

MIL-S-1222H  
AMENDMENT 1  
31 March 1989

## MILITARY SPECIFICATION

### STUDS, BOLTS, HEX CAP SCREWS, SOCKET HEAD CAP SCREWS AND NUTS

This amendment forms a part of MIL-S-1222H, dated 21 October 1986, and is approved for use by all Departments and Agencies of the Department of Defense.

#### PAGE 1

1.2, under "Studs, Type IV": After "Continuous thread", add "(bolt-stud)".

#### PAGE 2

2.1.1, under "SPECIFICATIONS, FEDERAL, QQ-C-465": Delete "Numbers 606, 614, 630, 632M, and 642" and substitute "Numbers C60600, C61400, C63000, C63200 and C64200".

#### PAGE 3

2.1.1, under "STANDARDS, FEDERAL": Add "FED-STD-H28/2 - Screw Thread Standards for Federal Services, Section 2, Unified Thread Form and Thread Series for Bolts, Screws, Nuts, Tapped Holes and General Applications."

2.1.1, under "STANDARDS, MILITARY": Add "MIL-STD-792 - Identification Marking Requirements for Special Purpose Components."

#### PAGE 4

2.2, under "ASTM": Delete reference to ASTM A 751.

2.2, after J 995, add: "AMS 2750 - Pyrometry."

#### PAGE 5

Table I, under "Material grade" for alloy steels: Delete "574" and substitute "A 574".

#### PAGE 6

Table I, under "Identification marking" for martensitic corrosion resistant steels: Delete footnote "5/".

AMSC N/A

FSC 53GP

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MIL-S-1222H  
AMENDMENT 1

PAGE 7

Table I, under "Identification marking" for martensitic corrosion resistant steels: Delete footnote "5/".

Table I, under Chemical requirement for Ni-Cu-Al: Delete "class A".

PAGE 8

Table I, under "Material grade" for copper alloys, Nickel-aluminum-bronze: Delete "632" and substitute "C63200".

PAGE 9

Table I, footnote 4: Delete and substitute:

"4/ In addition to the material grade, the marking shall include the heat treatment symbol "An" when the fastener is machined from annealed stock or when the fastener is annealed after forming or the identification symbol "SH" when the fastener is cold headed and rolled from strain hardened stock thus acquiring a degree of cold work (see tables II, III, and IV)."

Table I, footnote 6, (f): Delete "651".

Table I, footnote 8: Delete and substitute: "See 3.9."

3.1.2.1(a): Delete first sentence and substitute: "When fasteners are produced by cold heading and reduction of the shank, the starting material shall be in the cold drawn and annealed, hot finished and annealed, or hot forged and annealed condition."

PAGE 10

3.1.2.1, Add new (d) as follows:

"(d) When fasteners are machined from annealed barstock, threading may be by cutting or rolling. The finished fastener shall be reannealed and age hardened."

3.1.2.2: Delete and substitute:

"3.1.2.2 Grade 400 externally threaded fasteners. Grade 400 externally threaded fasteners shall be fabricated from either hot finished bar stock or cold drawn and stress relieved material in accordance with QQ-N-281. When specified (see 6.2.1), fasteners shall be fabricated from cold drawn material stress relieved at 900 to 1200°F. Heat treatment shall be controlled in accordance with AMS 2750. Tensile properties shall be determined after heat treatment."

MIL-S-1222H  
AMENDMENT 1

PAGE 11

Table II, under "Nominal diameter" for carbon and alloy steels and 300 series corrosion resistant steels: Delete "1/4 to \*" wherever it appears and substitute "\* or less". (Where \* is a variable number.)

Table II, under "Nominal diameter" for 400 series corrosion resistant steels: Delete "1/4 and over" and substitute "All sizes".

Table II, Delete lines covering 300 series corrosion resisting steel and insert new lines as shown.

Machined specimens from  
full size fasteners

Grade	Condition	Diameter	Tensile strength ksi	Yield strength ksi min	Proof stress ksi min	Rockwell hardness
303, 303Se 304, 305	Annealed "A"	All sizes	75-100	30	---	B95 max
316, 321 347, 384	Strain hardened "SH"	Less than 3/4 3/4 to 1 1-1/8 to 1-1/4 1-3/8 to 1-1/2	120-160 110-150 100-140 95-130	95 75 60 45	--- --- --- ---	--- --- --- ---

Machined specimens from  
fasteners or on parent barstock

Tensile strength ksi min	Yield strength ksi min	Elongation in 4D percent min	Reduction of area percent min
75	30	20	-----
115	90	12	-----
105	70	15	-----
95	55	20	-----
90	40	28	-----

MIL-S-1222H  
AMENDMENT 1

PAGE 12

Table II, under "Nominal diameter" for copper and aluminum alloys and grade 630 stainless steel: Delete "1/4 and over" and substitute "All sizes".

Table II, under "Rockwell hardness" for grade 500 nickel alloy: Delete "C24 min" and substitute "C24-35" for all sizes.

PAGE 13

Table II, under "Nominal diameter" for titanium alloys: Delete "1/4" wherever it appears.

PAGE 14

Table III, under "Rockwell hardness" for grade 500: Delete "C24 min" and substitute "C24-35" for all sizes.

PAGE 19

3.8.1, Delete first sentence and substitute:

"Except for stud end threads of style a or b studs, screw threads shall be in accordance with ANSI B1.1 and unless otherwise specified (see 6.2.1), shall be unified class 2A/2B."

PAGE 20

Table VI, Full body, Type I, Styles a and c, Styles b and d, maximums for both 1-3/8 sizes: Delete "1.295" and substitute "1.395".

Table VI, footnote 1/, line 2: Delete "FED-STD-H28/20" and substitute "FED-STD-H28/2".

PAGE 22

3.8.2.4, under "Tolerance for nominal stud diameter": Delete "5/8 to 1-1/4" and substitute "9/16 to 1-1/4".

MIL-S-1222H  
AMENDMENT 1

PAGE 27

3.9 Delete and substitute:

"3.9 Identification marking. Unless otherwise specified (see 6.2.1), identification symbols/markings shall be as shown in table I. When heat-to-heat traceability (lot definition "a") is desired, and for grade 500 nickel alloy fasteners, the material symbol, manufacturer's symbol, and the lot number shall be marked on fasteners greater than 1/4-inch nominal size. For fasteners 1/4-inch in diameter or less, if all of the marking on the item cannot be applied due to space limitations, the marking shall be applied using the following order of precedence: material symbol, lot number, manufacturer's symbol. The material symbol is mandatory for all fasteners. For purposes of this document, hardened material shall be defined as that with a maximum hardness in excess of HRC 35. Marking shall be applied to the head of bolts, hex cap screws and socket head cap screws, the nut end of type I, II, III studs, either end of type IV studs and the top face of nuts."

3.10 and 3.10.1, Delete and substitute:

"3.10 Workmanship. Fasteners shall be uniform in quality and condition, free from rust, scale, cracks, seams, bursts, voids, laps, nicks, gouges, and burrs as determined by the applicable nondestructive tests."

PAGE 28

Table XI, under "Type of test or inspection": Delete "Nondestructive testing" from box with "Permeability measurement".

PAGE 30

4.4.3, Delete third sentence and substitute: "Screw thread gaging shall be variables/indicating in accordance with ANSI B1.3."

4.4.4.1, line 1: Delete "with heads formed by upsetting".

PAGE 31

Table XIII, footnote 4: Delete.

Table XIII, footnote 5: Delete and substitute: "4/ See 4.4.4.4."

4.4.4.4 Add second and third sentences:

"Nuts with a proof load greater than 150,000 pounds shall not be subjected to the proof load test but shall meet the hardness test of 4.4.4.5. For those facilities with the capability, proof load test results shall be submitted along with hardness test results."

At end of new fifth sentence: Delete "Table IV" and substitute "Table V".

## MIL-S-1222H

## AMENDMENT 1

## PAGE 32

4.4.4.5, line 2: Delete "ASTM A 606" and substitute "ASTM F 606".

4.4.4.5, line 2: Delete "table II and III" and substitute "tables II, III, or IV".

4.4.4.6, Delete and substitute:

"4.4.4.6 Alternate mechanical testing. Certified mechanical test reports (see 4.5) furnished by the barstock supplier which demonstrates compliance with the mechanical properties of tables II, III, and IV may be substituted for mechanical testing of fasteners provided that; (a) lot definition "a" is employed, (b) marking or identification is maintained to ensure traceability to the barstock certification, (c) no further heat treatment is performed, and (d) fabrication is solely by machining with thread forming by machining or rolling. The following exceptions apply:

- (a) For bolts and screws fabricated by thread rolling and cold heading, the wedge tensile test of 4.4.4.1 shall be required in addition to the barstock suppliers certification.
- (b) For grade 500 nickel-copper-aluminum alloy studs manufactured from age hardened barstock, only thread forming by cutting shall be permitted."

4.4.5, Delete and substitute:

"4.4.5 Nondestructive testing. Fasteners shall be nondestructively inspected by wet magnetic particle or liquid penetrant test in accordance with MIL-STD-271. Fasteners made from magnetic materials shall be wet magnetic particle inspected. All other fasteners shall be inspected by the liquid penetrant test. When protective coating is specified, the nondestructive tests shall be performed before the coating process."

## PAGE 33

4.4.10 Insert "be" between "shall" and "impact".

4.5 Delete "When specified in the contract or order," and substitute: "When specified (see 6.2.1),".

## PAGE 35

Table XIV, under "Steel grades": Delete "Carbon steel grades SAE 2 and 5" and substitute "Carbon steel grades SAE 2, 5, and 8".

Table XIV, under "Steel grades": Delete "Grade B7 externally threaded used with grade 2H, 4, or 7 nuts" and substitute "Grade B7 externally threaded fasteners used with grade 2H, 4, or 7 nuts".

MIL-S-1222H  
AMENDMENT 1

PAGE 36

6.1.4, line 1: Delete "steal" and substitute "steel".

PAGE 37

6.2.1, (b): Delete and substitute:

"(b) Type, style, material grade, and heat treatment or condition of fasteners (see 1.2, 3.1, 3.2, and tables I, II, III, or IV)."

6.2.1: Add new (1): "(1) Test report, if required (see 4.5)."

PAGE 38

6.2.2: Add:

<u>"Paragraph no.</u>	<u>Data requirements title</u>	<u>Applicable DID no.</u>	<u>Option</u>
	Certification data for non-nuclear level I material"	UDI-T-23191	----

6.3, line 3: Delete "table XVI" and substitute "table XVII".

PAGE 39

Table XVI, title: Delete "TABLE XVI" and substitute "TABLE XVII".

Table XVI, under "Description" for studs: After "Continuous thread", add "(bolt-stud)".

PAGE 40

6.4, line 3: Delete "6.4.1 and 6.4.2" and substitute "6.4.1, 6.4.2, and 6.4.3".

6.4, lines 3 and 5: Delete "table XVI" and substitute "table XVII".

6.4.1, line 12: Delete "table XVII" and substitute "table XVIII".

Table XVII, title: Delete "TABLE XVII" and substitute "TABLE XVIII".

Table XVII, under "MIL-S-1222H" for carbon and alloy steels: Add "A 574" and "4340".

Table XVII, under "MIL-B-857A" for Corrosion resistant steel: Add "304".

MIL-S-1222H  
AMENDMENT 1

PAGE 41

Table XVII, title: Delete "Table XVII" and substitute "Table XVIII".

Table XVIII, under "MIL-S-1222H" for copper alloys: Delete "632" and substitute "C63200".

Table XVIII, under "MIL-B-857A" for copper alloy 544: Delete "Aluminum bronze" and substitute "Phosphor bronze".

Table XVIII, under "MIL-S-1222H, MIL-S-001222G, and MIL-B-857A" for copper alloys: Add "670", "670", and "Manganese bronze", respectively.

Table XVIII, under "MIL-B-857A" for nickel alloy 500: Delete "Ni-Cu-A2" and substitute "Ni-Cu-Al".

PAGE 42

6.6: Add: "Studs".

Custodians:

Navy - SH

Air Force - 99

Preparing activity:

Navy - SH

(Project 53GP-0188)

Review activities:

Navy - MC

DLA - IS

User activities:

Army - AR, AV, ME