MILITARY SPECIFICATION

STUDS, BOLTS, HEX CAP SCREWS, AND NUTS

This amendment forms a part of Military Specification MIL-S-001222G(SHIPS), dated 13 January 1976.

PAGE 2

2.1, under "SPECIFICATIONS, FEDERAL": Delete all reference to QQ-P-416 and QQ-Z-325 in their entirety.

2.1, under "SPECIFICATIONS, MILITARY", add:

"MIL-C-81751 - Coating, Metallic-Ceramic.
MIL-C-83488 - Coating, Aluminum, ION Vapor Deposited.
MIL-C-87115 - Coating, Immersion Zinc Flake/Chromate Dispersion."

* 2.1, under "STANDARDS, MILITARY", add:

"MS18116 - Bolt, Stud, and Socket Cap Head Screw, Nickel-Copper-Aluminum Alloy."

2.2, under "AMERICAN SOCIETY FOR TESTING AND MATERIALS": Delete all reference to ASTM A 153, and add:

"ASTM B 454 - Mechanically Deposited Coatings of Cadmium and Zinc on Ferrous Metals.
ASTM B 633 - Electrodeposited Coatings of Zinc on Iron and Steel.

PAGE 3

2.2, under "AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)", add:

"B1.12 - Class 5 Interference-fit Thread."

* Table I: Under "Material" column: After "carbon steel", add "or alloy steel".

* under "Material specification" for carbon steel: Delete "10xx series", and substitute "steel".

PAGE 4

Table I: Footnote 3, delete second sentence.

* 3.2, line 1: Delete "fastness" and substitute "fasteners".

PAGE 5

Table II: For Grade 5 steels over 1-1/2-inch diameter, Machined specimens, yield strength, delete "90" and substitute "58".

PAGE 6

* Table II: For "Grade 500" material, under the "Nominal Diameter" column, delete "1/4 to 1" and substitute "less than 1"; delete "over 1" and substitute "1 and over".

PAGE 7

Table III: For Grade 5 nuts 1/4 to 1 inch, types II and IV, delete "170" and substitute "72".

PAGE 9

* Table IV, Coarse thread series UNC, Stress area $A_{(s)}$ for 1/4-inch size: Delete "0.0313" and substitute "0.0318".

* Fine thread series UNF, Stress area $A_{(s)}$ for 5/16-inch size: Delete "0.0560" and substitute "0.0580".

PAGE 10

3.3 through 3.3.2: Delete and substitute:

"3.3 Protective coatings.

"3.3.1 Carbon and alloy steels. When specified (see 6.1 and 6.2.1), carbon and alloy steel fasteners shall be coated as follows:

Metallic-ceramic coating: MIL-C-81751, type I, class 4
Ion vapor deposited aluminum: MIL-C-83488, type II, class 3
Zinc flake/chromate dispersion: MIL-C-87115, class 3
Electrodeposited zinc: ASTM B 633, type II, class Fe/Zn 13
Mechanically deposited zinc: ASTM B 454, class 13

* "3.3.1.1 When zinc coating is specified, the coating may be either electrodeposited or mechanically deposited, at the option of the manufacturer."

3.4.1: Add "Class 5 interference-fit threads shall be in accordance with ANSI B1.12."

3.4.3.1: Delete.

PAGE 13

* 3.5.1: Delete and substitute:

"3.5.1 Material identification. Fasteners 1/4 inch size and over (except for grades 1 and 2) shall be marked to identify the material. In addition, all externally threaded grade 500 (nickel-copper-aluminum)

and grade T7 (titanium) fasteners 1/2 inch and larger shall be marked with the heat or lot number and the manufacturer's symbol. Marking shall be of permanent type and shall be raised or depressed. Stamping shall be made with low stress (round radius) die stamps. Marking shall be applied to the head of the hex cap screws, the nut end of tap end studs, one end of continuous studs, and the top face (not washer face) of nuts. Manufacturer's identification symbols shall be applied to fasteners procured to lot definition "A". Manufacturer's identification symbols may be omitted for fasteners procured to lot definition "B" (see 4.2)."

PAGE 15

3.5.1.1: Delete.

4.1: Delete and substitute:

"4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements."

PAGE 16

Table VIII: For Mechanical tests, delete "MIL-STD-105, special inspection level S-1, AQL = 1.5" and substitute "2/".

After footnote 1/, add:

"2/

Lot size (pieces)	Sample size	Acceptable defects
50 and less	2	0
51 - 500	3	0
501 - 3500	5	0
Over 3500	8	0

"

* Table IX: Delete all reference to "Pitch diameter".

* 4.4.4, second sentence: Delete.

PAGE 18

* 4.4.4.5: Delete and substitute:

"4.4.4.5 Proof load for nuts. Proof load testing is required for all nuts having sizes and tensile loads specified in table X. Testing shall be conducted in accordance with 4.4.4, using a hardened mandrel or

bolt and a load holding time of ten seconds at the specified proof load. The proof load shall be calculated by multiplying the appropriate proof stress from table III by the corresponding stress area from table IV. The nut shall resist the proof load without stripping or rupturing and shall be removable from the test bolt or mandrel by hand. Use of a wrench to start the nut is permitted, provided the nut is turned no more than 180 degrees before removal by hand."

* 4.4.6: Delete and substitute:

"4.4.6 Waiver of mechanical testing. Certified mechanical test reports (see 4.5) furnished by the bar stock supplier which demonstrate compliance with the mechanical property requirements of table II may be substituted for the mechanical tests required by table X for:

(a) Bolts, screws or studs fabricated solely by machining without further heat-treatment.
(b) Studs fabricated solely by thread rolling without further heat treatment, except for nickel-copper-aluminum grade 500 studs which may not be formed by thread rolling (see 3.2.1.6)."

* 4.4.7: Delete and substitute:

"4.4.7 Surface discontinuities. Fasteners shall be visually and nondestructively inspected in accordance with SAE J122 or J123, as applicable, except that nondestructive testing shall be magnetic particle (wet method) or liquid penetrant inspected in accordance with MIL-STD- . Acceptance criteria for externally threaded fasteners shall be in accordance with SAE J123, except that the acceptance criteria for nickel-copper-aluminum (grade 500) shall be in accordance with MS18116. Acceptance criteria for nuts shall be in accordance with SAE J122 except that seam depth shall not exceed 0.030D inch, where D is the dimension between sides. Method of depth determination may be made by comparing the dimension of an area where the seam has been removed by grinding, machining or filing with that of the adjacent area containing no seams. Seam depth determination shall be made on samples selected for cone proof load test by SAE J122 but before the cone proof load test. The cone proof load test, which uses a hardened cone, and the cone proof load (CPL) formula specified in ASTM A 194, shall be required for heat treated (hardened) nuts with seams or forging crack indications, and which are 1 inch or less in nominal size."

PAGE 19

6.1.1: Delete and substitute:

"6.1.1 Protective coatings. The characteristics of the various coatings are contained in the applicable plating specification. Recommended applications are summarized in table XIa."

* Add table XIa.

"TABLE XIa. Coatings for various applications.

Coating type	Base material	Upper temperature limit 1/	Required salt spray test (min.)	Environment
Metallic-ceramic MIL-C-81751, type I, class 4	Carbon and alloy steels 3/8 inch and larger	1000°F	1000 hrs	High temperature and severe corrosion
IVD Aluminum MIL-C-83488, type II, class 3	Carbon and alloy steels. No size limitation.	925°F	336 hrs	Moderate temperature and corrosion
Immersion zinc/flake MIL-C-87115, class 3	Carbon and alloy steels. No size limitation.	650°F	336 hrs	Moderate temperature and corrosion
Zinc coating 2/ ASTM B 454, class 13 or ASTM B 633, type II, class Fe/Zn 13	Grades 2 and 5 only (Not recommended for high strength steels)	300°F	96 hrs	Ambient temperature and mild corrosion

1/ Maximum service temperature applies to coating alone and not to the base metal (see table XI).
2/ For electrodeposited zinc coating, steel fasteners having a hardness of Rockwell C-40 or greater shall require hydrogen embrittlement relief in accordance with ASTM B 633, and hydrogen embrittlement relief testing in accordance with a procedure subject to concurrence by the command or agency concerned."

PAGE 20

6.2.1(c): Delete and substitute:

"(c) Type of coating required (see 3.3.1 and 6.1.1)."

PAGE 21

* TABLE XII: Delete both references to "Ni-Cu Class A1" and substitute "Ni-Cu-Al".

* TABLE XIII: Delete and substitute:

"TABLE XIII. Fastener type comparability.

	MIL-S-001222G(SHIPS)	MIL-S-1222F 1/	MIL-B-857A(SHIPS) 2/	FF-S-85C	FF-N-836D
Stud	Type I Type II Type III Type IV	Bolt-stud	Type I Type II		
Bolt	Type I Type II Type III		Type I Type II		
Cap screw	Type I		Type III bolt	Type II, style 10p	
Nut	Type I	Finished Hex nut	Type III		Type II, style 4
	Type II		Type V		Type II, style [illegible]
	Type III	Heavy hexagon nut			Type II, style 11
	Type IV				Type II, style 12

1/ Types I and II, as contained in MIL-S-1222F, refer to studs and nuts, respectively, of specific materials, and not to stud or nut configuration.

2/ Types IV and V bolts, and types I, II, IV, VI, and VII nuts of MIL-B-857A have been omitted from this specification to eliminate fasteners with limited applications or to standardize fastener usage. Where these omitted fasteners are specified, use the following substitute:

MIL-B-857A, type IV bolt, round head: Use ANSI B18.5 round head bolt
MIL-B-857A, type V bolt, round head square neck: Use ANSI B18.5 round head square neck bolt
MIL-B-857A, types I and II nuts: Use MIL-S-001222G, type I nut
MIL-B-857A, type IV jam nut: Use MIL-S-001222G, type II jam nut
MIL-B-857A, types VI and VII slotted nuts: Use ANSI B18.2.2 hex slotted nuts"

NOTE: The margins of this amendment are marked with an asterisk (*) to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire document irrespective of the marginal notations and relationship to the last previous issue.

Preparing activity:
Navy - SH
(Project 53GP-N007)