E | 1/2 H1 | | | | | | | | | | | | |
| MAX. DEPTH OF COMPLETE DECARBURIZATION, G | 2/3 H1 | | | | | | | | | | | | |

- 1) Minimum tensile properties apply to products of nominal length $l \geq 2.5 d$. Minimum hardness applies to products of length $l < 2.5 d$ and other products which cannot be tensile tested (i.e. due to head configuration).
- 2) For testing of full size Bolts, Screws and Studs, the loads given in Table - SP-003T/4 shall be applied.
- 3) In cases where the lower yield stress R_{el} cannot be determined, it is permissible to measure the Proof stress R_{p0.2}.
- 4) For Bolts of property class 8.8 in diameter, $d \leq M16$, there is an increased risk of Nut stripping in the case of inadvertent overtightening a load in excess of Proofing load.
- 5) For Structural bolting, limit is M12
- 6) Applies only to nominal thread dia. $d \leq M16$

CHEMICAL COMPOSITION & HARDNESS REQUIREMENTS OF NUTS^A TABLE - SP-004T/3

| PROPERTY CLASS | NOMINAL PRODUCT DIAMETER, mm. | PRODUCT ANALYSIS ELEMENT (% BY WEIGHT) ^B | | | | | | | | | | HARDNESS | | ^H TEMPERING TEMP°C. MIN. | RECOMMENDED GRADE | |
|------------------|-------------------------------|---|-----------------|-----------|-----------|-------|---------------------|-----------|-----------|-----------|--------------|------------------------|---------|-------------------------------------|-------------------|---|
| | | C | Mn ^c | Si | P | S | B ^D | Cr | Ni | Cu | BRINELL, BHN | ROCKWELL HRC(C)/HRB(B) | | | | |
| 04 | M5-M100 | 0.58 | 0.25 | --- | 0.060 | 0.150 | --- | --- | --- | --- | --- | --- | 179-286 | 8C-30C | --- | En-3A,5, C-20, C-30 |
| 05 | M5-M100 | 0.58 | 0.30 | --- | 0.048 | 0.058 | --- | --- | --- | --- | --- | --- | 258-336 | 26C-38C | 525 | En-5,8, C-30, C-40, C-45 |
| 4 ^F | M1.6-M100 | 0.50 | --- | --- | 0.060 | 0.150 | --- | --- | --- | --- | --- | --- | 111-286 | 65B-28C | --- | En-3A,5, C-20, C-30 |
| 5 ^F | M1.6-M100 | 0.50 | --- | --- | 0.060 | 0.150 | --- | --- | --- | --- | --- | --- | 139-286 | 77B-28C | --- | En-3A,5, C-20, C-30 |
| 6 ^F | M5-M100 | 0.50 | --- | --- | 0.060 | 0.150 | --- | --- | --- | --- | --- | --- | 165-286 | 85B-28C | --- | En-5, 8, C-30, C-40 |
| 8 | UPTO M4 | 0.58 | 0.25 | --- | 0.060 | 0.150 | --- | --- | --- | --- | --- | --- | 171-286 | 6C-30C | --- | 15B25, En-8, 8D, C-40, C-45 |
| | OVER M4 TO M16 | 0.58 | 0.25 | --- | 0.060 | 0.150 | 0.0005 ^E | --- | --- | --- | --- | --- | 190-286 | 11C-30C | --- | 15B25, En-8, 8D, C-40, C-45 |
| | OVER M16 TO M100 | 0.58 | 0.25 | --- | 0.060 | 0.150 | 0.0005 ^E | --- | --- | --- | --- | --- | 222-336 | 19C-36C | 425 | 15B25, En-8, 8D, C-40, C-45 |
| 8S | M12-M36 | 0.55 | 0.25 | --- | 0.060 | 0.150 | --- | --- | --- | --- | --- | --- | 222-336 | 19C-36C | 425 | En-8, 8D, C-40, C-45 |
| 8S3 | M12-M36 | 0.38-0.48 | 0.70-0.90 | 0.30-0.50 | 0.06-0.12 | 0.050 | --- | 0.50-0.75 | 0.50-0.80 | 0.20-0.40 | --- | --- | 222-336 | 19C-36C | 425 | ATMOSPHERIC CORROSION RESISTANCE STEEL, H & T |
| 9 | M3-M100 | 0.58 | 0.25 | --- | 0.060 | 0.150 | --- | --- | --- | --- | --- | --- | 179-286 | 8C-28C | --- | En-8, 8D, C-40, C-45 |
| 10 ^G | M1.6-M100 | 0.58 | 0.30 | --- | 0.048 | 0.058 | --- | --- | --- | --- | --- | --- | 258-336 | 26C-38C | 425 | En-8D, 15,16, 18, C-50, C-45 Cr. |
| 10S ^G | M12-36 | 0.58 | 0.30 | --- | 0.048 | 0.058 | --- | --- | --- | --- | --- | --- | 258-336 | 26C-38C | 425 | En-8D, 15,16, 18, C-50, C-45 Cr. |
| 10S3 | M12-M36 | 0.15-0.25 | 0.40-1.20 | 0.25-0.50 | 0.040 | 0.050 | --- | 0.50-1.00 | 0.50-0.80 | 0.30-0.50 | --- | --- | 258-336 | 26C-38C | 425 | ATMOSPHERIC CORROSION RESISTANCE STEEL, H & T |
| 12 ^G | M5-M100 | 0.58 | 0.45 | --- | 0.048 | 0.058 | --- | --- | --- | --- | --- | --- | 280-336 | 29C-38C | 425 | En-18,19,24, C-45 Cr. |

^A The chemical composition limits are mandatory for all types of nuts.

^B The values are maximum, unless otherwise specified.

^C The values are maximum, unless otherwise specified.

^D The values are maximum, unless otherwise specified.

^E The values are maximum, unless otherwise specified.

^F The values are maximum and optional, applicable in case of Boron quality steels only.

^G Nuts of these property classes may be manufactured from free cutting steel, unless otherwise agreed between the purchaser and the manufacturer

In such cases, sulphur 0.34% max., phosphorus 0.11% max. and lead 0.35% max. are permissible.

^H Alloying elements like, Cr or Ni or Mo may be added, if necessary, to develop the mechanical properties of the nuts.

^I The minimum tempering temperatures are mandatory for property classes 05, 8, 10, 10S, 10S3, 12 in all cases.

PROOF LOAD STRESS (MPa) AND PROOF LOAD VALUES FOR NUTS, kN^A TABLE - SP-004T/4

| NOMINAL PRODUCT DIA. D AN THREAD PITCH, P | STRESS AREA ^B mm ² , a | 04 | | 05 | | 4 | | 5 | | 6 | | 8 | | 8S | |
|---|--|-----------------------|---------------|-----------------------|---------------|-----------------------|---------------|-----------------------|---------------|-----------------------|---------------|-----------------------|---------------|-----------------------|---------------|
| | | PROOF LOAD STRESS MPa | PROOF LOAD kN | PROOF LOAD STRESS MPa | PROOF LOAD kN | PROOF LOAD STRESS MPa | PROOF LOAD kN | PROOF LOAD STRESS MPa | PROOF LOAD kN | PROOF LOAD STRESS MPa | PROOF LOAD kN | PROOF LOAD STRESS MPa | PROOF LOAD kN | PROOF LOAD STRESS MPa | PROOF LOAD kN |
| M1.6X0.35 | 1.27 | 380 | 0.48 | 500 | 0.64 | 510 | 0.65 | 520 | 0.6604 | --- | --- | 800 | 1.02 | --- | --- |
| M2X0.4 | 2.07 | 380 | 0.79 | 500 | 1.04 | 510 | 1.06 | 520 | 1.08 | --- | --- | 800 | 1.66 | --- | --- |
| M2.5X0.45 | 3.39 | 380 | 1.29 | 500 | 1.70 | 510 | 1.73 | 520 | 1.76 | --- | --- | 800 | 2.71 | --- | --- |
| M3X0.5 | 5.03 | 380 | 1.91 | 500 | 2.52 | 510 | 2.57 | 520 | 2.62 | --- | --- | 800 | 4.02 | --- | --- |
| M3.5X0.6 | 6.78 | 380 | 2.57 | 500 | 3.39 | 510 | 3.46 | 520 | 3.52 | --- | --- | 800 | 5.42 | --- | --- |
| M4X0.7 | 8.78 | 380 | 3.34 | 500 | 4.39 | 510 | 4.48 | 520 | 4.56 | --- | --- | 800 | 7.02 | --- | --- |
| M5X0.8 | 14.18 | 380 | 5.39 | 500 | 7.09 | 510 | 7.23 | 580 | 8.23 | 670 | 670 | 855 | 12.13 | --- | --- |
| M6X1 | 20.12 | 380 | 7.65 | 500 | 10.06 | 510 | 10.26 | 580 | 11.67 | 670 | 670 | 855 | 17.21 | --- | --- |
| M8X1.25 | 36.61 | 380 | 13.91 | 500 | 18.30 | 510 | 18.67 | 580 | 21.23 | 680 | 680 | 870 | 31.85 | --- | --- |
| M10X1.5 | 57.99 | 380 | 22.04 | 500 | 28.99 | 510 | 29.57 | 580 | 33.63 | 680 | 680 | 870 | 50.45 | --- | --- |
| M12X1.75 | 84.27 | 380 | 32.02 | 500 | 42.13 | 510 | 42.98 | 610 | 51.40 | 700 | 700 | 880 | 74.15 | 1075 | 90.59 |
| M14X2 | 115.44 | 380 | 43.87 | 500 | 57.72 | 510 | 58.87 | 610 | 70.42 | 700 | 700 | 880 | 101.6 | 1075 | 124.10 |
| M16X2 | 156.67 | 380 | 59.53 | 500 | 78.33 | 510 | 79.90 | 610 | 95.57 | 700 | 700 | 880 | 137.9 | 1075 | 168.42 |
| M18X2.5 | 192.47 | 380 | 73.14 | 500 | 96.24 | 510 | 98.16 | 630 | 121.3 | 720 | 720 | 920 | 177.1 | 1075 | 206.91 |
| M20X2.5 | 244.79 | 380 | 93.02 | 500 | 122.4 | 510 | 124.8 | 630 | 154.2 | 720 | 720 | 920 | 225.2 | 1075 | 263.15 |
| M22X2.5 | 303.40 | 380 | 115.3 | 500 | 151.7 | 510 | 154.7 | 630 | 191.1 | 720 | 720 | 920 | 279.1 | 1075 | 326.15 |
| M24X3 | 352.50 | 380 | 134.0 | 500 | 176.3 | 510 | 179.8 | 630 | 222.1 | 720 | 720 | 920 | 324.3 | 1075 | 378.94 |
| M27X3 | 459.41 | 380 | 174.6 | 500 | 229.7 | 510 | 234.3 | 630 | 289.4 | 720 | 720 | 920 | 422.7 | 1075 | 493.86 |
| M30X3.5 | 560.59 | 380 | 213.0 | 500 | 280.3 | 510 | 285.9 | 630 | 353.2 | 720 | 720 | 920 | 515.7 | 1075 | 602.63 |
| M33X3.5 | 693.55 | 380 | 263.6 | 500 | 346.3 | 510 | 353.7 | 630 | 436.9 | 720 | 720 | 920 | 638.1 | 1075 | 745.57 |
| M36X4 | 816.72 | 380 | 310.4 | 500 | 408.4 | 510 | 416.5 | 630 | 514.5 | 720 | 720 | 920 | 751.4 | 1075 | 877.98 |
| M39X4 | 975.75 | 380 | 370.8 | 500 | 487.9 | 510 | 497.6 | 630 | 614.7 | 720 | 720 | 920 | 897.7 | --- | --- |
| M42X4.5 | 1120.91 | 380 | 425.9 | 500 | 560.5 | 510 | 571.7 | 630 | 706.2 | 720 | 720 | 920 | 1031.2 | --- | --- |
| M48X5 | 1473.15 | 380 | 559.8 | 500 | 736.6 | 510 | 751.3 | 630 | 928.1 | 720 | 720 | 920 | 1355.3 | --- | --- |
| M56X5.5 | 2030.02 | 380 | 771.4 | 500 | 1015.0 | 510 | 1035.3 | 630 | 1278.9 | 720 | 720 | 920 | 1867.6 | --- | --- |
| M64X6 | 2675.98 | 380 | 1016.9 | 500 | 1338.0 | 510 | 1364.7 | 630 | 1685.9 | 720 | 720 | 920 | 2461.9 | --- | --- |
| M72X6 | 3459.75 | 380 | 1314.7 | 500 | 1729.0 | 510 | 1764.5 | 630 | 2179.6 | 720 | 720 | 920 | 3183.0 | --- | --- |
| M80X6 | 4344.06 | 380 | 1650.7 | 500 | 2172.0 | 510 | 2215.5 | 630 | 2736.8 | 720 | 720 | 920 | 3996.5 | --- | --- |
| M90X6 | 5590.82 | 380 | 2124.5 | 500 | 2795.4 | 510 | 2851.3 | 630 | 3522.2 | 720 | 720 | 920 | 5143.6 | --- | --- |
| M100X6 | 6994.65 | 380 | 2658.0 | 500 | 3497.3 | 510 | 3567.3 | 630 | 4406.6 | 720 | 720 | 920 | 6435.1 | --- | --- |

^APROOF LOADS ARE COMPUTED BY MULTIPLYING THE PROOF LOAD STRESS GIVEN IN THIS TABLE BY THE STRESS AREA OF THE THREAD.

^BSTRESS AREA, mm² = 0.7854 (D - 0.9382 P)², WHERE D = NOMINAL PRODUCT SIZE, mm, AND P = THREAD PITCH, mm.

CONTD.

219 A HANDBOOK OF STEEL AND INDL. FASTENERS



PROOF LOAD STRESS (MPa) AND PROOF LOAD VALUES FOR NUTS, kN^A TABLE - SP-004T/4

| NOMINAL PRODUCT DIA. D AN THREAD PITCH, P | STRESS AREA ^B mm ² , a | 8S3 | | 9 | | 10 | | 10S | | 10S3 | | 12 | | FORMULAE |
|---|--|-----------------------|---------------|-----------------------|---------------|-----------------------|---------------|-----------------------|---------------|-----------------------|---------------|-----------------------|---------------|---|
| | | PROOF LOAD STRESS MPa | PROOF LOAD kN | PROOF LOAD STRESS MPa | PROOF LOAD kN | PROOF LOAD STRESS MPa | PROOF LOAD kN | PROOF LOAD STRESS MPa | PROOF LOAD kN | PROOF LOAD STRESS MPa | PROOF LOAD kN | PROOF LOAD STRESS MPa | PROOF LOAD kN | |
| M1.6X0.35 | 1.27 | --- | --- | 900 | 1.14 | 1040 | 1.32 | --- | --- | --- | --- | 1150 | 1.46 | STRESS AREA, mm ² , a = 0.7854(D-0.9382P) ² For Example For D = 20 ; Pitch = 2.5 a=0.7854(20-0.9382X 2.5) ² = 244.79 mm ² Proof Load of Nut, kN = STRESS UNDER PROOFING LOAD, SpXa DIVIDED BY 1000 For Example FOR NUT M20X2.5 AND P-10 Proof load of nut = 1245x244.79/1000 = 304.8 kN. 1 Mpa = 1N = 0.10197 Kg/mm ² |
| M2X0.4 | 2.07 | --- | --- | 900 | 1.87 | 1040 | 2.16 | --- | --- | --- | --- | 1150 | 2.38 | |
| M2.5X0.45 | 3.39 | --- | --- | 900 | 3.05 | 1040 | 3.53 | --- | --- | --- | --- | 1150 | 3.90 | |
| M3X0.5 | 5.03 | --- | --- | 900 | 4.53 | 1040 | 5.23 | --- | --- | --- | --- | 1150 | 5.79 | |
| M3.5X0.6 | 6.78 | --- | --- | 900 | 6.10 | 1040 | 7.05 | --- | --- | --- | --- | 1150 | 7.79 | |
| M4X0.7 | 8.78 | --- | --- | 900 | 7.90 | 1040 | 9.13 | --- | --- | --- | --- | 1150 | 10.10 | |
| M5X0.8 | 14.18 | --- | --- | 915 | 12.98 | 1040 | 14.75 | --- | --- | --- | --- | 1150 | 16.31 | |
| M6X1 | 20.12 | --- | --- | 915 | 18.41 | 1040 | 20.93 | --- | --- | --- | --- | 1150 | 23.14 | |
| M8X1.25 | 36.61 | --- | --- | 940 | 34.41 | 1040 | 38.07 | --- | --- | --- | --- | 1160 | 42.47 | |
| M10X1.5 | 57.99 | --- | --- | 940 | 54.51 | 1040 | 60.31 | --- | --- | --- | --- | 1160 | 67.27 | |
| M12X1.75 | 84.27 | 1075 | 90.6 | 950 | 80.05 | 1050 | 88.48 | 1245 | 104.9 | 1245 | 104.9 | 1190 | 100.3 | |
| M14X2 | 115.44 | 1075 | 124.1 | 950 | 109.7 | 1050 | 121.2 | 1245 | 143.7 | 1245 | 143.7 | 1190 | 137.4 | |
| M16X2 | 156.67 | 1075 | 168.4 | 950 | 148.8 | 1050 | 164.5 | 1245 | 195.1 | 1245 | 195.1 | 1190 | 186.4 | |
| M18X2.5 | 192.47 | 1075 | 206.9 | 920 | 177.1 | 1060 | 204.0 | 1245 | 239.6 | 1245 | 239.6 | 1200 | 231.0 | |
| M20X2.5 | 244.79 | 1075 | 263.2 | 920 | 225.2 | 1060 | 259.5 | 1245 | 304.8 | 1245 | 304.8 | 1200 | 293.8 | |
| M22X2.5 | 303.40 | 1075 | 326.2 | 920 | 279.1 | 1060 | 321.6 | 1245 | 377.7 | 1245 | 377.7 | 1200 | 364.1 | |
| M24X3 | 352.50 | 1075 | 378.9 | 920 | 324.3 | 1060 | 373.7 | 1245 | 438.9 | 1245 | 438.9 | 1200 | 423.0 | |
| M27X3 | 459.41 | 1075 | 493.9 | 920 | 422.7 | 1060 | 487.0 | 1245 | 572.0 | 1245 | 572.0 | 1200 | 551.3 | |
| M30X3.5 | 560.59 | 1075 | 602.6 | 920 | 515.7 | 1060 | 594.2 | 1245 | 697.9 | 1245 | 697.9 | 1200 | 672.7 | |
| M33X3.5 | 693.55 | 1075 | 745.6 | 920 | 638.1 | 1060 | 735.2 | 1245 | 863.5 | 1245 | 863.5 | 1200 | 832.3 | |
| M36X4 | 816.72 | 1075 | 878.0 | 920 | 751.4 | 1060 | 865.7 | 1245 | 1016.8 | 1245 | 1016.8 | 1200 | 980.1 | |
| M39X4 | 975.75 | --- | --- | 920 | 897.7 | 1060 | 1034.3 | --- | --- | --- | --- | 1200 | 1170.9 | |
| M42X4.5 | 1120.91 | --- | --- | 920 | 1031.2 | 1060 | 1188.2 | --- | --- | --- | --- | 1200 | 1345.1 | |
| M48X5 | 1473.15 | --- | --- | 920 | 1355.3 | 1060 | 1561.5 | --- | --- | --- | --- | 1200 | 1767.8 | |
| M56X5.5 | 2030.02 | --- | --- | 920 | 1867.6 | 1060 | 2151.8 | --- | --- | --- | --- | 1200 | 2436.0 | |
| M64X6 | 2675.98 | --- | --- | 920 | 2461.9 | 1060 | 2836.5 | --- | --- | --- | --- | 1200 | 3211.2 | |
| M72X6 | 3459.75 | --- | --- | 920 | 3183.0 | 1060 | 3667.3 | --- | --- | --- | --- | 1200 | 4151.7 | |
| M80X6 | 4344.06 | --- | --- | 920 | 3996.5 | 1060 | 4604.7 | --- | --- | --- | --- | 1200 | 5212.9 | |
| M90X6 | 5590.82 | --- | --- | 920 | 5143.6 | 1060 | 5926.3 | --- | --- | --- | --- | 1200 | 6709.0 | |
| M100X6 | 6994.65 | --- | --- | 920 | 6435.1 | 1060 | 7414.3 | --- | --- | --- | --- | 1200 | 8393.6 | |

^APROOF LOADS ARE COMPUTED BY MULTIPLYING THE PROOF LOAD STRESS GIVEN IN THIS TABLE BY THE STRESS AREA OF THE THREAD.

^BSTRESS AREA, mm² = 0.7854 (D - 0.9382 P)², WHERE D = NOMINAL PRODUCT SIZE, mm, AND P = THREAD PITCH, mm.

CHEMICAL COMPOSITION OF EXTERNALLY (BOLTS/SCREWS/STUDS) THREADED FASTENERS (INCH THREAD SERIES)

| PRODUCT STANDARD | GRADE OR TYPE | TYPE OF STEEL | CHEMICAL COMPOSITION % (MAXIMUM) EXCEPT AS SHOWN | | | | | | | | | | | SUGG. GRADE | | |
|--------------------------------|---------------|---------------------|--|-----------|-----------|-------|-------|-----------|-----------|-----------|---|---|--------------|-------------|--|------------------|
| | | | C | Mn | Si | S | P | Cr | Ni | Mo | V | B | Cu | | | |
| ASTM A307-94 | A | PLAIN CARBON STEEL | | | | 0.150 | 0.060 | | | | | | | | | En-1A |
| | B | | | | | 0.050 | 0.040 | | | | | | | | | En-2 |
| ASTM A325-94 | 1 | PLAIN CARBON STEEL | 0.28-0.55 | 0.57 | 0.15-0.35 | 0.050 | 0.040 | | | | | | | | | En-5 |
| | 2 | CARBON BORON STEEL | 0.28-0.55 | 0.57 | | 0.045 | 0.040 | | | | | | 0.003-0.0005 | | | 15B35 |
| | 3 | WEATHERING STEEL | 0.31-0.42 | 0.86-1.24 | 0.15-0.35 | 0.055 | 0.045 | 0.42-0.68 | 0.22-0.48 | | | | | 0.22-0.48 | | Cu BEARING STEEL |
| ASTM A325M-94 | 1 | MEDIUM CARBON STEEL | 0.25-0.55 | 0.60-0.90 | 0.15-0.35 | 0.058 | 0.048 | | | | | | | | | En-5,8 |
| ASTM A394M-93 | 0 & 1 | | | | | | | | | | | | | | | En-9 |
| ASTM A325M-94 | 2 | CARBON BORON STEEL | 0.15-0.40 | 0.74 MIN. | 0.15-0.35 | | | | | | | | 0.0005 MIN. | | | 15B21 |
| ASTM A394M-93 | | | | | | | | | | | | | | | | |
| ASTM A325M-94 ASTM A394M-93 | 3 | WEATHERING STEEL | 0.31-0.42 | 0.86-1.24 | 0.15-0.35 | 0.055 | 0.045 | 0.42-0.68 | 0.22-0.48 | | | | | 0.22-0.48 | | Cu BEARING STEEL |
| | | | 0.14-0.26 | 0.36-1.14 | 0.25-0.50 | 0.055 | 0.045 | 0.45-1.05 | 0.47-0.83 | | | | | 0.27-0.63 | | |
| ASTM A354-95 | BC | MEDIUM CARBON STEEL | 0.28-0.55 | 1.30-1.70 | 0.15-0.35 | 0.045 | 0.040 | | | | | | | | | En-15, 37mn2 |
| | BD | ALLOY STEEL | 0.35-0.45 | 0.40-0.70 | 0.15-0.35 | 0.040 | 0.040 | 0.85-1.20 | | 0.25-0.35 | | | | | | En-18, En-110 |
| ASTM A449-93 | 1 | MEDIUM CARBON STEEL | 0.28-0.58 | 0.57 MIN. | | 0.058 | 0.048 | | | | | | | | | En-8,9 |
| | 2 | CARBON BORON STEEL | 0.13-0.41 | 0.67 MIN. | | 0.050 | 0.040 | | | | | | 0.0005 MIN. | | | 15B21 |
| ASTM A490-93 | 1 | ALLOY STEEL | 0.28-0.50 | 0.40-0.70 | 0.15-0.35 | 0.045 | 0.045 | 0.85-1.20 | | 0.25-0.35 | | | | | | En-18, En-110 |
| | 2 | CARBON BORON STEEL | 0.13-0.37 | 0.67 MIN. | 0.15-0.35 | 0.058 | 0.048 | | | | | | 0.0005 MIN. | | | 15B35 |
| | 3 | ALLOY STEEL | 0.19-0.55 | 0.37 MIN. | 0.15-0.35 | 0.055 | 0.045 | 0.42 MIN. | 0.17 MIN. | 0.14 MIN. | | | | 0.42 MAX. | | En-100 En-24 |
| ASTM A490M-93 | 1 | ALLOY STEEL | 0.28-0.50 | 0.40-0.70 | 0.15-0.35 | 0.045 | 0.045 | 0.85-1.20 | | | | | | | | En-18, En-110 |
| | 2 | CARBON BORON STEEL | 0.13-0.37 | 0.67 MIN. | 0.15-0.35 | 0.058 | 0.048 | | | | | | 0.0005 MIN. | | | 15B35 |
| | 3 | ALLOY STEEL | 0.19-0.55 | 0.37 MIN. | 0.15-0.35 | 0.055 | 0.045 | 0.42 MIN. | 0.17 MIN. | 0.14 MIN. | | | | 0.42 MAX. | | En-100 En-24 |

CHEMICAL AND MECHANICAL PROPERTIES OF INTERNALLY THREADED (NUTS) FASTENERS (INCH THREAD SERIES)

| PRODUCT STANDARD | GRADE OR TYPE | CHEMICAL COMPOSITION % (MAX) UNLESS OTHERWISE SPECIFIED | | | | | | | | | | MECHANICAL PROPERTIES | | | MARKING OF NUT | SUGG. GRADE OF STEEL | |
|------------------|---------------|---|-----------|-----------|------|-----------|-----------|-----------|----------|-----------|----------|-----------------------|------------------------|---------|----------------|----------------------|------------------|
| | | C | Mn | Si | S | P | Cr | Ni | Mo | Cu | HARDNESS | | PROOF LOAD STRESS, ksi | | | | |
| | | | | | | | | | | | BRINELL | ROCKWELL | | | | | |
| ASTM A563-94 | O,A,B | 0.55 | | | 0.15 | 0.12 | | | | | | | 121-352 | 69B-38C | 116 | NIL | En-1,3,5,8 |
| | C | 0.55 | | | 0.15 | 0.12 | | | | | | | 121-352 | 69B-38C | 116 | 3 MARK AT 120° | En-1,3,5,8 |
| | D | 0.55 | 0.30 MIN | | 0.05 | 0.04 | | | | | | | 159-352 | 84B-38C | 150 | D | En-3,5,8 |
| | DH | 0.20-0.55 | 0.6 | | 0.05 | 0.04 | | | | | | | 248-352 | 24-38C | 175 | DH | En-8,9 |
| | C3 | 0.38-0.48 | 0.70-0.90 | 0.30-0.50 | 0.05 | 0.06-0.12 | 0.50-0.75 | 0.50-0.80 | 0.06 | 0.20-0.40 | | | 143-352 | 78B-38C | 144 | MARK AT 120° & | Cu BEARING STEEL |
| | DH3 | 0.20-0.53 | 0.40 MIN | | 0.05 | 0.046 | 0.45 MIN | 0.20 MIN | 0.15 MIN | 0.20 MIN | | | 248-352 | 24-38C | 175 | DH3 | |



In applications where risk of intergranular corrosion is present, testing in accordance with ISO 3651-1 or ISO 3651-2 is recommended. In such cases, stabilized stainless steels A3 and A5 or stainless steels A2 or A4 with carbon content not exceeding 0.03% are recommended.

Table 1 - Stainless steel grades - Chemical composition

| Group | Grade | Chemical composition % (m/m) ¹⁾ | | | | | | | | | Notes |
|-------------|-----------|---|----|-----|-------|--------------|------------|--------|------------|--------------|--------|
| | | C | Si | Mn | P | S | Cr | Mo | Ni | Cu | |
| Austenitic | A1 | 0,12 | 1 | 6,5 | 0,2 | 0,15 to 0,35 | 16 to 19 | 0.7 | 5 to 10 | 1,75 to 2,25 | 2)3)4) |
| | A2 | 0,1 | 1 | 2 | 0,05 | 0,03 | 15 to 20 | - 5) | 8 to 19 | 4 | 7)8) |
| | A3 | 0,08 | 1 | 2 | 0,045 | 0,03 | 17 to 19 | - 5) | 9 to 12 | 1 | 9) |
| | A4 | 0,08 | 1 | 2 | 0,045 | 0,03 | 16 to 18.5 | 2 to 3 | 10 to 15 | 1 | 8) 10) |
| | A5 | 0,08 | 1 | 2 | 0,045 | 0,03 | 16 to 18.5 | 2 to 3 | 10,5 to 14 | 1 | 9) 10) |
| Martensitic | C1 | 0,09 to 0,15 | 1 | 1 | 0,05 | 0,03 | 11.5 to 14 | | 1 | | 10) |
| | C3 | 0,17 to 0,25 | 1 | 1 | 0,04 | 0,03 | 16 to 18 | | 1,5 to 2,5 | | |
| | C4 | 0,08 to 0,15 | 1 | 1.5 | 0,06 | 0,15 to 0,35 | 12 to 14 | 0,6 | 1 | | 2) 10) |
| Ferritic | F1 | 0,12 | 1 | 1 | 0,04 | 0,03 | 15 to 18 | - 6) | 1 | | 11 12) |

NOTES

- 1) A description of the groups and grades of stainless steels also entering into their specific properties and application is given in annex B.
- 2) Examples for stainless steels which are standardized in ISO 683-13 and in ISO 4954 are given in annexes C and D respectively.
- 3) Certain materials for specific application are given in annex E.

- 1) Values are maximum unless otherwise indicated.
- 2) Sulfur may be replaced by selenium.
- 3) If the nickel content is below 8 %, the minimum manganese content must be 5 %.
- 4) There is no minimum limit to the copper content provided that the nickel content is greater than 8 %.
- 5) Molybdenum may be present at the discretion of the manufacturer. However, if for some applications limiting of the molybdenum content is essential, this must be stated at the time of ordering by the purchaser.
- 6) Molybdenum may be present at the discretion of the manufacturer.
- 7) If the chromium content is below 17%, the minimum nickel content should be 12%.
- 8) For austenitic stainless steels having a maximum carbon content of 0.03%, nitrogen may be present to a maximum of 0.22%.
- 9) Must contain titanium $\geq 5 \times C$ upto 0,8% maximum for stabilization and be marked appropriately in accordance with this table, or must contain niobium (columbium) and/or tantalum $\geq 10 \times C$ upto 1,0% maximum for stabilization and be marked appropriately in accordance with this table.
- 10) At the discretion of the manufacturer the carbon content may be higher where required to obtain the specified mechanical properties at larger diameters, but shall not exceed 0,12 for austenitic steels.
- 11) May contain titanium $\geq 5 \times C$ up to 0,8% maximum.
- 12) May contain niobium (columbium) and/or tantalum $\geq 10 \times C$ upto 1% maximum.

Table 2 - Mechanical properties for bolts, screws and studs - Austenitic grades

| Group | Grade | Property Class | Thread diameter range | Tensile strength $R_m^{1)}$ min. N/mm ² | Stress at 0,2% permanent strain $R_{p0,2}^{2)}$ min. N/mm ² | Elongation after fracture $A^{2)}$ min. mm |
|------------|---------------------------|----------------|-----------------------|---|---|---|
| Austenitic | A1, A2, A3, A4, A5 | 50 | $\leq M39$ | 500 | 210 | 0,6 <i>d</i> |
| | | 70 | $\leq M24^{3)}$ | 700 | 450 | 0,4 <i>d</i> |
| | | 80 | $\leq M24^{3)}$ | 800 | 600 | 0,3 <i>d</i> |

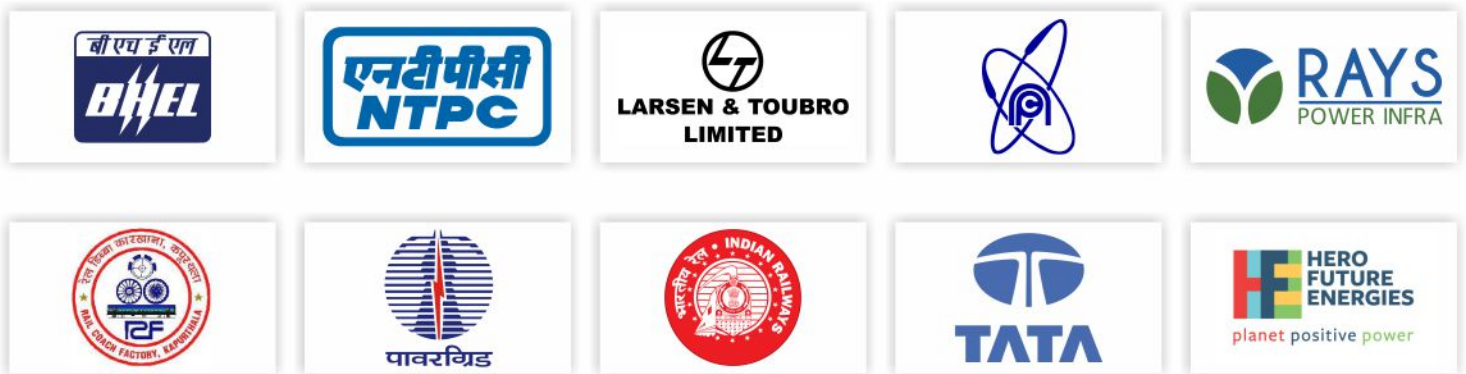
- 1) The tensile stress is calculated on the stress area (see annex A).
- 2) To be determined according to 6.2.4 on the actual screw length and not on a prepared test piece; *d* is the nominal thread diameter.
- 3) For fasteners with nominal thread diameters *d* > 24 mm the mechanical properties shall be agreed upon between user and manufacturer and marked with grade and property class according to this table.



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