



## THREADED ROD / STUD / BOLT / NUT / SCREW / WASHER

ASME SA 193 Grade B5, Grade B6, Grade B6X, Grade B7, Grade B7M, Grade B16  
 ASTM A 193 Grade B5, Grade B6, Grade B6X, Grade B7, Grade B7M, Grade B16  
 ASME SA 320 Grade L7, Grade L7M, Grade L43  
 ASTM A 320 Grade L7, Grade L7M, Grade L43  
 ASME SA 194 Grade 2H, Grade 2HM, Grade 3, Grade 4, Grade 7, Grade 7M, Grade 16  
 ASTM A 194 Grade 2H, 2HM, 3, 4, 7, 7M, 16  
 ASME SA 193 Grade B8, Grade B8M, Grade B8 Class 2, Grade B8M Class 2  
 ASTM A 193 Grade B8, B6M, B8 Class 2, B8M Class 2  
 ASME SA 320 Grade B8, Grade B8M, Grade B8 Class 2, Grade B8M Class 2  
 ASTM A 320 Grade B8, B8M, B8 Class 2, B8M Class 2  
 ASTM F1554 Grade 36, Grade 55, Grade 105 KSI Yield Strength Anchor Foundation Bolt  
 ASTM F1554-36, ASTM F1554-55, ASTM F1554-105 KSI Anchor Bolt for Concrete Foundations  
 High Tensile Bolts Grade 8.8, High Tensile Bolts Grade 10.9, High Tensile Bolts Grade 12.9  
 High Tensile Nuts Grade-8, High Tensile Nuts Grade-10, High Tensile Nuts Grade-12  
 ISO 898-1 Bolts, Screws, Studs Property Class / Grade 4.6, 4.8, 5.6, 5.8, 6.8, 8.8, 9.8, 10.9, 12.9  
 ISO 898-1 Bolt, Screw, Stud Property Class / Grade 4.6, 4.8, 5.6, 5.8, 6.8, 8.8, 9.8, 10.9, 12.9  
 ISO 898-2 Nuts Property Class / Grade 6, 8, 9, 10, 12 with specified Proof Load Value  
 ISO 898-2 Nut Property Class / Grade 6, 8, 9, 10, 12 with specified Proof Load Value  
 ISO 898-5 Screws, Threaded Fasteners Property Class / Grade 14H, 22H, 33H, 45H  
 ISO 898-5 Screw, Threaded Fastener Property Class / Grade 14H, 22H, 33H, 45H  
 ISO 898-6 Nuts Property Class / Grade 5, 6, 8, 10, 12 with specified Proof Load Value  
 ISO 898-6 Nut Property Class / Grade 5, 6, 8, 10, 12 with specified Proof Load Value  
 ISO 898-7 Bolts, Screws Property Class / Grade 8.8, 9.8, 10.9, 12.9  
 ISO 898-7 Bolt, Screw Property Class / Grade 8.8, 9.8, 10.9, 12.9  
 ASME SA453 / ASME SA453M Grade-660 UNS S66286 Class-A, Class-B, Class-C, Class-D  
 ASME SA453 / ASME SA453M Grade-651 UNS S63198 Class-A, Class-B  
 ASME SA453 / ASME SA453M Grade-662 UNS S66220 Class-A, Class-B  
 ASME SA453 / ASME SA453M Grade-665 UNS S66545 Class-A, Class-B  
 ASME SA453 / ASME SA453M Grade-668 UNS S66285 Class-A, Class-B

ASME SA540 / ASTM A540M Grade B21 (Cr-Ni-V) Class-1, Class-2, Class-3, Class-4, Class-5  
ASME SA540 / ASTM A540M Grade B22 (4142-H) Class-1, Class-2, Class-3, Class-4, Class-5  
ASME SA540 / ASTM A540M Grade B23 (E-4340-H) Class-1, Class-2, Class-3, Class-4, Class-5  
ASME SA540 / ASTM A540M Grade B24 (4340 Mod.) Class-1, Class-2, Class-3, Class-4, Class-5  
ASME SA540 / ASTM A540M Grade B24V (4340V Mod.) Class-1, Class-2, Class-3  
ASTM A437 / ASTM A437M Grade B4B, Grade B4C, Grade B4D  
ASME SA307, ASTM A307M, ASME SA307, ASME SA307M, ASTM A325, ASTM A325M, ASME SA325,  
ASME SA325M, ASTM A354, ASTM A354M, ASME SA354, ASME SA354M, ASTM A394, ASTM A394M,  
ASME SA394, ASME SA394M, ASTM A449, ASTM A449M, ASME SA449, ASME SA449M, ASTM A490,  
ASTM A490M, ASME SA490, ASME SA490M BOLTS, STUDS, SCREWS  
ASTM A563, ASTM A563M Grade O, A, B, C, D, DH, DH3 Carbon Steel & Alloy Steel Nuts  
ASME SA563, ASME SA563M Grade O, A, B, C, D, DH, DH3 Carbon Steel & Alloy Steel Nuts  
ASTM F436, ASTM F436M Type-1, Type-3 Hardened Steel Washers  
ASME SA 307 Grade A, B, C Carbon Steel Bolt and Stud 60000 PSI Tensile Strength  
ASTM A 307 Grade A, B, C Carbon Steel Bolt and Stud 60,000 PSI Tensile Strength  
ASME SA 194 Grade 8, Grade 8M, Grade 8F, Grade 8A, Grade 8C, Grade 6, Grade 310  
ASTM A 194 Grade 8, 8M, 8F, 8A, 8C, 6, 310  
Stainless Steel Carbide Solution Treated & Strain Hardened Threaded Bar, Rod, Stud  
Roll Threaded Bars, Roll Threaded Rods, Roll Threaded Studs  
Stainless Steel Austenitic Fastener Grade A1 (AISI 303) A2 (AISI 304), A4 (AISI 316)  
Fastener 303 A1-50, A1-70, A1-80, 304 A2-50, A2-70, A2-80, 316 A4-50, A4-70, A4-80  
B-8 Class-1 Stainless Steel AISI 304 / 304L Carbide Solution Treated  
B-8 Class-2 Stainless Steel AISI 304 / 304L Carbide Solution Treated, Strain Hardened  
B-8M Class-1 Stainless Steel AISI 316 / 316L Carbide Solution Treated  
B-8M Class-2 Stainless Steel AISI 316 / 316L Carbide Solution Treated, Strain Hardened  
B-8C Stainless Steel AISI 347 / 347H Carbide Solution Treated, Strain Hardened  
B-8T Stainless Steel AISI 321 / 321H Carbide Solution Treated, Strain Hardened  
B-8P Stainless Steel AISI 305 Carbide Solution Treated, Strain Hardened  
Threaded Rod / Threaded Bar DIN 975, Stud Bolt DIN 976  
Hexagon Bolt DIN 601, DIN 931, DIN 933, Hexagon Nut DIN 555, DIN 934  
SOCKET HEAD CAP SCREW, FLAT HEAD SOCKET SCREW, BUTTON HEAD CAP SCREW  
SOCKET HEAD SHOULDER SCREW, SQUARE HEAD SET SCREW, SOCKET SET SCREW  
LOW HEAD CAP SCREW, SELF DRILLING SCREW, SOCKET COUNTERSUNK HEAD SCREW  
HEX KEY / HEXAGONAL SOCKET KEY, PRESSURE PLUG, DOWEL PIN, PULL-OUT DOWEL PIN  
D.T.I Washer, Direct Tension Indicators, Direct Tension Indicator, Load Indicating Washer  
DTI Washer, DTI Compressible Washers, Load Indicator Washer, Direct Tension Indicating Washers  
D.T.I Washers, ASTM F959 DTI Washers, ASTM F959M DTI Washers, ASTM F959 Type 325 DTI Washers  
ASTM F959 Type 490 DTI Washers, ASTM F959 Type 325 D.T.I Washers, ASTM F959 Type 490 D.T.I Washers  
Plain Washer DIN 125, Stud Metal End DIN 938, DIN 939, DIN 940  
Flat Plain Washer, Square Flat Washer, Punch Washer, Taper Washer, Machine Washer  
Conical Washer, Doubled Coiled Spring Washer, Spring Lock Washer, Spring Washer  
Wave Spring Washer, Serrated Safety Washer (RIB Washer), Cylindrical Curved Washer  
Property Class : 4.6, 4.8, 5.6, 5.8, 6.8, 8.8, 9.8, 10.9, 12.9  
Make : UNBRAKO, CAPARO, TVS, LPS, UNK High Tensile Bolt, Screw & Nut  
Coating : Bright Zinc Plated, Hot Dip Galvanised, Phosphatided, Nickel Plated, BZP Cr3  
Coating : Yellow Zinc Plating, Blue Zinc Plating, White Zinc Plating, Black Oxide, BZP CR+3  
Coating : Cadmium Plating - Silver, Cadmium Plating - Yellow, XYLAN / PTFE, Fluoropolymer  
Coating : PTFE Coating, Fluoropolymer Coating, XYLAN Coating, Molybdenum Disulfide Coating  
Coating : Epoxy Coating, Phenolic Coating, Phosphate Coating, Polyurethane Coating  
Coating : Inorganic Zinc Coating, Polyphenylene Sulfide / Kyton Coating, FEP Coating  
Coating : PVDF & Kynar Coating, ECTFE / HALAR Coating, Ceramic Epoxy Coating  
Coating : TEFLON Coating, PTFE TEFLON Coating, HDG Hot Dip Galvanized Coating  
Coating : Cadmium Plating - Silver, Cadmium Plating - Yellow, XYLAN / PTFE, Fluoropolymer  
Treatments : Annealing, Solution Annealing, Normalizing, Blackodizing, Phosphating, Nitriding  
Cold Heading Quality Wire for Fastener - CHQ HB, HHB, SAE1006, SAE1008, SAE1010  
Cold Heading Quality Wire for Fastener - CHQ SAE1015, SAE1018, SAE1020, EN8, EN8D  
Cold Heading Quality Wire for Fastener - CHQ SAE1541, SAE1035, EN5K, 50CrV4, EN45, EN47  
Cold Heading Quality Wire for Fastener - CHQ SUP7, SUP9, SUP11, EN19, SAE4135, SAE4140  
Cold Heading Quality Wire for Fastener - CHQ SCM435, SCM440, EN18, 40Cr4, SAE 10B21  
Cold Heading Quality Wire for Fastener - CHQ SAE15B25, SAE15B41, SAE10B35, 19MnB4M  
Material : Nickel, Monel, Inconel, Incoloy, Hastelloy, Titanium, Alloy 904L, SMO254, Alloy 20, Sanicro 28  
Material : Duplex 2205 UNS S32205 UNS S31803 ASTM A182 F51 F60, Duplex 329 ASTM A182 F52  
Material : Super Duplex 2507 UNS S32750 ASTM A182 F53, UNS S32760 ASTM A182 F55 Din 1.4501  
Material : 22CrMo4, 24CrMo4, 25CrMo4, 26CrMo4, 34CrMo4, 42CrMo4, 34CrNiMo6, 41CrNiMo6  
Material : AISI 4130, SAE 4130, AISI 4140, SAE 4140, AISI 4145, SAE 4145, AISI 4340, SAE 4340  
Material : EN 8, EN 9, EN 19, EN 24 Condition : Normalised, Tempered, Quenched & Tempered

ASTM A193 / ASTM A193M Alloy Steel & Stainless Steel Bolting Materials for High-Temperature Service  
ASTM A193 / ASTM A193M Grade B5 (AISI 501)  
ASTM A193 / ASTM A193M Grade B6, B6X (AISI 410)  
ASTM A193 / ASTM A193M Grade B7, B7M (AISI 4140, AISI 4142, AISI 4145, AISI 4140H, AISI 4142H, AISI 4145H)  
ASTM A193 / ASTM A193M Grade B16  
ASTM A193 / ASTM A193M Grade B8, B8A (AISI 304, AISI 304L, AISI 304H)  
ASTM A193 / ASTM A193M Grade B8C, B8CA (AISI 347, AISI 347H)  
ASTM A193 / ASTM A193M Grade B8M, B8MA, B8M2, B8M3 (AISI 316, AISI 316L, AISI 316H)  
ASTM A193 / ASTM A193M Grade B8P, B8PA (AISI 305)  
ASTM A193 / ASTM A193M Grade B8N, B8NA (AISI 304N)  
ASTM A193 / ASTM A193M Grade B8MN, B8MNA (AISI 316N)  
ASTM A193 / ASTM A193M Grade B8MLCuN, B8MLCuNA  
ASTM A193 / ASTM A193M Grade B8T, B8TA (AISI 321, AISI 321H)  
ASTM A193 / ASTM A193M Grade B8A, B8RA

ASTM A193 / ASTM A193M Grade B8S, B8SA  
ASTM A193 / ASTM A193M Grade B8LN, B8LNA (AISI 304N, AISI 304LN)  
ASTM A193 / ASTM A193M Grade B8MLN, B8MLNA (AISI 316N, AISI 316LN)

ASME SA193 / ASME SA193M Alloy Steel & Stainless Steel Bolting Materials for High-Temperature Service

ASME SA193 / ASME SA193M Grade B5 (AISI 501)  
ASME SA193 / ASME SA193M Grade B6, B6X (AISI 410)  
ASME SA193 / ASME SA193M Grade B7, B7M (AISI 4140, AISI 4142, AISI 4145, AISI 4140H, AISI 4142H, AISI 4145H)  
ASME SA193 / ASME SA193M Grade B16  
ASME SA193 / ASME SA193M Grade B8, B8A (AISI 304, AISI 304L, AISI 304H)  
ASME SA193 / ASME SA193M Grade B8C, B8CA (AISI 347, AISI 347H)  
ASME SA193 / ASME SA193M Grade B8M, B8MA, B8M2, B8M3 (AISI 316, AISI 316L, AISI 316H)  
ASME SA193 / ASME SA193M Grade B8P, B8PA (AISI 305)  
ASME SA193 / ASME SA193M Grade B8N, B8NA (AISI 304N)  
ASME SA193 / ASME SA193M Grade B8MN, B8MNA (AISI 316N)  
ASME SA193 / ASME SA193M Grade B8MLCuN, B8MLCuNA  
ASME SA193 / ASME SA193M Grade B8T, B8TA (AISI 321, AISI 321H)  
ASME SA193 / ASME SA193M Grade B8A, B8RA  
ASME SA193 / ASME SA193M Grade B8S, B8SA  
ASME SA193 / ASME SA193M Grade B8LN, B8LNA (AISI 304N, AISI 304LN)  
ASME SA193 / ASME SA193M Grade B8MLN, B8MLNA (AISI 316N, AISI 316LN)

ASTM A194 / ASTM A194M Carbon Steel, Alloy Steel & Stainless Steel Nuts for Bolts for High-Pressure & High-Temperature Service

ASTM A194 / ASTM A194M Grade 1 (Carbon Steel)  
ASTM A194 / ASTM A194M Grade 2, Grade 2HM, Grade 2H (Carbon Steel)  
ASTM A194 / ASTM A194M Grade 4 (Carbon Molybdenum Steel)  
ASTM A194 / ASTM A194M Grade 3 (AISI 501)  
ASTM A194 / ASTM A194M Grade 6 (AISI 410)  
ASTM A194 / ASTM A194M Grade 6F (AISI 416)  
ASTM A194 / ASTM A194M Grade 7, Grade 7M (AISI 4140, AISI 4142, AISI 4145, AISI 4140H, AISI 4142H, AISI 4145H)  
ASTM A194 / ASTM A194M Grade 8, Grade 8A (AISI 304, AISI 304L, AISI 304H)  
ASTM A194 / ASTM A194M Grade 8C, Grade 8CA (AISI 347, AISI 347H)  
ASTM A194 / ASTM A194M Grade 8M, Grade 8MA (AISI 316, AISI 316L, AISI 316H)  
ASTM A194 / ASTM A194M Grade 8T, Grade 8TA (AISI 321, AISI 321H)  
ASTM A194 / ASTM A194M Grade 8F, Grade 8FA (AISI 303)  
ASTM A194 / ASTM A194M Grade 8P, Grade 8PA (AISI 305)  
ASTM A194 / ASTM A194M Grade 8N, Grade 8NA (AISI 304N)  
ASTM A194 / ASTM A194M Grade 8LN, Grade 8LNA (AISI 304LN)  
ASTM A194 / ASTM A194M Grade 8MN, Grade 8MNA (AISI 316N)  
ASTM A194 / ASTM A194M Grade 8MLN, Grade 8MLNA (AISI 316LN)  
ASTM A194 / ASTM A194M Grade 8R, Grade 8RA (XM19 Nitronic-50)  
ASTM A194 / ASTM A194M Grade 8S, Grade 8SA  
ASTM A194 / ASTM A194M Grade 8MLCuN, Grade 8MLCuNA (UNS S31254 SMO254)  
ASTM A194 / ASTM A194M Grade 16 (Chromium Molybdenum Vanadium Steel)

ASME SA194 / ASME SA194M Carbon Steel, Alloy Steel & Stainless Steel Nuts for Bolts for High-Pressure & High-Temperature Service

ASME SA194 / ASME SA194M Grade-1 (Carbon Steel)  
ASME SA194 / ASME SA194M Grade-2, Grade-2HM, Grade-2H (Carbon Steel)  
ASME SA194 / ASME SA194M Grade-4 (Carbon Molybdenum Steel)  
ASME SA194 / ASME SA194M Grade-3 (AISI 501)  
ASME SA194 / ASME SA194M Grade-6 (AISI 410)  
ASME SA194 / ASME SA194M Grade-6F (AISI 416)  
ASME SA194 / ASME SA194M Grade-7, Grade-7M (AISI 4140, AISI 4142, AISI 4145, AISI 4140H, AISI 4142H, AISI 4145H)  
ASME SA194 / ASME SA194M Grade-8, Grade-8A (AISI 304, AISI 304L, AISI 304H)  
ASME SA194 / ASME SA194M Grade-8C, Grade-8CA (AISI 347, AISI 347H)  
ASME SA194 / ASME SA194M Grade-8M, Grade-8MA (AISI 316, AISI 316L, AISI 316H)  
ASME SA194 / ASME SA194M Grade-8T, Grade-8TA (AISI 321, AISI 321H)  
ASME SA194 / ASME SA194M Grade-8F, Grade-8FA (AISI 303)  
ASME SA194 / ASME SA194M Grade-8P, Grade-8PA (AISI 305)  
ASME SA194 / ASME SA194M Grade-8N, Grade-8NA (AISI 304N)  
ASME SA194 / ASME SA194M Grade-8LN, Grade-8LNA (AISI 304LN)  
ASME SA194 / ASME SA194M Grade-8MN, Grade-8MNA (AISI 316N)  
ASME SA194 / ASME SA194M Grade-8MLN, Grade-8MLNA (AISI 316LN)  
ASME SA194 / ASME SA194M Grade-8R, Grade-8RA (XM19 Nitronic-50)  
ASME SA194 / ASME SA194M Grade-8S, Grade-8SA  
ASME SA194 / ASME SA194M Grade-8MLCuN, Grade-8MLCuNA (UNS S31254 SMO254)  
ASME SA194 / ASME SA194M Grade-16 (Chromium Molybdenum Vanadium Steel)

DIN 906 - Hexagon Socket Pipe Plugs  
DIN 908 - Hexagon Socket Screw Plugs  
DIN 910 - Hexagon Head Screw Plugs  
DIN 911 - Hexagon Socket Screw Keys

DIN 912 - Socket Head Cap Screws  
DIN 913 - Socket Set Screws with Flat Point  
DIN 914 - Socket Set Screws with Cone Point  
DIN 915 - Socket Set Screws with Dog Point  
DIN 916 - Socket Set Screws with Cup Point  
DIN 917 - Hexagon Cup Nuts - Low Pattern  
DIN 920 - Slotted Pan Head Screws, Small Head  
DIN 923 - Slotted Pan Head Screws with Shoulder  
DIN 927 - Slotted Shoulder Screws  
DIN 928 - Square Weld Nuts  
DIN 929 - Hexagon Weld Nuts  
DIN 931 - Hexagon Cap Screws Partially Threaded  
DIN 933 - Hexagon Cap Screws Fully Threaded  
DIN 933 Sz - Hexagon Cap Screws with Slot  
DIN 934 - Hexagon Nuts - 0,8d  
DIN 935 - Castle Nuts  
DIN 936 - Hexagon Jam Nuts  
DIN 937 - Hexagon Thin Slotted and Castle Nuts  
DIN 939 - Studs, Tap End - 1,25d  
DIN 960 - Hex Cap Screws, Metric Fine Thread - Part Thread  
DIN 961 - Hex Cap Screws, Metric Fine Thread - Full Thread  
DIN 963 A- Slotted Flat Head Machine Screws  
DIN 964 A- Slotted Oval Head Machine Screws  
DIN 965 A - Cross Recessed Flat Head Machine Screws  
DIN 966 A - Cross Recessed Oval Head Machine Screws  
DIN 980 V - Self-Locking Nuts; All Metal Construction  
DIN 982 - Self-Locking Nuts w/nylon Insert: Heavy Series  
DIN 985 - Self Locking Nuts w/locking Insert: Standard Series  
DIN 986 - Self Locking Domed Cap Nuts with Nylon Insert  
DIN 988 - Shim Washers

#### ASME Fasteners

ASME SA193 : Alloy & Stainless Steel Bolting Material for High Temperature  
ASME SA193M : Alloy & Stainless Steel Bolting Material for High Temperature  
ASME SA194 : Alloy & Stainless Steel Nuts for High Temperature  
ASME SA194M : Alloy & Stainless Steel Nuts for High Temperature  
ASME SA307 : Carbon Steel Externally Threaded Fasteners  
ASME SA307M : Carbon Steel Externally Threaded Fasteners  
ASME SA320 : Alloy & Stainless Steel Bolting for Low Temperature  
ASME SA320M : Alloy & Stainless Steel Bolting for Low Temperature  
ASME SA325 : High Strength Bolts for Structural Joints  
ASME SA325M : High Strength Bolts for Structural Joints  
ASME SA354 : Quenched & Tempered Alloy Steel Bolts, Studs & Other Fasteners  
ASME SA354M : Quenched & Tempered Alloy Steel Bolts, Studs & Other Fasteners  
ASME SA437 : Alloy Steel turbine Bolting Specially Heat Treated for High Temperature  
ASME SA437M : Alloy Steel turbine Bolting Specially Heat Treated for High Temperature  
ASME SA449 : Quenched & Tempered Bolts & Studs  
ASME SA449M : Quenched & Tempered Bolts & Studs  
ASME SA453 : Bolting Material, High Temperature 50 to 120 ksi Yield Strength  
ASME SA453M : Bolting Material, High Temperature 50 to 120 ksi Yield Strength  
ASME SA489 : Carbon Steel Eyebolts  
ASME SA489M : Carbon Steel Eyebolts  
ASME SA490 : Heat Treated Structural Bolts, 150 ksi Tensile Strength  
ASME SA490M : Heat Treated Structural Bolts, 150 ksi Tensile Strength  
ASME SA540 : Alloy Steel Bolting for Special Applications  
ASME SA540M : Alloy Steel Bolting for Special Applications  
ASME SA563 : Carbon & Alloy Steel Nuts  
ASME SA563M : Carbon & Alloy Steel Nuts  
ASME SA574 : Alloy Steel Socket Head Cap Screws  
ASME SA574M : Alloy Steel Socket Head Cap Screws  
ASME SA687 : High Strength Non Headed Steel Bolts & Studs  
ASME SA687M : High Strength Non Headed Steel Bolts & Studs  
ASME F436 : Hardened Flat Washers  
ASME F436M : Hardened Flat Washers  
ASME F467 : Nonferrous Nuts for General Use  
ASME F467M : Nonferrous Nuts for General Use  
ASME F468 : Nonferrous Bolts, Cap Screws, & Studs for General Use  
ASME F468M : Nonferrous Bolts, Cap Screws, & Studs for General Use  
ASME F541 : Alloy Steel Eyebolts  
ASME F541M : Alloy Steel Eyebolts  
ASME F568 : Carbon & Alloy Steel Metric Fasteners  
ASME F568M : Carbon & Alloy Steel Metric Fasteners  
ASME F593 : Stainless Steel Bolts, Cap Screws & Studs  
ASME F593M : Stainless Steel Bolts, Cap Screws & Studs  
ASME F594 : Stainless Steel Nuts  
ASME F594M : Stainless Steel Nuts  
ASME F738 : Stainless Steel Metric Bolts, Screws & Studs  
ASME F738M : Stainless Steel Metric Bolts, Screws & Studs

ASME F835 : Metric Socket Head Cap Screws  
 ASME F835M : Metric Socket Head Cap Screws  
 ASME F836 : Metric Stainless Steel Nuts  
 ASME F836M : Metric Stainless Steel Nuts  
 ASME F844 : Steel Washers for General Use  
 ASME F844M : Steel Washers for General Use

**ASTM Fasteners**

ASTM A193 : Alloy & Stainless Steel Bolting Material for High Temperature  
 ASTM A193M : Alloy & Stainless Steel Bolting Material for High Temperature  
 ASTM A194 : Alloy & Stainless Steel Nuts for High Temperature  
 ASTM A194M : Alloy & Stainless Steel Nuts for High Temperature  
 ASTM A307 : Carbon Steel Externally Threaded Fasteners  
 ASTM A307M : Carbon Steel Externally Threaded Fasteners  
 ASTM A320 : Alloy & Stainless Steel Bolting for Low Temperature  
 ASTM A320M : Alloy & Stainless Steel Bolting for Low Temperature  
 ASTM A325 : High Strength Bolts for Structural Joints  
 ASTM A325M : High Strength Bolts for Structural Joints  
 ASTM A354 : Quenched & Tempered Alloy Steel Bolts, Studs & Other Fasteners  
 ASTM A354M : Quenched & Tempered Alloy Steel Bolts, Studs & Other Fasteners  
 ASTM A437 : Alloy Steel turbine Bolting Specially Heat Treated for High Temperature  
 ASTM A437M : Alloy Steel turbine Bolting Specially Heat Treated for High Temperature  
 ASTM A449 : Quenched & Tempered Bolts & Studs  
 ASTM A449M : Quenched & Tempered Bolts & Studs  
 ASTM A453 : Bolting Material, High Temperature 50 to 120 ksi Yield Strength  
 ASTM A453M : Bolting Material, High Temperature 50 to 120 ksi Yield Strength  
 ASTM A489 : Carbon Steel Eyebolts  
 ASTM A489M : Carbon Steel Eyebolts  
 ASTM A490 : Heat Treated Structural Bolts, 150 ksi Tensile Strength  
 ASTM A490M : Heat Treated Structural Bolts, 150 ksi Tensile Strength  
 ASTM A540 : Alloy Steel Bolting for Special Applications  
 ASTM A540M : Alloy Steel Bolting for Special Applications  
 ASTM A563 : Carbon & Alloy Steel Nuts  
 ASTM A563M : Carbon & Alloy Steel Nuts  
 ASTM A574 : Alloy Steel Socket Head Cap Screws  
 ASTM A574M : Alloy Steel Socket Head Cap Screws  
 ASTM A687 : High Strength Non Headed Steel Bolts & Studs  
 ASTM A687M : High Strength Non Headed Steel Bolts & Studs  
 ASTM F436 : Hardened Flat Washers  
 ASTM F436M : Hardened Flat Washers  
 ASTM F467 : Nonferrous Nuts for General Use  
 ASTM F467M : Nonferrous Nuts for General Use  
 ASTM F468 : Nonferrous Bolts, Cap Screws, & Studs for General Use  
 ASTM F468M : Nonferrous Bolts, Cap Screws, & Studs for General Use  
 ASTM F541 : Alloy Steel Eyebolts  
 ASTM F541M : Alloy Steel Eyebolts  
 ASTM F568 : Carbon & Alloy Steel Metric Fasteners  
 ASTM F568M : Carbon & Alloy Steel Metric Fasteners  
 ASTM F593 : Stainless Steel Bolts, Cap Screws & Studs  
 ASTM F593M : Stainless Steel Bolts, Cap Screws & Studs  
 ASTM F594 : Stainless Steel Nuts  
 ASTM F594M : Stainless Steel Nuts  
 ASTM F738 : Stainless Steel Metric Bolts, Screws & Studs  
 ASTM F738M : Stainless Steel Metric Bolts, Screws & Studs  
 ASTM F835 : Metric Socket Head Cap Screws  
 ASTM F835M : Metric Socket Head Cap Screws  
 ASTM F836 : Metric Stainless Steel Nuts  
 ASTM F836M : Metric Stainless Steel Nuts  
 ASTM F844 : Steel Washers for General Use  
 ASTM F844M : Steel Washers for General Use

**Standard / Norm Parts**

A wide assortment of standard articles can be made available worldwide, to effectively meet customers' cost, quality and time requirements. Some of the established standards are mentioned below.

Description	STANDARDS				RANGE	
	DIN	ISO	ANSI/ASME	BS	METRIC	INCHES
Hexagon fit bolts	609 / 610				M6 TO M36	
Pipe / Screw plugs	906 / 908 / 910		B.1.20.3			

Hexagon socket head cap screws	912	4762	B.18.3	2470	M4 TO M24	#10 TO 1"
Hexagon bolts and screws	931 / 933	4017 / 4014	B.18.2.1	1768 / 1083	M6 TO M36	1/4" TO 1 1/4"
Parallel pins	6325	8734	B.18.8.2		Ø3 to Ø25	Ø1/8" TO Ø1"
Hexagon flange bolts	6921				M4 TO M16	
Hexagon socket head shoulder screws		7379	B.18.3		Ø5 to Ø36	Ø3/16" TO Ø1.1/2"
Hexagon socket button head screws		7380	B.18.3		M3 TO M16	#10 TO 5/8"
Hexagon socket button head screws, with flange					M4 TO M12	
Hexagon socket head cap screws, low head	7984		B.18.3		M5 TO M20	1/4" TO 3/4"
Parallel pins with internal thread	7979		B.18.8.2		Ø6 to Ø25	Ø1/4" TO Ø1"
Hexagon socket countersunk head screws	7991	10642	B.18.3	2470	M3 TO M24	#10 TO 1"
Stud and Special Screws						
Six Lobe Screws					M4 TO M10	

### Stainless Steel Parts

In our endeavour to offer one stop solution to customers. we offers stainless steel components for the Norm parts and Parts by drawing.

Description	STANDARDS				RANGE	
	DIN	ISO	ANSI/ASME	BS	METRIC	INCHES
Parallel pins	7	2338	B.18.8.2		Ø3 TO Ø16	Ø1/8" TO 5/8"
Square head bolts	479		B.18.6.2		M4 TO M20	1/4" TO 3/4"
Hexagon fit bolts	609 / 610				M6 TO M20	
Screw plugs	908 / 910					
Hexagon socket head cap screws	912	4762	B.18.3		M4 TO M16	1/4" TO 5/8"
Hexagon socket head shoulder screws		7379	B.18.3		Ø5 TO Ø24	Ø1/8" TO Ø1"
Hexagon socket button head screws		7380	B.18.3		M3 TO M16	#10 TO 5/8"
Hexagon socket button head screws, with flange					M4 TO M12	
Hexagon socket countersunk head screws	7991	10642	B.18.3		M3 TO M16	#10 TO 5/8"

## HEAT-TREATED ALLOY STUDS, BOLTS THREADED BARS & RODS

Chemical Composition

Elements	A354 Grades BC, BD		A193 Grade B7	
	**See Note Below		Chromium-Molybdenum	
	Range percent	Check variation over percent	Range percent	Check variation over or under percent
Carbon...	--	--	*0.38-0.48	0.02
Manganese...	--	--	0.750-1.00	0.04
Phosphorus, max...	0.04	0.005	0.04	0.005 over
Sulphur, max...	0.04	0.005	0.04	0.005 over
Silicon...	--	--	0.20-0.35	0.02

Chromium...	--	--	0.80-1.10	0.05
Molybdenum...	--	--	0.15-0.25	0.02

Elements	A193 Grade B16 Chromium-Molybdenum-Vanadium	
	Range percent	Check variation over or under percent
Carbon...	0.36-0.44	0.02
Manganese...	0.45-0.70	0.03
Phosphorus, max...	0.04	0.005 over
Sulphur, max...	0.04	0.005 over
Silicon...	0.20-0.35	0.02
Chromium...	0.80-1.15	0.05
Molybdenum...	0.50-0.65	0.03
Vanadium...	0.25-0.35	0.03

Elements	A320 Grade L7		A320 Grade L43	
	Chromium-Molybdenum (AISI 4140, 4142, 4145)		Nickel-Chromium-Molybdenum (AISI 4340)	
	Range percent	Check variation over percent	Range percent	Check variation over or under percent
Carbon...	*0.38-0.48	0.02	0.38-0.148	0.02
Manganese...	0.75-1.00	0.04	0.60-0.85	0.03
Phosphorus, max...	0.04	0.005 over	0.04	0.005 over
Sulphur, max...	0.04	0.005 over	0.04	0.005 over
Silicon...	0.20-0.35	0.02	0.20-0.35	0.02
Nickel...	--	--	1.65-2.00	0.05
Chromium...	0.80-1.10	0.05	0.70-1.90	0.03
Molybdenum...	0.15-0.25	0.02	0.20-0.30	0.02

\*For bar sizes over 3-1/2 in. to 4 in., inclusive, the carbon content may be 0.50 pct. max.

\*\* Any alloy steel capable of meeting the tensile requirements of Specification A354 may be used.

**Tensile Requirements**

Grade	Diameter, in.	Min tempering temp F	Tensile strength min psi	Yield point min psi	Elongation in 2 in. min pct	Reduction of area min pct
A354 Grade BC	{2-1/2 and under {Over 2-1/2 to 4 incl.	850	125,000	109,000	16	50
A354 Grade BD	1-1/2 and under	850	115,000	99,000	16	45
A193 Grade B7 Chromium- Molybdenum	{2-1/2 and under {Over 2-1/2 to 4 incl. {Over 4 to 7 incl.	850	150,000	125,000	14	35
A193 Grade B16 Chromium- Molybdenum- Vanadium	{2-1/2 and under {Over 2-1/2 to 4 incl. {Over 4 to 7 incl.	1100 1100 1100	125,000 115,000 100,000	105,000 95,000 75,000	16 16 18	50 50 50
A320 Grade L7 Chromium- Molybdenum	2-1/2 and under	--	125,000	105,000	16	50
A320 Grade L43 Nickel-Chromium- Molybdenum	4 and under	--	125,000	105,000	16	50

Commonly used are the following grades of heat-treated alloy steel for high-pressure or extreme temperature service in diameters of 1/2 in. to 2 in., inclusive. Other grades and other diameters are available on special order.

**ASTM A354, Grades BC and BD** - heat-treated alloy steels for applications at normal atmospheric temperatures where high strength is required.







**ASTM A193, Grade B7** - a heat-treated chromium-molybdenum steel widely used for medium high-temperature service.

**ASTM A193, Grade B16** - a heat-treated chromium-molybdenum-vanadium steel for high-pressure, high-temperature service.












**ASTM A320, Grade L7** - This grade is intended for low-temperature service down to minus 150°F and has a minimum Charpy impact value of 15 ft-lb at this temperature. Sizes 2-1/2 in. and under.












**ASTM A320, Grade L43** - The same properties offered by Grade L7 in sizes up to 2-1/2 are obtainable up to 4 in. in Grade L43












# ASTM, SAE AND ISO GRADE MARKINGS AND MECHANICAL PROPERTIES FOR STEEL FASTENERS









Identification Grade Mark	Specification	Fastener Description	Material	Nominal Size Range (in.)	Mechanical Properties		
					Proof Load (psi)	Yield Strength Min (psi)	Tensile Strength Min (psi)
 No Grade Mark	SAE J429 Grade 1	Bolts, Screws, Studs	Low or Medium Carbon Steel	1/4 thru 1-1/2	33,000	36,000	60,000
	ASTM A307 Grades A&B		Low Carbon Steel	1/4 thru 4	--	--	
	SAE J429 Grade 2		Low or Medium Carbon Steel	1/4 thru 3/4 Over 3/4 to 1-1/2	55,000 33,000	57,000 36,000	74,000 60,000
 No Grade Mark	SAE J429 Grade 4	Studs	Medium Carbon Cold Drawn Steel	1/4 thru 1-1/2	--	100,000	115,000
 B5	ASTM A193 Grade B5		AISI 501	1/4 Thru 4	--	80,000	100,000
 B6	ASTM A193 Grade B6		AISI 410			85,000	110,000
 B7	ASTM A193 Grade B7		AISI 4140, 4142, OR 4105	1/4 thru 2-1/2 Over 2-1/2 thru 4 Over 4	-- -- --	105,000 95,000 75,000	125,000 115,000 100,000
 B16	ASTM A193 Grade B16		CrMoVa Alloy Steel	thru 7		105,000 95,000 85,000	125,000 115,000 100,000




 B8	ASTM A193 Grade B8		AISI 304				
 B8C	ASTM A193 Grade B8C		AISI 347	1/4 and larger	--	30,000	75,000
 B8M	ASTM A193 Grade B8M		AISI 316				
 B8T	ASTM A193 Grade B8T		AISI 321	1/4 and larger	--	30,000	75,000
 B8	ASTM A193 Grade B8	Bolts, Screws, Studs for High- Temperature Service	AISI 304 Strain Hardened	1/4 thr 3/4 Over 3/4 thru 1 Over 1 thru 1-1/4 Over 1-1/4 thru 1-1/2	-- -- -- --	100,000	125,000
 B8C	ASTM A193 Grade B8C		AISI 347 Strain Hardened			80,000	115,000
 B8M	ASTM A193 Grade B8M		AISI 316 Strain Hardened			65,000	105,000
 B8T	ASTM A193 Grade B8T		AISI 321 Strain Hardened			50,000	100,000
 L7	ASTM A320 Grade L7		Bolts, Screws, Studs for Low- Temperature Service			AISI 4140, 4142 or 4145	1/4 thru 2- 1/2
 L7A	ASTM A320 Grade L7A	AISI 4037					
 L7B	ASTM A320 Grade L7B	AISI 4137					

 L7C	ASTM A320 Grade LC7		AISI 8740								
 L43	ASTM A320 Grade L43		AISI 4340	1/4 thru 4	--	105,000	125,000				
 B8	ASTM A320 Grade B8	Bolts, Screws, Studs for Low- Temperature Service	AISI 304	1/4 and larger	--	30,000	75,000				
 B8C	ASTM A320 Grade B8C		AISI 347								
 B8T	ASTM A320 Grade B8T		AISI 321								
 B8F	ASTM A320 Grade B8F		AISI 303 or 303Se								
 B8M	ASTM A320 Grade B8M		AISI 316								
 B8	ASTM A320 Grade B8		AISI 304					1/4 thru 3/4 Over 3/4 thru 1 Over 1 thru 1-1/4 Over 1-1/4 thru 1-1/2	-- -- -- --	100,000 80,000 65,00 50,00	100,000 80,000 65,00 50,00
 B8C	ASTM A320 Grade B8C		AISI 347								
 B8F	ASTM A320 Grade B8F		AISI 303 or 303Se								
 B8M	ASTM A320 Grade B8M		AISI 316								

 B8T	ASTM A320 Grade B8T		AISI 321				
	SAE J429 Grade 5	Bolts, Screws, Studs	Medium Carbon Steel, Quenched and Tempered	1/4 thru 1 Over 1 to 1-1/2	85,000 74,000	92,000 81,000	120,000 105,000
	ASTM A449			1/4 thru 1 Over 1 to 1-1/2 Over 1-1/2 thru 3	85,000 74,000 55,000	92,000 81,000 58,000	120,000 105,000 90,000
	SAE J429 Grade 5.1	Sems	Low or Medium Carbon Steel, Quenched and Tempered	No. 6 thru 3/8	85,000	--	120,000
	SAE J429 Grade 5.2	Bolts, Screws, Studs	Low Carbon Martensitic Steel, Quenched and Tempered	1/4 thru 1	85,000	92,000	120,000
 A325	ASTM A325 Type 1	High Strength Structural Bolts	Medium Carbon Steel, Quenched and Tempered	1/2 thru 1 1-1/8 thru 1-1/2	85,000 74,000	92,000 81,000	120,000 105,000
 A325	ASTM A325 Type 2		Low Carbon Martensitic Steel, Quenched and Tempered	1/2 thru 1	85,000	92,000	120,000
 A325	ASTM A325 Type 3		Atmospheric Corrosion Resisting Steel, Quenched and Tempered	1/2 thru 1 1-1/8 thru 1-1/2	85,000 74,000	92,000 81,000	120,000 105,000
 BB	ASTM A354 Grade BB	Bolts, Studs	Alloy Steel, Quenched and Tempered	1/4 thru 2- 1/2	80,000 75,000	83,000 78,000	105,000 100,000
 BC	ASTM A354 Grade BC			2-3/4 thru 4	105,000 95,000	109,000 99,000	125,000 115,000
	SAE J429 Grade 7	Bolts, Screws,	Medium Carbon Alloy Steel, Quenched and Tempered <sup>4</sup>	1/4 thru 1- 1/2	105,000	115,000	133,000
	SAE J429 Grade 8	Bolts, Screws, Studs	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 1- 1/2	120,000	130,000	150,000
	ASTM A354 Grade BD		Alloy Steel, Quenched and Tempered <sup>4</sup>				

 No Grade Mark	SAE J429 Grade 8.1	Studs	Medium Carbon Alloy or SAE 1041 Modified Elevated Temperature Drawn Steel	1/4 thru 1-1/2	120,000	130,000	150,000
 A490	ASTM A490	High Strength Structural Bolts	Alloy Steel, Quenched and Tempered	1/2 thru 1-1/2	120,000	130,000	150,000 min 170,000 max
 No Grade Mark	ISO R898 Class 4.6	Bolts, Screws, Studs	Medium Carbon Steel, Quenched and Tempered	All Sizes thru 1-1/2	33,000	36,000	60,000
 No Grade Mark	ISO R898 Class 5.8				55,000	57,000	74,000
8.8  or  8.8	ISO R898 Class 8.8				85,000	92,000	120,000
10.9  or  10.9	ISO R898 Class 10.9				120,000	130,000	150,000
					Alloy Steel, Quenched and Tempered		

## FASTENER IDENTIFICATION MARKING

Grade Identification Marking	Specification	Material	Nominal Size In.	Proof Load Stress ksi	Hardness Rockwell		See Note
					Min	Max	
 No Mark	ASTM A563 - Grade 0	Carbon Steel	1/4 thru 1-1/2	69	B55	C32	3,4
	ASTM A563 - Grade A	Carbon Steel	1/4 thru 1-1/2	90	B68	C32	3,4
	ASTM A563 - Grade B	Carbon Steel	1/4 thru 1 over 1 thru 1-1/2	120 105	B69	C32	3,4

	ASTM A563 - Grade C	Carbon Steel May be Quenched and Tempered	1/4 thru 4	144	B78	C38	5
	ASTM A563 - Grade C3	Atmospheric Corrosion Resistant Steel May be Quenched and Tempered	1/4 thru 4	144	B78	C38	5,9
	ASTM A563 - Grade D	Carbon Steel May be Quenched and Tempered	1/4 thru 4	150	B84	C38	6
	ASTM A563 - Grade DH	Carbon Steel Quenched and Tempered	1/4 thru 4	175	C24	C38	6
	ASTM A563 - Grade DH3	Atmospheric Corrosion Resistant Steel, Quenched and Tempered	1/4 thru 4	175	C24	C38	5,9
	ASTM A194 - Grade 1	Carbon Steel	1/4 thru 4	130	B70	--	7
	ASTM A194 - Grade 2	Medium Carbon Steel	1/4 thru 4	150	159	352	7,8
	ASTM A194 - Grade 2H	Medium Carbon Steel, Quenched and Tempered	1/4 thru 4	175	C24	C38	7
	ASTM A194 - Grade 2HM	Medium Carbon Steel, Quenched and Tempered	1/4 thru 4	150	159	237	7,8
	ASTM A194 - Grade 4	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 4	175	C24	C38	7
	ASTM A194 - Grade 7	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 4	175	C24	C38	7
	ASTM A194 - Grade 7M	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 4	150	159	237	7
See Note 1,2	10						

**NOTES:**

1. In addition to the indicated grade marking, all grades, except A563 grades O, A and B, must be marked for manufacturer identification.

2. The markings shown for all grades of A194 nuts are for cold formed and hot forged nuts. When nuts are machined from bar stock the nut must be additionally marked with the letter 'B'.
3. Nuts are not required to be marked unless specified by the purchaser. When marked, the identification marking shall be the grade letter O, A or B.
4. Properties shown are those of nonplated or noncoated coarse thread hex nuts.
  5. Properties shown are those of coarse thread heavy hex nuts.
  6. Properties shown are those of coarse thread heavy hex nuts.
  7. Properties shown are those of coarse 8-pitch thread heavy hex nuts.
  8. Hardnesses are Brinell Hardness Numbers.
9. The nut manufacturer, at his option, may add other markings to indicate the use of atmospheric corrosion resistant steel.
  10. Specifications --
    - ASTM A563 -- Carbon and Alloy Steel Nuts.
    - ASTM A194/A194M -- Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service

## Mechanical Requirements for Stainless Steel Fasteners

Grade(1)	General Description of Material	Bolts, Screws and Studs					Nuts		
		Full Size Bolts, Screws, Studs		Machine Test Specimens of Bolts, Screws, Studs			Hardness Rockwell	Proof Load Stress	Hardness Rockwell
		Yield (2) Strength	Tensile Strength	Yield (2) Strength	Tensile Strength	Elongation(3)			
		Min psi	Min psi	Min psi	Min psi	% Min.	Min	psi	Min
303A	Austenitic Stainless Steel- Sol. Annealed	30,000	75,000	30,000	75,000	20	B75	75,000	B75
304-A	Austenitic Stainless Steel- Sol. Annealed	30,000	75,000	30,000	75,000	20	B75	75,000	B75
304	Austenitic Stainless Steel- Cold Worked	50,000	90,000	45,000	85,000	20	B85	90,000	B85
304-SH	Austenitic Stainless Steel- Strain Hardened	See Note 6	See Note 6	See Note 6	See Note 6	15	C25	See Note 6	C20
305-A	Austenitic Stainless Steel- Sol. Annealed	30,000	75,000	30,000	75,000	20	B70	75,000	B70
305	Austenitic Stainless Steel- Cold Worked	50,000	90,000	45,000	85,000	20	B85	90,000	B85
305-SH	Austenitic Stainless Steel-	See Note 6	See Note 6	See Note 6	See Note 6	15	C25	See Note 6	C20

	Strain Hardened								
316-A	Austenitic Stainless Steel-Sol. Annealed	30,000	75,000	30,000	75,000	20	B70	75,000	B70
316	Austenitic Stainless Steel-Cold Worked	50,000	90,000	45,000	85,000	20	B85	90,000	B85
316-SH	Austenitic Stainless Steel-Strain Hardened	See Note 6	See Note 6	See Note 6	See Note 6	15	C25	See Note 6	C20
XM7-A	Austenitic Stainless Steel-Sol. Annealed	30,000	75,000	30,000	75,000	20	B70	75,000	B70
XM7	Austenitic Stainless Steel-Cold Worked	50,000	90,000	45,000	85,000	20	B85	90,000	B85
384-A	Austenitic Stainless Steel-Sol. Annealed	30,000	75,000	30,000	75,000	20	B70	75,000	B70
384	Austenitic Stainless Steel-Cold Worked	50,000	90,000	45,000	85,000	20	B85	90,000	B85
410-H	Martensitic Stainless Steel-Hardened and Tempered	95,000	125,000	95,000	125,000	20	C22	125,000	C22
410-HT	Martensitic Stainless Steel-Hardened and Tempered	135,000	180,000	135,000	180,000	12	C36	180,000	C36
416-H	Martensitic Stainless Steel-Hardened and Tempered	95,000	125,000	95,000	125,000	20	C22	125,000	C22
416-HT	Martensitic Stainless Steel-Hardened and Tempered	135,000	180,000	135,000	180,000	12	C36	180,000	C36
430	Ferritic Stainless Steel	40,000	70,000	40,000	70,000	20	B75	70,000	B75

**Note 6.** Austenitic stainless steel, strain hardened bolts, screws, studs, and nuts shall have the following strength per properties.

Product Size	Bolts, Screws, Studs				Nuts
	Tested Full Size		Machine Test Specimens,		Proof Load Stress
	Yield Strength	Tensile Strength	Yield Strength	Tensile Strength	
in.	min psi	min psi	min psi	min psi	psi
to 5/8 in.	100,000	125,000	90,000	115,000	125,000
over 5/8 to 1 in.	70,000	105,000	65,000	100,000	105,000
over 1 to 1-1/2 in.	50,000	90,000	45,000	85,000	90,000

FASTENER DATA				
Basic Product	Product Type and Head Style	Available Size Range	For thread and dimension details refer to:	For mechanical property details refer to Table 10 or:
Metric Bolts	hex	M5-M100	ANSI/ASME B18.2.3.5M	ASTM F568M ASTM F486M ASTM F738M
	heavy hex	M12-M36	ANSI/ASME B18.2.3.6M	
	round head short square neck (carriage)	M8-M20	ANSI/ASME B18.5.2.1M	
	round head square neck (carriage)	M5-M24	ANSI/ASME B18.5.2.2M	
	bent	M5 and larger	IFI 528 [sic]	
	heavy hex structural	M12-M36	ANSI/ASME B18.2.3.7M	ASTM A325M ASTM A490M
	hex transmission tower	M16-M24	IFI 541 [sic]	IFI 541 [sic]
Metric Screws	hex cap	M5-M100	ANSI/ASME B18.2.3.1M	ASTM F568M ASTM F468M ASTM F738M
	formed hex	M5-M24	ANSI/ASME B18.2.3.2M	
	heavy hex	M12-M36	ANSI/ASME B18.2.3.3M	
	hex flange	M5-M16	ANSI/ASME B18.2.3.4M	
	heavy hex flange	M10-M20	ANSI/ASME B18.2.3.9M	
	hex lag	M5-M24	ANSI/ASME B18.2.3.8M	see note 3 [sic]
Metric Studs	double end	M5-M100	IFI 528 [sic]	ASTM F568M ASTM F468M ASTM F736M
	continuous thread	M5-M100		
Metric Locking Screws	prevailing torque, non-metallic insert	M1.6-M36	see note 3 [sic]	IFI 524
	chemical coated	M6-M20	see note 3 [sic]	IFI 525
Metric Socket Screws	socket head cap	M1.6-M48	ANSI/ASME B18.3.1M	ASTM A574M ASTM F837M
	socket head shoulder	M6.5-M25	ANSI/ASME B18.3.3M	ASTM F835M ASTM A574M ASTM F879M
	socket button head cap	M3-M16	ANSI/ASME B18.3.4M	
	socket countersunk head cap	M3-M20	ANSI/ASME B18.3.5M	
	socket set	M1.6-M24	ANSI/ASME B18.3.6M	ANSI/ASME B18.3.6M ASTM F912M ASTM F880M



Metric Nuts	hex, style 1	M1.6-M36	ANSI/ASME B18.2.4.1M	ASTM A563M ASTM F467M ASTM F836M ASTM A194M
	hex, style 2	M3-M36	ANSI/ASME B18.2.4.2M	
	slotted hex	M5-M36	ANSI/ASME B18.2.4.3M	
	hex flange	M5-M20	ANSI/ASME B18.2.4.4M	
	hex jam	M5-M36	ANSI/ASME B18.2.4.5M	
	heavy hex	M12-M100	ANSI/ASME B18.2.4.6M	
Metric Prevailing-Torque Nuts	hex, steel	M3-M36	ANSI/ASME B18.16.3M	ANSI/ASME B18.16.1M ANSI/ASME B18.16.2M
	hex flange, steel	M6-M20		

Notes for Table 10.

- When only the ISO property class number is shown in Table 10, below, the class is standard in both ISO 898-1 and ASTM documents. Properties specified in each are identical except for minor exceptions. Where differences exist, the ASTM F 568M values are given.
- To compute the tensile proof load, tensile yield strength, or tensile ultimate strength in kilonewtons (kN) for a bolt, screw, or stud, multiply the stress value (MPa) in Table 10 by the tensile stress area (mm<sup>2</sup>) of the product's screw thread as given in Table 9 or [Standard Metric Bolt Shank Dimensions](#), then divide this result by 1000.
- In general, identification markings are located on the top of the head and preferably are raised.
- Class 5.8 products are available in lengths 150 mm and less.
- Caution is advised when considering the use of property class 12.9 products. The capabilities of the fastener manufacturer, as well as the anticipated service environment, should be carefully considered. Some environments may cause stress corrosion cracking of nonplated, as well as electroplated, products.

Table 10									
<b>MECHANICAL REQUIREMENTS FOR CARBON STEEL EXTERNALLY-THREADED METRIC FASTENERS</b>									
Property Class Designation	Nominal Size of Product	Material and Treatment	Mechanical Requirements						Property Class Ident. Marking
			Proof Load Stress, MPa	Tensile Yield Strength, MPa, Min.	Tensile Ultimate Strength, MPa, Min.	Prod. Hardness, Rockwell			
						Surface, Max.	Core		
				Min.	Max.				
4.6	M5-M100	low or medium carbon steel	225	240	400	--	B67	B95	4.6
4.8	M1.6-M16	low or medium carbon steel, fully or partially annealed	310	340	420	--	B71	B95	4.8
5.8	M5-M24	low or medium carbon steel, cold worked	380	420	520	--	B82	B95	5.8
8.8	M16-M72	medium carbon steel, quenched and tempered	600	660	830	30N56	C23	C34	8.8
A325M Type 1	M16-M36	medium carbon steel, quenched and tempered							A325M 8S
8.8	M16-M36	low carbon boron steel, quenched and tempered	600	660	830	30N56	C23	C34	8.8
A325M Type 2	M16-M36	low carbon boron steel, quenched and tempered							A325M 8S
A325M Type 3	M16-M36	atmospheric corrosion resistant steel, quenched and tempered	600	660	830	30N56	C23	C34	A325M 8S3
9.8	M1.6-M16	medium carbon steel, quenched and tempered	650	720	900	30N58	C27	C36	9.8
9.8	M1.6-M16	low carbon boron steel, quenched and tempered	650	720	900	30N58	C27	C36	9.8
10.9	M5-M20	medium carbon steel, quenched and	830	940	1040	30N59	C33	C39	10.9

		tempered							
10.9	M5-M100	medium carbon alloy steel, quenched and tempered	830	940	1040	30N59	C33	C39	10.9
A490M Type 1	M12-M36								A490M 10S
10.9	M5-M36	low carbon boron steel, quenched and tempered	830	940	1040	30N59	C33	C39	10.9
A490M Type 2	M12-M36								A490M 10S
A490M Type 3	M12-M36	atmospheric corrosion resistant steel, quenched and tempered	830	940	1040	30N59	C33	C39	A490M 10S3
12.9	M1.6-M100	alloy steel, quenched and tempered	970	1100	1220	30N63	C38	C44	12.9

**Certificate & Inspection** : c/w Calibration Works Certificate EN10204 3.1 Mill Test Report, NACE MR-01-75/ISO-15156, European Pressure Equipment Directive PED 97/23/EC, AD 2000-WO, ASME Boiler & Pressure Vessel Code Section-II Part-A Edition 2008, API 6A, with 3.2 certificate duly certified & approved by LRS-Lloyd's Register, GL-Germanischer Lloyd, BV-Bureau Veritas, DNV-Det Norske Veritas, ABS-American Bureau of Shipping, SGS, TUV, RINA, IRS, NORSOK APPROVED STANDARD M630, M650 Rev.3