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INCH-POUND

FF-S-85C
AMENDMENT 3
28 June 1996
SUPERSEDING
Amendment 2
August 2, 1994

FEDERAL SPECIFICATION

SCREW, CAP, SLOTTED AND HEXAGON HEAD

This amendment forms a part of Federal Specification FF-S-85C, dated May 5, 1969, and is approved for use by all Departments and Agencies of the Department of Defense.

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2.1: Under Federal Specifications:

delete "QQ-B-637" and title,
delete "QQ-B-728" and title,
delete "QQ-B-750" and title,
delete "QQ-C-591" and title, and
delete "QQ-Z-325" and title.

2.1: Under Federal Standards:

delete the title for Fed. Std. No. 123 and substitute "Marking for Shipment (Civil Agencies)",
delete "Fed. Test Method Std. No. 151" and title and add "FED-STD-H28/2 - Unified Inch Screw Threads - UN and UNR Thread Forms".

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2.1: Under Military Specifications:

delete "MIL-H-3982" and title,
delete "MIL-I-6866" and title,
delete "MIL-I-6868" and title,
delete "MIL-I-17214" and title,
delete "MIL-B-24059" and title, and
add "MIL-F-18240 - Fastener Element, Self-Locking, Threaded Fastener, 250 Deg. F Maximum".

2.1: Under Military Standards:

add "MIL-STD-1312-6 - Fastener Test Methods - Method 6, Hardness",
delete "MS18153" and title, and
delete "MS18154" and title.

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2.1: Under Military Standards (continued):

delete "MS90727" and title and
delete "MS90728" and title.

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2.2: Under Other publications:

delete "National Bureau of Standards (NBS) Standard: H28, Part I - Screw-Thread Standards for Federal Services. (Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.)",
delete "United States of America Standards Institute Standards:" and substitute "American Society of Mechanical Engineers (ASME) Standards:",
delete "USAS" and substitute "ASME",
delete "USAS B18.6.2" and title and substitute "ASME B18.6.2 - Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws",
* delete "United States of America Standards Institute, 10 East 40th Street, New York, New York 10016" and substitute "American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017",
delete "485 Lexington Avenue, New York, New York 10017" and substitute "400 Commonwealth Drive, Warrendale, PA 15096".

2.2: Under American Society for Testing and Materials (ASTM) Publication:

* delete E8 and title and E112 and title and add the following ASTM standards:
"ASTM A342 - Test Method for Permeability of Feebly Magnetic Materials",
"ASTM B21 - Specification for Naval Brass Rod, Bar, and Shapes",
"ASTM B98 - Specification for Copper-Silicon Alloy Rod, Bar, and Shapes",
"ASTM B124 - Specification for Copper and Copper Alloy",
"ASTM B138 - Specification for Manganese Bronze Rod, Bar, and Shapes",
"ASTM B139 - Specification for Phosphor Bronze Rod, Bar, and Shapes",
"ASTM B150 - Specification for Aluminum Bronze Rod, Bar, and Shapes",
"ASTM B154 - Mercurous Nitrate Test for Copper and Copper Alloys",
"ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel",
"ASTM D3951 - Commercial Packing, Standard Practice for",
"ASTM E1282 - Guide for Specifying the Chemical Compositions and Selecting Sampling Practices and Quantitative Analysis Methods for Metals and Alloys",
ASTM E1417 - Standard Practice for Liquid Penetrant Examination
"ASTM E1444 - Standard Practice for Magnetic Particle Examination", and
"ASTM F606 - Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers and Rivets".

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* Delete the address for the American Society for Testing and Materials "1916 Race Street, Philadelphia, Pa. 19103" and substitute "100 Barr Harbor Drive, West Conshohocken, PA 19428-2959".

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Table I: Under column heading Hardness, Rockwell
delete "C32" Min and "C38" Max and substitute "C33" Min and "C39" Max, respectively.

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3.1.3.1: Delete "MS18153", "MS18154", "MS90727", and "MS90728" and substitute "ASME B18.2.1".

Add the following new paragraphs:

"3.1.5.1 Stress relief. Cold worked naval brass screws shall be stress relieved by heating the screws to a temperature of 600° F, and holding at that temperature for a minimum of one hour."

"3.1.6 Self-locking element. Non-metallic, self-locking elements shall be in accordance with MIL-F-18240."

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Table IA: Under column heading Applicable specifications,
delete "QQ-B-728" and substitute "ASTM B138",
delete "MIL-B-24059" and substitute "ASTM B150",
delete "QQ-B-750" and substitute "ASTM B139",
delete "QQ-C-591" and substitute "ASTM B124",
delete "QQ-B-637" and substitute "ASTM B21",

Table IA: For Naval brass,
under column for Composition, delete "( )" around alloy 464,
delete "Composition I", and add "alloy 462".
under column for Condition, add "hard" beside alloy 462.

Table IA: For Nickel-Copper Alloy,
delete "hot finished" under Condition and
delete "30" and substitute "20" under Elongation.

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3.3: Delete "USAS" and substitute "ASME".

3.3.1: Delete "5/8" and substitute "1/2" (two places).
Delete "1-1/2" and substitute "1" (two places).

3.3.2 and 3.3.3: Delete "National Bureau of Standards Handbook H28, Part I" and substitute "FED-STD-H28/2" (two places).

3.4.3: Delete in its entirety and substitute the following:

"3.4.3 Cadmium plating. When specified (see 6.2), cap screws shall be cadmium plated in accordance with QQ-P-416, Type II, Class 2."

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* 3.4.4: Delete "QQ-Z-325, type II, class 3" and substitute "ASTM B633, type II, Fe/Zn 5".

3.4.7: Delete in its entirety and substitute the following:

"3.4.7 Black chemical. When specified (see 6.2), brass cap screws shall be treated with a black chemical finish in accordance with MIL-F-495."

* 3.6: Add to the end of the paragraph,

"Normally, it will be sufficient to ascertain that these surfaces on screws have the equivalent of a smooth machined finish by visual comparison with known surface standards. However, when it is deemed necessary to measure these surfaces with commercially available equipment, roughness measurements shall be taken axially on the body and fillet surfaces, and circumferentially on the bearing surface in accordance with ASME B46.1."

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3.8: Under "Head markings", add "Steel" in front of "Cap screws" in the first sentence and add "all" in front of "cap screws" in the second sentence.

* 3.9: Replace and renumber the existing paragraphs under 3.9 as follows:

"3.9 Defects.

3.9.1 Discontinuities. Cap screws shall not contain discontinuities which equal or exceed the following limitations. Care must be exercised not to confuse cracks with discontinuities, as described herein. When visual inspection discloses discontinuities which show cause for further examination, magnetic particle or penetrant inspection as applicable, shall be as specified in 4.4.9.

3.9.1.1 Laps and Seams. Cap screws may possess laps and seams except in locations specified in 3.9.2. The depth shall not exceed that permitted in 3.9.2. They shall be examined as specified in 4.4.9. Typical lap and seam discontinuities are shown in Figure 6.

3.9.1.2 Inclusions. Cap screws shall show no evidence of surface or subsurface inclusions at the thread root when examined as specified in 4.4.9. Small inclusions in other parts of the cap screws not indicative of unsatisfactory quality, shall not be cause for rejection.

3.9.1.3 Tool marks. Tool marks or undercuts of depths not exceeding those shown in Table II and Figure 8 are acceptable. Surface discontinuities such as nicks, gouges, dents, scratches, and scrapes are permissible if they do not impair the functionability of the product.

3.9.1.4 Voids. Voids are permissible discontinuities if in the limits specified in 4.4.9.2. Typical voids are shown in Figure 8.

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3.9.1.5 Folds. Folds may occur at or near the intersection of diameter changes. Folds at exterior corners are permissible discontinuities if within the limits specified in 4.4.9.3. Typical folds are shown in Figure 7.

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3.9.1.6 Bursts. Cap screws may possess bursts that occur at the flat of the head of screws if within the limits specified in 4.4.9.4. Typical bursts are shown in Figure 7.

3.9.2 Thread discontinuities. (Laps, seams, and surface irregularities). Threads shall have no laps at the root or along the flanks as shown in Figure 6. Laps are permissible at the crest but shall not exceed 25 percent of the basic thread depth. Slight deviation from the thread contour is permissible at the crest of the thread as shown in Figure 6. Magnetic inspection techniques may be used in accordance with 4.4.9.

3.9.3 Cracks. Cap screws shall be free from cracks in any direction or location.

3.9.3.1 Quench cracks. Quench cracks may occur during heat treatment and usually traverse an irregular and erratic course on the surface of the screw. They shall be examined as specified in 4.4.9. Typical quench cracks are shown in Figure 7.

3.9.3.2 Forging cracks. Forging cracks may occur during the cut-off or forging operations and are located on the top of the head of screws. They shall be examined as specified in 4.4.9. Typical forging cracks are shown in Figure 7."

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* 4.2.2: Delete "MIL-STD-105" and substitute "ANSI/ASQC Z1.4".

* Delete TABLE III. Classification of defects in its entirety and substitute the following table:

TABLE III. Classification of defects:

Categories	Defects	Inspection method
Critical	AQL = 1.0 percent	
1	Cracks (3.9.3)	Microscope or S. I. E.*
Major	AQL = 2.5 percent	
101	Thread, size and form (3.3.1 and 3.3.2)	Thread ring gauge Go and No Go
102	Thread lengths (3.3.2)	S.I.E. *
103	Discontinuities (3.9.1)	S.I.E. *
104	Self-locking element missing, when applicable (3.1.6)	Visual
Minor	AQL = 4.0 percent	
201	Length (3.3.1)	S.I.E.*
202	Surface roughness (3.6)	Visual
203	Coated threads (when applicable) (3.3.3)	Visual
204	Head marking (3.8)	Visual

*Standard Inspection Equipment

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* 4.2.3: Delete "Sampling for test of mechanical properties." and substitute "Sampling for mechanical properties and metallographic tests." and delete "MIL-STD-105" and substitute "ANSI/ASQC Z1.4".

4.2.4: Delete "Fed. Test Method Std. No. 151, method 111.2" and substitute "ASTM E1282".

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4.2.5: Delete "MIL-H-3982" and substitute "ASTM D3951".

Add the following new paragraph:

* "4.2.6 Sampling for mercurous nitrate test. When specified (see 6.2), a random sample shall be taken from each lot of cold-worked naval brass screws in accordance with ANSI/ASQC Z1.4, Inspection Level S-1. Any one defect shall cause rejection of the represented lot."

* 4.3.1: Delete "MIL-STD-105" and substitute "ANSI/ASQC Z1.4".

4.3.2: Delete "MIL-H-3982" and substitute "ASTM D3951".

4.4.1: Delete "4.4.9" and substitute "4.4.13".

* 4.4.3: Delete "E8" and substitute "ASTM F606".

Add to the end "unless otherwise specified (see 6.2), Grade 2, low carbon steel screws shall not be subjected to this test."

* 4.4.3.2: Delete "E8" and substitute "ASTM F606".

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* Add the following new paragraph:

"4.4.3.4 Screws too short to be tensile strength tested as defined in ASTM F606 shall be hardness tested in accordance with MIL-STD-1312-6. If the hardness limits are not specified, screws shall meet the minimum hardness requirement of the material from which they were made."

* 4.4.7: Delete "except that the screws shall be held under load for 23 hours and then examined for cracks or fractures".

4.4.8: Delete "MIL-I-17214" and substitute "ASTM A342".

* 4.4.9: Under "Discontinuities" delete the first sentence and substitute "Magnetic particle inspection performed in accordance with ASTM 1444 or liquid penetrant inspection performed in accordance with ASTM E1417 shall be used to determine the presence of cracks and discontinuities such as laps, seams, and inclusions."

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* 4.4.9.1: delete "110 RHR (roughness height ratings)" and substitute "125 microinches, determined as the arithmetic average deviation from the mean surface."

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Add the following new paragraphs:

"4.4.10 Self-locking. Self-locking screws having non-metallic elements shall be tested in accordance with MIL-F-18240."

"4.4.11 Mercurous nitrate (stress relief) test. The contractor shall furnish the Government certification that cold worked naval brass screws have been subjected to the stress relief treatment specified in 3.1.5.1. When specified (see 6.2), samples taken as specified in 4.2.6 shall be subjected to a mercurous nitrate test conducted in accordance with ASTM B154. There shall be no evidence of cracks."

"4.4.12 Proof load. Proof load test for cap screws shall be conducted in accordance with ASTM F606."

"4.4.13 Yield strength. Yield strength test for cap screws shall be conducted in accordance with ASTM F606."

5.1.1: Delete "MIL-H-3982" and substitute "ASTM D3951" (two places).

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* 6.2: (b) delete "Type, style, grade, and size required (1.2)" and substitute "Type and style, grade (for carbon and alloy steel), and size or standard part number (1.2)".

add the following:
"(p) Mercurous nitrate test, if required (4.4.11)."
"(q) Proof load test, if required (4.4.12)."
"(r) Yield strength test, if required (4.4.13)."

* 6.4.1: delete "Handbook H28, Screw Thread Standards for Federal Services" and substitute "FED-STD-H28/1, Nomenclature, Definitions and Letter Symbols for Screw Threads".

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* Figure 5, row 2 under column heading "TYPE" add "I".

NOTE: The margins of this amendment are marked with asterisks (*) to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment 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 content irrespective of the marginal notations and relationship to the last previous amendment.

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3. DOCUMENT TITLE: SCREW, CAP, SLOTTED AND HEXAGON HEAD

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach sheets if needed.)*

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