

FF-N-836D
April 24, 1972
SUPERSEDING
(See section 6)

FEDERAL SPECIFICATION

NUT: SQUARE, HEXAGON, CAP, SLOTTED, CASTLE, KNURLED,
WELDING AND SINGLE BALL SEAT

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers cap, castle, hexagon, knurled, slotted, square, welding and single ball seat nuts (see 6-3).

1.2 Classification.

1.2.1 Types and styles. Nuts shall be of the following types and styles (see 6.2, fig. 1).

Type I - Nuts, square (fig. 1).

Style 1 - Regular.

Style 2 - Heavy.

Style 3 - Machine screw.

Type II - Nuts, hexagon (fig. 1).

Style 4 - Plain.

Style 5 - Jam.

Style 6 - Thick.

Style 7 - Flat.

Style 8 - Flat Jam.

Style 9 - Heavy flat.

Style 10 - Heavy flat Jam.

Style 11 - Heavy.

Style 12 - Heavy Jam.

Style 13 - Machine screw.

Type III - Nuts, cap (fig. 1).

Style 14 - High crown.

Style 15 - Low crown.

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Type IV - Nuts, slotted (fig. 1).

Style 16 - Plain.

Style 17 - Thick.

Style 18 - Heavy.

Type V - Nuts plain, castle (fig. 1).

Type VII - Nuts, plain, knurled (fig. 1).

Type VIII - Nuts, welding (fig. 1).

Style 19 - Without pilot.

Style 20 - Pilot.

Type IX - Nuts, plain., single ball seat, hexagon (fig. 1).

1.2.2 Sizes. Nuts shall be of the sizes specified in ANSI B18.2.2 and B18.6.3, except for weld, cap,, knurled and slotted nuts, which shall be in accordance with the applicable Military standards (see 3.1.1.1 and 3.1.4). Single ball seat nuts shall be of the size specified (see 6.2).

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on the date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

Federal Specifications:

- QQ-A-225/6 - Aluminum Alloy Bar, Rod, and Wire; Rolled, Drawn, or Cold Finished, 2024.
- QQ-B-613 - Brass, Leaded and Non-Leaded; Flat Products (Plate, Bar, Sheet, and Strip).
- QQ-B-626 - Brass, Leaded and Non-Leaded; Rod, Shaped, Forgings, and Flat Products with Finished Edges (Bar and Strip).
- QQ-B-637 - Brass, Naval: Rod, Wire, Shapes, Forgings, and Flat Products with Finished Edges (Bar, Flat Wire, and Strip).
- QQ-B-728 - Bronze Manganese; Rod, Shapes, Forgings and Flat Products (Flat Wire, Strip, Sheet, Bar, and Plate).
- QQ-C-591 - Copper-Silicon, Copper-Zinc-Silicon, and Copper-Nickel-Silicon Alloys: Rod,, Wire, Shapes, Forgings, and Flat Products., (Flat Wire Strip, Sheet, Bar, and Plate).
- QQ-N-281 - Nickel-Copper-Alloy (Monel and R-Monel) Bar, Plate, Rod, Sheet, Strip, Wire, Forging, and Structural and Special Shaped Sections.
- QQ-N-286 - Nickel-Copper-Aluminum Alloy, Wrought.
- QQ-N-290 - Nickel Plating (Electrodeposited).

- QQ-P-35 - Passivation Treatments for Austenitic, Ferritic, and Martensitic Corrosion-Resisting Steel (Fastening Devices).
- QQ-P-416 - Plating, Cadmium (Electrodeposited).
- QQ-8-763 - Steel Bars, Wire, Shapes, and Forgings, Corrosion-Resisting.
- QQ-3-764 - Steel Bar, Corrosion Resisting, Free Machining.
- QQ-Z-325 - Zinc Coating, Electrodeposited, Requirements for.
- PPP-H-1581 - Hardware (Fasteners and Related Items), Packaging and Packing for Shipment and Storage of

Federal Standards:

- Fed. Std. No. 66 - Steel: Chemical Composition and Hardenability.
- Fed. Test Method Std. No. 151 - Metals; Test Methods.

(Activities outside of the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specifications:

- MIL-F-495 - Finish, Chemical, Black, for Copper Alloys.
- MIL-H-6088 - Heat Treatment of Aluminum Alloys.
- MIL-I-6866 - Inspection; Penetrant, Method of.
- MIL-I-6868 - Inspection Process, Magnetic Particle.
- MIL-I-6870 - Inspection Requirements, Non-destructive for Aircraft Materials and Parts.
- MIL-A-8625 - Anodic Coatings, for Aluminum and Aluminum Alloys.
- MIL-C-13924 - Coating, Oxide, Black for Ferrous Metals.
- MIL-P-16232 - Phosphate Coatings,, Heavy, Manganese or Zinc Base (for Ferrous Metals).
- MIL-M-20693 - Molding Plastic, Polyamide (Nylon), Rigid.
- MIL-C-45662 - Calibration System Requirements.

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Military Standards:

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-109 - Quality Assurance Terms and Definitions.
- MIL-STD-410 - Certification of Penetrant Inspection Personnel.
- MIL-STD-1312 - Fasteners, Test Methods.
- MS16994 - Nut, Plain, Knurled.
- MS24679 - Nut, Plain, Cap, High Crown, UNC-2B and UNF-2B.
- MS24680 - Nut, Plain, Cap, Low Crown, UNC-2B and UNF-2B.
- MS27127 - Nut, Plain, Welding - without Pilot.
- MS27128 - Nut, Plain, Welding - Pilot.
- MS35692 - Nut, Slotted, Hexagon.

Military Handbook:

- MIL-HDBK-131 - Military Handbook, Identification Markings for Fasteners; Bolts, Screws, Studs, Nuts and Rivets.

(Copies of Military Specifications and Standards required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified the issue in effect on date of invitation for bids or request for proposal shall apply.

American National Standards Institute (ANSI) Standards:

- ANSI B18.2.2 - Square and Hex Nuts.
- ANSI B18-6.3 - Slotted and Recessed Head Machine Screws and Machine Screw Nuts.

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, New York 10018.)

American Society for Testing and Materials (ASTM) Standard:

- A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- B154 - Mercurous Nitrate Test for Copper and Copper Alloys.

(Application for copies should be addressed to American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

National Bureau of Standards (NBS) Handbook:

- H28, Part 1 - Screw Thread Standards for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

Industrial Fasteners Institute (IFI) Standard:

IFI-106(1968) - Recommended Practice on Surface Discontinuities
On Nuts for Automotive Applications

(Application for copies should be addressed to the Industrial Fasteners Institute, 1505 East Ohio Bldg., 1717 E. Ninth Street, Cleveland, Ohio 44114.)

3. REQUIREMENTS

3.1 Materials.

3.1.1 Steel, carbon or low alloy. Unless otherwise specified (see 6.2), material for carbon steel nuts shall conform in chemical composition to Table IV. Unless otherwise specified (see 6.2), Grade A nuts shall be furnished. When specified (see 6.2), carbon steel nuts shall conform in chemical composition to Table V. For proof-load requirements see 3.3.

3.1.1.1 Steel, carbon or low alloy (Nuts, welding). Steel welding nuts, type VIII, styles 19 and 20 shall be made from steel which meets the material and proof-load requirements of MS27127 and MS27128 (see 6.2).

3.1.2 Corrosion-resisting steel. Corrosion-resisting steel nuts shall be made from materials of the 300 series (302, 303) 304, 305, 316, 317 and 347) and 400 series (410, 414 and 416) as specified (see 6.2), in conformance with the chemical composition requirements of Fed. Std. No. 66 and the mechanical property requirements of QQ-S-763 and QQ-S-764, as applicable. The 300 series nuts shall be condition A and shall have an ultimate tensile strength of 75,000 psi min. The 400 series nuts shall be condition T or H and shall have an ultimate tensile strength of 100,000 psi min. For proof load requirements see 3.3.

3.1.3 Non-ferrous materials. When specified (see 6.2), nuts shall be made from the following non-ferrous materials.

3.1.3.1 Brass. Naval brass shall be in accordance with QQ-B-637, alloy no. 464, half-hard, and shall have an ultimate tensile strength of 60,000 psi min. Leaded and non-leaded brass shall be in accordance with QQ-B-613, alloy no. 260, half-hard, or QQ-B-626, alloy no. 260, half-hard, and shall have an ultimate tensile strength of 60,000 psi min.

3.1.3.2 Aluminum alloy. Aluminum alloy shall be in accordance with QQ-A-225/6, To temper when heat-treated in accordance with MIL-H-6088, and shall have an ultimate tensile strength of 62,000 psi min.

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3.1.3.3 Nickel-copper alloy. Nickel-copper alloy shall be in accordance with QQ-N-281, class A or class B, and shall have an ultimate tensile strength of 80,000 psi min.

3.1.3.4 Silicon bronze. Silicon bronze shall be in accordance with QQ-C-591, alloy no. 651, hard or alloy no. 655, half-hard, and shall have an ultimate tensile strength of 60,000 psi min.

3.1.3.5 Manganese bronze. Manganese bronze shall be in accordance with CR-B-728, class A, soft, and shall have an ultimate tensile strength of 55,000 psi min.

3.1.3.6 Nickel-copper-aluminum alloy. Nickel-copper-aluminum alloy shall be in accordance with QQ-N-266, class A or class B, age hardened, and shall have an ultimate tensile strength of 130,000 psi min.

3.1.4 Plastic (nylon). Plastic (nylon) nuts shall be made from material in accordance with MIL-M-20693, type I, natural color.

3.1.5 Material for cap, knurled, and slotted nuts. Cap, knurled and slotted nuts procured under this specification (see 6.2), shall meet the requirements of this specification, MS24679 and MS24680 for cap nuts, MS16994 for knurled nuts and MS35692 for slotted nuts.

3.2 Stress relief of brass and bronze nuts. Cold-worked brass and bronze nuts shall be stress relieved by heating the part to a temperature of 600 deg. F, and holding at that temperature for a minimum of one hour per inch diameter or thickness. Cold-worked brass or bronze nuts shall pass the mercurous nitrate test of 4.5.5 without evidence of cracks. Stress relief of nuts made of extruded or soft temper brass or bronze will not be required.

3.3 Proof loads. Carbon or low alloy steel and corrosion-resisting steel nuts shall pass their respective proof-loads specified in tables VI and VII and MS sheet form standards as applicable, without evidence of stripped threads or ruptured metal. These requirements are based on the principle that the nut shall be capable of withstanding a stripping load equal to the minimum tensile strength requirements of the bolt grade with which it is used.

3.4 Dimensions. Dimensions, including thickness, width across flats and corners, chamfer, diameter and depth of washer face and perpendicularity of bearing surface with axis of thread shall conform to the applicable tables of ANSI B18.2.2 and B18.6.3, except welding, cap, slotted and knurled nuts which shall agree with the applicable MS (see 3.1.1.1 and 3.1.5). Dimensions of single ball seat nuts shall be as specified (see 6.2).

3.4.1 Slot tolerance. Opposite slots of slotted and castle nuts shall coincide within 0.005 inch and the slot axis shall be within 0.005 inch of the pitch diameter axis.

3.5 Threads.

3.5.1 Series and class. Threads shall be class 2B, UNC, UNF or 8 thread series as specified (see 6-2). The dimensions and tolerances of these threads shall conform to Handbook H28.

3.5.2 Overtapping of nuts. Hot-dip galvanized nuts shall be tapped after galvanizing and shall be tapped oversize by the following minimum diametral amounts:

.4375 inch diameter and smaller.....	0.010 inch
Over .4375 inch to 1.000 inch diameter.....	0.015 inch
Over 1.000 inch diameter.....	0.020 inch

3.6 Protective finishes. Nuts shall be furnished uncoated, passivated or coated, as specified (see 6.2). When cadmium, zinc, nickel, black oxide, anodic or passivation coatings are specified, they shall be coated in accordance with 3.6.1 thru 3.6.7, as applicable.

3.6.1 Cadmium finish. Cadmium finish shall conform to type II, class 3 of QQ-P-416. Toxic effects are possible from the welding of cadmium plated nuts.

3.6.2 Zinc finishes.

3.6.2.1 Zinc, electrodeposited. Electrodeposited zinc finish shall be in accordance with type II, class 3 of QQ-Z-325. Electrodeposited finish shall be used only on .500 inch (nominal size) and smaller.

3.6.2.2 Zinc, Hot Dipped. Zinc hot-dipped (galvanizing) shall conform to ASTM A153,

3.6.3 Phosphate coating. Phosphate coating shall conform to type Z, class 2 of MIL-P-16232.

3.6.4 Anodic coating. Anodic coating shall conform to type II of MIL-A-8625.

3.6.5 Nickel plating. Nickel plating shall conform to class 2 of QQ-N-290.

3.6.6 Black oxide coating. Black oxide coating for carbon and low alloy steel shall conform to class 1 of MIL-C-13924, for copper alloys the finish shall conform to MIL-F-495 and for 300 series corrosion-resisting steel the coating shall conform to class 4 of MIL-C-13924.

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3.6.7 Passivation. Passivation treatments shall conform to QQ-P-35.

3.7 Identification markings. When specified (see 6.2), nuts shall be marked in accordance with MIL-HDBK-131.

3.8 Discontinuities. Discontinuities such as laps, seams, and inclusions in the nuts shall not exceed the depth limits specified in Table I and illustrated in Figure 2. The length shall not exceed the height of the nut when tested as specified in 4.5.7.

3.8.1 Cracks. A crack is a clear crystalline fracture passing through or across the grain boundaries without inclusion of foreign elements. Quench cracks are not permitted in any location. Forging cracks located in the top and bottom face are permitted provided that there are no more than two forging cracks which extend from the tapped hole across the full width of the face; no forging crack extends into the tapped hole beyond the first full thread; and the width of any forging crack does not exceed 0.008 inch plus 0.010D, where D is the nominal nut size in inches. Forging cracks located at the intersection of the top or bottom face with the flat are permitted provided that the width does not exceed 0.010 inch plus 0.020D, where D is the nominal nut size in inches.

TABLE I. Limits of depths on laps, seams, inclusions and forging cracks of nuts.

Thread size of nut (Inch)	Depth limits (Inch)	Thread size of nut (Inches)	Depth limits (Inch)
.3125 and under	0.010	.750	0.019
.375	0.011	.875	0.022
.4375	0.012	1.000	0.022
.500	0.014	1.125	0.022
.5625	0.016	1.250	0.022
.625	0.017	1.4375 and over	0.025

3.9 Decarburization. The decarburization limits of the bars from which the non-corrosion-resistant steel nuts are to be made shall not exceed the values specified in table II (see 4.5.8).

TABLE II. Decarburization limits

Thread size (Inches)	Complete decarburization (Max. in inches)	Complete plus partial decarburization (Max. in inches)
Hot Rolled Bars		
Up to .500 incl	0.003	0.010
Over .500 to .750 incl	0.004	0.012
Over .750 to 1.000 incl	0.005	0.015
Over 1.000 to 1.500 incl	0.007	0.020
Over 1.500 to 2.000 incl	0.008	0.025
Over 2.000 to 2.500 incl	0.010	0.030
Over 2.500 to 3.000 incl	0.012	0.035
Over 3.000	0.015	0.050
Annealed or Cold Drawn Bars		
Up to .500 incl	0.006	0.015
Over .500 to 1.000 incl	0.007	0.017
Over 1.000 to 1.500 incl	0.008	0.020
Over 1.500 to 2.000 incl	0.010	0.025
Over 2.000 to 2.500 incl	0.012	0.030
Over 2.500 to 3.000 incl	0.014	0.035
Over 3.000	0.020	0.050

3.10 Workmanship. The workmanship shall be compatible with the type of product, class of fit, and finish specified. The nuts shall be free from pipes, fissures, gas cavities, sponginess, segregation, scale, fins, seams, or any other defects which might affect their serviceability.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facility 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 that supplies and services conform to prescribed requirements.

4.2 Inspection terms. Inspection terms and definitions used herein are in accordance MIL-STD-109.

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4.2.1 Inspection equipment and facilities. The contractor shall establish and maintain a calibration system in accordance with MIL-C-45662.

4.3 Inspection lot. All nuts of the same type, material, protective finish, thread series, and size, produced under essentially the same conditions and offered for acceptance at one time shall be considered a lot for the purpose of inspection.

4.4 Sampling for examination. A random sample of nuts shall be taken from each lot, in accordance with MIL-STD-105, at inspection level II. The acceptable quality level (AQL) shall be as specified in table III.

TABLE III. Classification of defects

Categories	Defects	Method of Inspection
Critical	None defined	
Major A	AQL = 1.5 percent defective	
101	Threads, not as specified (3-5)	SIE*
102	Width across flats, incorrect (3.4)	SIE
103	Perpendicularity of bearing, face with thread axis (3.4)	SIE
Major B	AQL = 2.5 percent defective	
104	Laps, seams and cracks (3.8)	Visual and SIE
105	Thickness (3.4)	SIE
106	Protective finish (when specified) missing or incorrect type (3.6)	Visual
Minor	AQL = 4.0 percent defective	
201	Diameter and depth of washer face (when required), incorrect (3.4)	SIE
202	Width and depth of slots (when required), incorrect (3.4)	SIE
203	Chamfers or countersunk, missing	SIE
204	Identification marking (when required), missing or incorrect (3-7)	Visual
205	Width across corners, incorrect (3.4)	SIE

* Standard inspection equipment

4.4.1 Sampling for proof load testing (steel nuts). A random sample of nuts shall be taken from each lot in accordance with MIL-STD-105, at inspection level S-1, with an AQL of 2.5 percent defective.

4.4.2 Sampling for protective finish test. Sampling for tests of protective finishes shall be in accordance with the applicable specifications in 3.6.1 through 3.6.7.

4.4.3 Sampling for mercurous-nitrate test. A random sample shall be taken from each lot of cold-worked brass or bronze nuts in accordance with MIL-STD-105, at inspection level S-1, with an AQL of 2.5 percent defective.

4.4.4 Sampling for packaging and packing. Sampling for preservation, packaging, packing and marking shall be in accordance with PPP-H-1581.

4.4.5 Sampling for chemical analysis. When chemical analysis is specified (see 6.2), sampling shall be in accordance with Fed. Test Method Std. No. 151 for the test in 4.5.3.

4.4.6 Sampling for hardness test. Sampling for hardness of nuts excluded from the proof load test in 4.5.1 shall be in accordance with level S-4 of MIL-STD-105 with an AQL of 2.5 percent defective.

4.4.7 Discontinuities. Sampling for discontinuities by means of magnetic particle inspection or penetrant inspection shall be at random in accordance with MIL-STD-105, with an AQL of 2.5 percent defective. The acceptance and rejection numbers of this sampling plan shall apply to those nuts which are judged defective or are in non-conformance with the requirements contained herein after microexamination has been performed on those samples revealing indications. These inspection requirements shall not apply to nuts of less than .250 inch thread size.

4.4.8 Sampling for slot alignment test. Sampling for slot alignment of slotted and castle nuts shall be in accordance with level S-4 of MIL-STD-105, with an AQL of 4.0 percent defective.

4.5 Test methods.

4.5.1 Proof load. Each nut of the sample taken in accordance with 4.4.1 shall be subjected to the proof-load test and tables VI, VII, as applicable. Jam, slotted, castle and machine-screw nuts, nuts under standard thickness, plated nuts tapped oversize, or nuts with specified proof-loads beyond the capacity of commercially available testing equipment shall not be subjected to the proof-load test but shall meet the hardness test in 4.5.2.

4.5.1.1 Test equipment. A hardened threaded mandrel shall be used in conjunction with a tension testing machine for conducting the proof-load test. The mandrel shall be threaded to Unified Thread Series, class 3A, except that the major diameter shall be the minimum major diameter with a plus tolerance of 0.002 inch. The mandrel shall have a minimum hardness of Rockwell C45. In lieu of a hardened mandrel, a bolt with a minimum hardness of Rockwell C45 may be used.

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4.5.1.2 Test procedures. The nuts, with the exception of nuts covered by table V, shall be assembled to the mandrel of 4.5.1.1 and mounted in a tension testing machine and subjected to a load equal to the proof-load in tables VI or VII, for the nut size applied, to determine conformance to 3.3. To meet the requirements of this test, the nut shall resist the load without stripping or rupture. If the threads of the mandrel are damaged during the test, the test shall be discarded. If the unit tensile strength developed in the mandrel is required, the load thus obtained shall be divided by the stress area as given in tables VI and VII.

4.5.2 Hardness test. When a hardness test is to be conducted in lieu of a proof-load test (see 4.5.1), it shall be conducted in accordance with Test No. 6 of MIL-STD-1312 to determine conformance to tables IV or V of this specification.

4.5.3 Chemical analysis. When chemical analysis is specified (see 6.2), conformance to chemical composition requirements shall be determined by method 111.2 or method 112.2 of Fed. Test Method Std. No. 151. In case of dispute, method 111.2 shall be the basis for acceptance.

4.5.4 Protective finish test. Tests of protective finishes shall be conducted in accordance with the applicable specifications in 3.6.1 through 3.6.7.

4.5.5 Mercurous-nitrate test. (Stress relieved nuts.) The mercurous nitrate test of stress relieved brass and bronze nuts shall be conducted in accordance with ASTM B154 to determine conformance to 3.2.

4.5.6 Examination and tests of Packaging end packing. Examination and tests of preservation, packaging, packing and marking shall be in accordance with PPP-H-1581.

4.5.7 Discontinuities. This test is not applicable to nuts of less than .250 inch thread size. The presence of discontinuities in nuts shall be determined by magnetic particle inspection or penetrant inspection, depending upon the material, unless visual inspection discloses discontinuities which would preclude the necessity for such inspection. Indications of discontinuities shall not be cause for rejection provided they are within the limits of 3.8, table III and fig. 2. When specified (see 6.2), samples shall be subjected to the cone proof load test specified in IFI-106.

4.5.7.1 Magnetic particle inspection. Magnetic particle inspection shall be performed in accordance with MIL-I-6868. The nuts shall be magnetically inspected in accordance with MIL-I-6870. Personnel conducting magnetic particle inspection shall be certified in accordance with MIL-STD-410.

4.5.7.2 Penetrant inspection. Penetrant inspection shall be performed in accordance with MIL-I-6866. Personnel conducting penetrant inspection shall be certified in accordance with MIL-STD-410.

4.5.8 Decarburization. Microscopic examination to determine the extent of decarburization of bars from which non-corrosion-resisting steel nuts are to be fabricated shall be made on sample specimens at a magnification of 100 diameters. The etchant shall be 5 percent nital.

4.5.9 Slot alignment. Samples taken as specified in 4.4.8 shall be tested to determine conformance to 3.4.1. To check the slot alignment, use a threaded plug having the same basic pitch diameter as the nut being tested. The plug shall have a slot in one end wide enough to accept a round pin of the required diameter without looseness. The plug shall be screwed into the nut and the three slots aligned so that the pin will pass through.

Slot Dia	Pin Dia	Slot Dia	Pin Dia
.078	.073	.188	.168
.094	.084	.203	.183
.125	.110	.250	.230
.156	.141	.312	.292
.172	.152	.375	.355

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, packing, and marking. Preservation, packaging, packing, and marking shall be in accordance with PPP-H-1581 (see 6.2).

5.2 Levels. Levels of preservation, packaging, and packing shall be as specified by the procuring activity (see 6.2).

6. NOTES

6.1 Intended use. This specification covers various types of nuts (1.2.1) which are designed for assembly with bolts and screws for application at normal atmospheric temperatures.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- a. Title, number and date of this specification.

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- b. Type; style, size and thread series of nut (1.2.1, 1.2.2 and 3.5.1).
- c. Material, type and grade, if applicable (3-1). If grade is not specified, carbon or low alloy steel nuts will be Grade A (3.1.1).
- d. Dimensions of single ball seat nuts (3.4).
- e. Type of protective finish, if required (3.6).
- f. Marking when required (3.7).
- g. Chemical analysis, if required (4.5.3).
- h. Cone proof load test, if required (4.5.7).
- i. Level of packaging and packing (5.2).

6.3 Military procurement. Items procured under this specification for Military use are to be limited to the variety shown on the applicable Military Standard. Personnel of the Military departments are requested to refer to these documents for guidance (see 3.1.1.1 and 3.1.4).

6.4 Cross reference data. Supersession data cross references, between the types and styles of nuts covered by this specification and the group, types and styles of the preceding FF-N-836, dated September 16, 1955, FF-N-836a, dated January 18, 1961, FF-N-836b, dated January 26, 1965 and FF-N-836C, dated September 5, 1968 are shown in Table VIII.

Type VI - Nuts, plain, clinch have been deleted from this specification and are now covered by MIL-N-45938.

6.5 Supersession data. This specification includes the requirements of FF-N-836C, dated September 5, 1968, FF-B-571A, dated January 9, 1934 in part, MIL-B-857A (Ships), dated 1 June 1956 in part and MIL-N-6034B, dated 7 October 1965 (see Table IX).

6.6 International interest. Certain provisions, type II, style 4 and 5, nuts, hexagon, plain and jam - type II, style 9 and 10, nuts, hexagon, heavy flat and heavy flat jam - type II, style 11 and 12, nuts, hexagon, heavy and heavy jam - type IV, style 16, nuts, slotted, plain - type IV, style 17, nuts, slotted, thick - of this specification are the subject of international standardization agreement (ABC). When amendment, revision, or cancellation of this specification is proposed, the departmental custodians will inform their respective departmental standardization offices so that appropriate action may be taken respecting the international agreement concerned.

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TABLE IV. MECHANICAL AND CHEMICAL PROPERTIES OF CARBON AND ALLOY STEEL NUTS

GRADE	NOMINAL SIZE	ANALYSIS	CHEMICAL COMPOSITION			ULTIMATE TENSILE STRENGTH - PSI MIN				ROCKWELL HARDNESS	
			CARBON MAX %	PHOS- PHORUS MAX %	SULFUR MAX %	HEXAGON AND SQUARE NUTS		HEXAGON THICK AND HEAVY NUTS		MIN	MAX
						UNC	UNF	UNC	UNF		
A	.250-4.000	LADLE	0.55	0.12	0.15	90,000	80,000	100,000	90,000	B80	C32
		CHECK	0.58	0.13	--						
B	.250-1.000	LADLE	0.55	0.12	0.15	120,000	109,000	133,000	120,000	B95	C32
		CHECK	0.58	0.13	--						
	1.125-3.000	LADLE	0.55	0.12	0.15	105,000	94,000	116,000	105,000	B90	C32
		CHECK	0.58	0.13	--						
C	.500-3.000	LADLE	0.55	0.12	0.15	144,000	130,000	160,000	144,000	C22	C38
		CHECK	0.58	0.13	--						
D	.250-1.500	LADLE	0.55	0.04	0.05	150,000	135,000	165,000	150,000	C25	C38
		CHECK	0.58	0.048	0.058						

TABLE V. MECHANICAL AND CHEMICAL PROPERTIES OF CARBON AND ALLOY STEEL NUTS (FOR NAVY USE)

MATERIAL	NOMINAL SIZE	PROOF LOAD (PSI)						HARDNESS		COMPOSITION	
		HEXAGON NUTS		HEXAGON JAM NUTS		HEXAGON SLOTTED NUTS		BRINELL	ROCKWELL	PHOS- PHORUS % MAX	SULFUR % MAX
		UNC	UNF	UNC	UNF	UNC	UNF				
GRADE 1	ALL SIZES	55,000	55,000	---	---	---	---	207 MAX	95B MAX	0.05	0.06
GRADE 2	UP TO .500 INCL. OVER .500 TO .750 INCL OVER .750	69,000	69,000	41,000	41,000	55,000	55,000	---	---	0.04	0.05
		64,000	64,000	33,000	33,000	51,000	51,000	---	---	0.04	0.05
		55,000	55,000	33,000	33,000	44,000	44,000	---	---	0.04	0.05
GRADE 5	UP TO .750 INCL OVER .750 TO 1.000 INCL OVER 1.000 TO 1.500 INCL OVER 1.500	120,000	109,000	72,000	65,000	96,000	87,000	187 MIN	90B MIN	0.04	0.05
		115,000	104,000	69,000	62,000	92,000	83,000	175 MIN	88B MIN	0.04	0.05
		105,000	94,000	63,000	57,000	84,000	75,000	156 MIN	83B MIN	0.04	0.05
		90,000	79,000	54,000	47,000	72,000	63,000	121 MIN	69B MIN	0.04	0.05
GRADE 8	.250 TO 1.500 INCL	150,000	150,000	90,000	90,000	120,000	120,000	248-302	24-32C ^{1/}	0.04	0.05

^{1/} Rockwell 37C maximum permissible on sizes 1.250 inches and larger.

of Carbon and Alloy Steel Nuts]

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TABLE VI. MINIMUM PROOF LOADS OF STEEL AND CORROSION RESISTING STEEL NUTS - COARSE THREAD

NCM SIZE DIA OF THD (IN.)	THREADS PER INCH UNC	STRESS AREA OF MATING EXTERNAL THREADS (SQ. IN.)	PROOF LOADS - POUNDS, MIN ^{1/} _{2/}									
			GRADE A		GRADE B		GRADE C		GRADE D		300 SERIES ALL NUTS	400 SERIES ALL NUTS
			HEX & SQUARE	HEAVY AND THICK	HEX & SQUARE	HEAVY AND THICK	HEX & SQUARE	HEAVY AND THICK	HEX & SQUARE	HEAVY AND THICK		
.250	20	0.0318	2,862	3,180	3,800	4,229	----	----	4,770	5,250	2,400	3,175
.3125	18	0.0524	4,716	5,240	6,288	6,969	----	----	7,860	8,650	3,950	5,250
.375	16	0.0775	6,975	7,750	9,300	10,308	----	----	11,625	12,800	5,800	7,750
.4375	14	0.1063	9,567	10,650	12,756	14,138	----	----	15,945	17,540	7,975	10,650
.500	13	0.1419	12,771	14,200	17,028	18,872	20,433	22,700	21,285	23,400	10,650	14,200
.5625	12	0.182	16,380	18,200	21,840	24,200	26,208	29,120	27,300	30,000	13,650	18,200
.625	11	0.226	20,340	22,600	27,120	30,058	32,540	36,160	33,900	37,300	16,950	22,600
.750	10	0.334	30,060	33,400	40,080	44,422	48,100	53,440	50,100	55,100	25,050	33,400
.875	9	0.462	41,580	46,200	55,440	61,446	66,528	73,920	69,300	76,230	34,650	46,200
1.000	8	0.606	54,540	60,600	72,720	80,600	87,264	96,960	90,900	100,000	45,450	60,600
1.125	7	0.763	68,670	76,300	80,100	88,500	109,872	122,000	114,450	125,900	57,225	76,300
1.250	7	0.969	87,210	96,900	101,750	112,400	139,536	155,200	145,350	159,900	72,675	96,900
1.375	6	1.155	103,950	115,500	121,300	134,000	166,320	184,800	173,250	190,600	86,625	115,500
1.500	6	1.405	126,450	140,500	147,500	162,980	202,320	224,800	210,750	231,800	105,375	140,500
1.750	5	1.900	171,000	190,000	199,500	220,400	273,600	304,000			142,500	190,000
2.000	4-1/2	2.500	225,000	250,000	262,500	290,000	360,000	400,000			187,500	250,000
2.250	4-1/2	3.250	292,500	325,000	341,850	377,000	468,000	520,000			243,750	325,000
2.500	4	4.000	360,000	400,000	420,000	464,000	576,000	640,000			300,000	400,000
2.750	4	4.930	443,700	493,000	517,650	571,880	690,200	788,800			367,750	493,000
3.000	4	5.970	537,300	597,000	626,850	692,520	859,680	955,200			447,750	597,000
3.250	4	7.100	639,000	710,000							532,500	710,000
3.500	4	8.330	749,700	833,000							622,500	833,000
3.750	4	9.660	869,400	966,000							724,500	966,000
4.000	4	11.080	997,200	1,108,000							831,000	1,108,000

1/ Strengths of slotted and castle nuts shall be assumed as 67 percent of the tabulated loads.
Strengths of jam nuts shall be assumed as 50 percent of the tabulated loads.

2/ Proof-loads shown above are based on stress areas shown and minimum tensile strengths specified. (See Table IV for carbon steel nuts and 3.1.2 for creas. nuts.)

Steel Nuts - Coarse Thread]

TABLE VII. MINIMUM PROOF LOADS OF STEEL AND CORROSION RESISTING STEEL NUTS - FINE THREAD

NOM SIZE DIA OF TND (IN.)	THREADS PER INCH UNF	STRESS AREA OF MATING EXTERNAL THREADS (SQ. IN.)	PROOF LOADS - POUNDS, MIN 1/ 2/									
			GRADE A		GRADE B		GRADE C		GRADE D		300 SERIES ALL NUTS	400 SERIES ALL NUTS
			HEX & SQUARE	HEAVY AND THICK	HEX & SQUARE	HEAVY AND THICK	HEX & SQUARE	HEAVY AND THICK	HEX & SQUARE	HEAVY AND THICK		
.250	28	0.0364	2,912	3,280	3,970	4,368	----	----	4,914	5,460	2,750	3,650
.3125	24	0.0580	4,640	5,220	6,322	6,960	----	----	7,830	8,700	4,350	5,800
.375	24	0.0878	7,024	7,900	9,570	10,536	----	----	11,853	13,170	6,590	8,780
.4375	20	0.1187	9,500	10,680	12,940	14,244	----	----	16,025	17,800	8,900	11,870
.500	20	0.1599	12,792	14,390	17,430	19,188	20,790	23,000	21,586	23,980	12,000	15,990
.5625	18	0.203	16,240	18,270	22,130	24,360	26,400	29,232	27,405	30,450	15,250	20,300
.625	18	0.256	20,480	23,040	27,900	30,720	33,300	36,900	34,560	38,400	19,200	25,600
.750	16	0.373	29,840	33,510	40,660	44,760	48,500	53,700	50,355	55,950	27,980	37,300
.875	14	0.509	40,720	45,810	55,480	61,080	66,200	73,300	68,715	76,350	38,180	50,900
1.000	12	0.663	53,040	59,670	72,267	79,560	86,200	95,500	89,505	99,450	49,725	66,300
1.125	12	0.856	68,480	77,040	80,464	89,900	111,300	123,300	115,560	128,400	64,200	85,600
1.250	12	1.073	85,840	96,570	100,862	112,665	139,500	154,500	144,885	160,950	80,480	107,300
1.375	12	1.315	105,200	118,350	123,610	138,075	171,000	189,400	177,525	197,250	98,650	131,500
1.500	12	1.581	126,480	142,300	148,614	166,000	205,500	227,700	213,435	237,150	118,580	158,100
1.750	12	2.190	175,200	219,000	205,860	229,950	284,700	315,400			164,250	219,000
2.000	12	2.890	231,200	289,000	271,660	303,450	375,700	416,200			216,750	289,000
2.250	12	3.690	295,200	369,000	346,860	387,450	479,700	531,400			276,750	369,000
2.500	12	4.600	368,000	460,000	432,400	483,000	598,000	662,400			345,000	460,000
2.750	12	5.590	447,200	559,000	525,460	586,960	726,700	805,000			419,250	559,000
3.000	12	6.690	535,200	669,000	628,860	702,450	869,700	963,400			501,750	669,000
3.250	12	7.890	631,200	789,000							591,750	789,000
3.500	12	9.180	734,400	918,000							688,500	918,000
3.750	12	10.570	845,600	1,057,000							792,750	1,057,000
4.000	12	12.060	964,800	1,206,000							904,500	1,206,000

1/ Strengths of slotted and castle nuts shall be assumed as 67 percent of the tabulated loads.
Strengths of jam nuts shall be assumed as 50 percent of the tabulated loads.

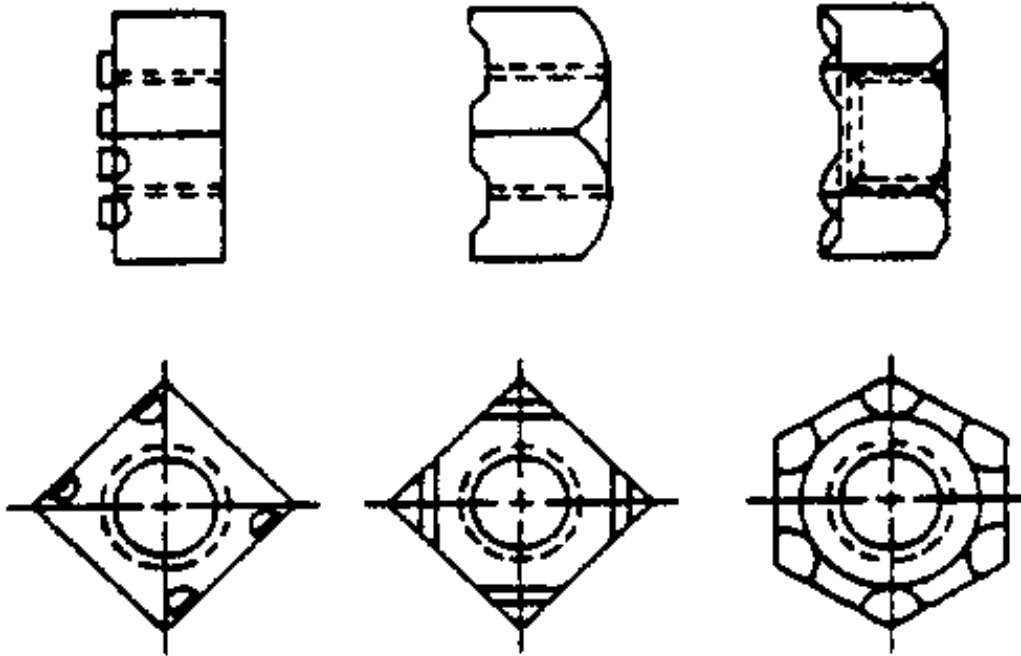
2/ Proof-loads shown above are based on stress areas shown and minimum tensile strengths specified. (See Table IV for carbon steel nuts and 3.1.2 for crec. nuts.)

Steel Nuts - Fine Thread]

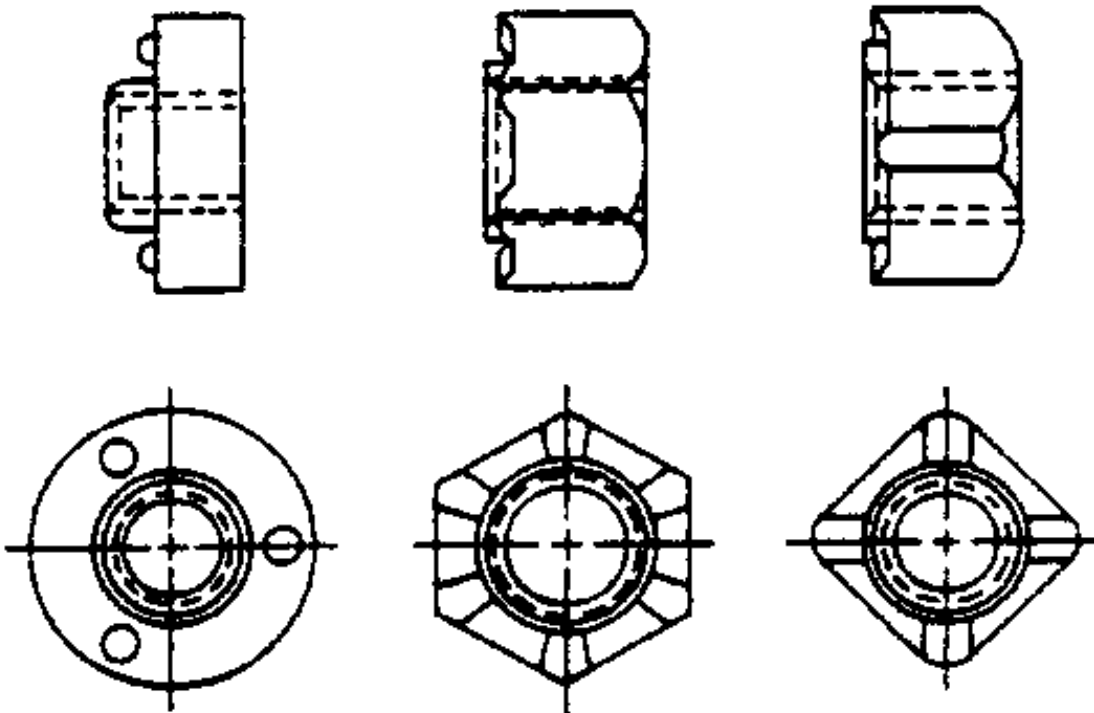
FF-N-836D

TABLE VIII. Cross reference data

FF-N-836	FF-N-836A	FF-N-836B	FF-N-836C	FF-N-836D
Group A				
Type 1	Type I Style 1	Type I Style 1	Type I Style 1	Type I Style 1
Type 2	Type I Style 2	Type I Style 2	Type I Style 2	Type I Style 2
Group B				
Type 1				
None	None	Type I Style 4	Type VIII Style 19	Type VIII Style 19
None	None	Type I Style 5	Type VIII Style 20	Type VIII Style 20
Style 1	Type II Style 1	Type II Style 1	Type II Style 4	Type II Style 4
Style 2	Type II Style 2	Type II Style 2	Type II Style 5	Type II Style 5
Style 3	Type IV Style 1	Type IV Style 1	Type IV Style 16	Type IV Style 16
Style 4	Type V Style 1	Type V Style 1	Type V	Type V
Type 2				
Style 1	Type II Style 3	Type II Style 3	Type II Style 6	Type II Style 6
Style 2	Type IV Style 2	Type IV Style 2	Type IV Style 17	Type IV Style 17
Type 3				
Style 1	Type II Style 4	Type II Style 4	Type II Style 7	Type II Style 7
Style 2	Type II Style 5	Type II Style 5	Type II Style 8	Type II Style 8
Style 3	Deleted	None	None	None
Style 4	Deleted	None	None	None
Style 5	Deleted	None	None	None
Type 4				
Style 1	Type II Style 6	Type II Style 6	Type II Style 9	Type II Style 9
Style 2	Type II Style 7	Type II Style 7	Type II Style 10	Type II Style 10
Style 3	Type II Style 8	Type II Style 8	Type II Style 11	Type II Style 11
Style 4	Type II Style 9	Type II Style 9	Type II Style 12	Type II Style 12
Style 5	Type IV Style 3	Type IV Style 3	Type IV Style 18	Type IV Style 18
Type 5				
Style 1	Type III Style 1	Type III Style 1	Type III Style 14	Type III Style 14
Style 2	Type III Style 2	Type III Style 2	Type III Style 15	Type III Style 15
Group C				
Type 1	Type I Style 3	Type I Style 3	Type I Style 3	Type I Style 3
Type 2				
Style 1	Type II Style 10	Type II Style 10	Type II Style 13	Type II Style 13
None	None	Type II Style 11	Type VIII Style 20	Type VIII Style 20
None	None	None	Type VI	Deleted
None	None	None	Type VII	Type VII
None	None	None	Type IX	Type IX



**WELDING, WITHOUT PILOT
TYPE VIII, STYLE 19**



**WELDING, WITH PILOT
TYPE VIII, STYLE 20**

FIGURE 1 - NUTS

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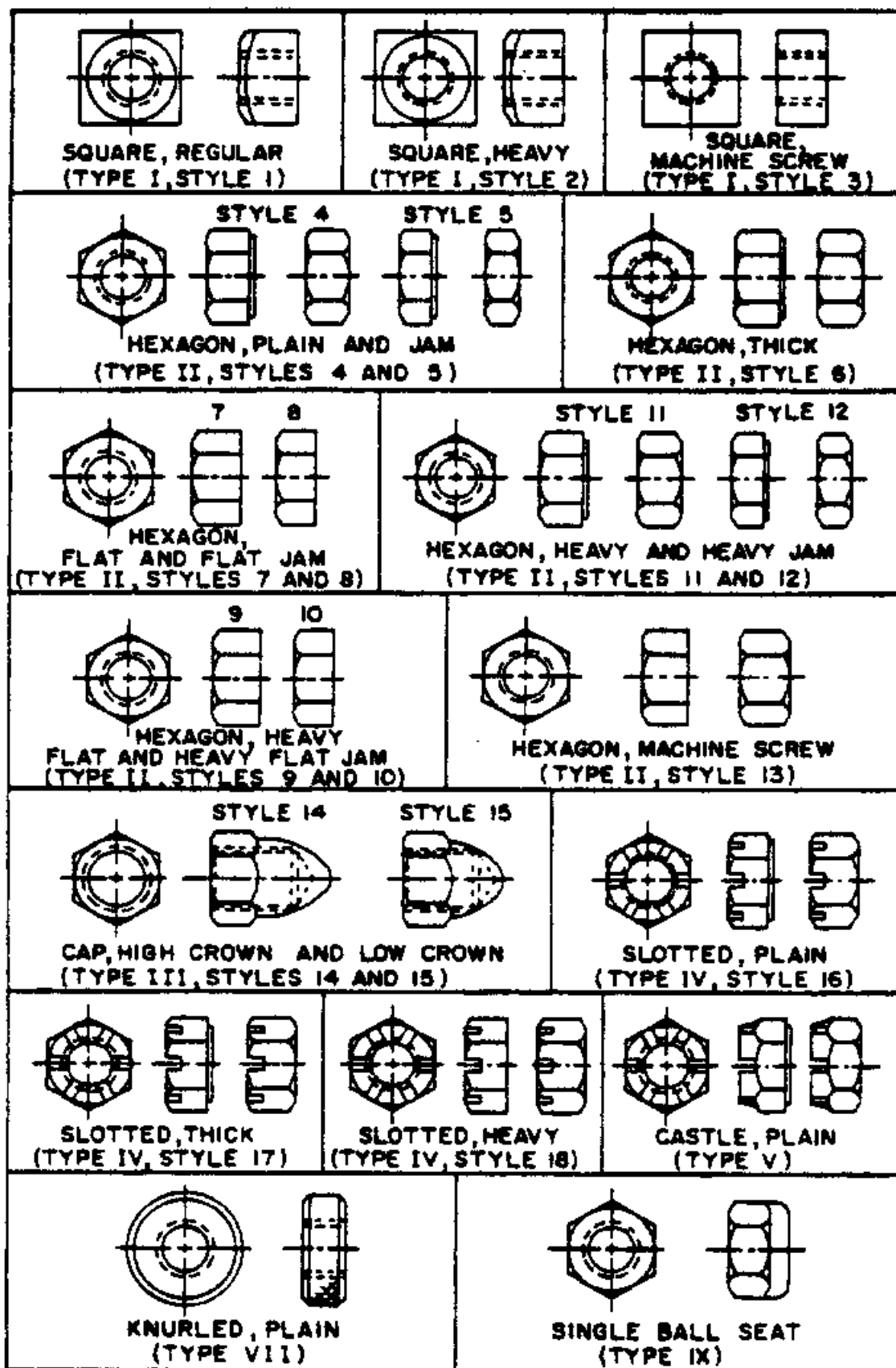
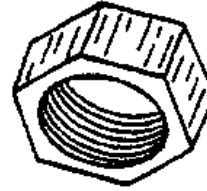


FIGURE 1 (CONTD) - NUTS

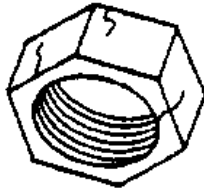


Seam extends into washer face and side, forged nut.

Acceptable, provided discontinuities are within the limits of Table I.



Toolmarks and draw marks on nuts as a result of normal machining or heading operations shall not be cause for rejection.



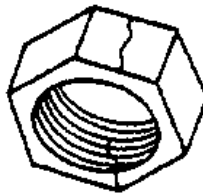
Nuts fabricated from bar stock which has seams, laps or inclusions which intersect an edge.

Acceptable, provided discontinuities are within the limits of Table I.



Nuts having seams, laps or inclusions which intersect an edge in line with beam slots passing through the center of the hex flats.

Acceptable, provided discontinuities are within the limits of Table I.



Nuts having laps or seams due to the forming of the metal in excess of the limits specified in Table I - Rejectable.

Figure 2 - Discontinuities

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Military Custodians:

Army - WC
Navy - SH
Air Force 82

Preparing Activity:

Army - WC

Civil Agency Coordinating Activity:

Review Activities:

Army - AV, MI, MU
Navy - None
Air Force - None
DSA - IS

GSA-FSS

User Activities:

Army - AT, GL, ME
Navy - AS, MC, OS, YD
Air Force - None

Orders for this publication are to be placed with the General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein. Price 20 cents each.

FF-N-836D
AMENDMENT 3
January 31, 1989
SUPERSEDING
Amendment 2
April 25, 1984

FEDERAL SPECIFICATION

NUT: SQUARE, HEXAGON, CAP, SLOTTED, CASTLE,
KNURLED, WELDING AND SINGLE BALL SEAT

This amendment, which forms a part of Federal Specification FF-N-836D, dated April 24, 1972, is approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

Page 3

Paragraph 2.1, Military Specifications

ADD: "MIL-C-81562 - Coatings, Cadmium, Tin-Cadmium and Zinc (Mechanically Deposited)".

DELETE: "MIL-I-6866 - Inspection; Penetrant, Method of" and "MIL-I-6868 - Inspection Process, Magnetic Particle"

Page 4

Paragraph 2.1, Military Standards

ADD: "MIL-STD-1949 - Inspection, Magnetic Particle
MIL-STD-6866 - Inspection, Liquid Penetrant"

Paragraph 2.2, Other Publications, ASTM

ADD: "A108-Steel Bars, Carbon, Cold-Finished, Standard Quality"

ADD: "SAE Aerospace Material Specification:
AMS 5020C - Steel, Bars, Forgings and Tubing, Free-cutting 1.5Mn -
0.25Pb (0.32 - 0.39C) (11L37).

(Application for copies of AMS publications should be addressed to Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.)"

1 of 3

AMSC N/A

FSC 5310

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Page 5

Paragraph 3.1.3.1, First sentence, after "half-hard".

ADD: "or alloy no 462, hard".

Page 7

Paragraph 3.6.2.1

DELETE AND SUBSTITUTE: "3.6.2.1 Zinc, Electrodeposited: Electrodeposited zinc coating shall be in accordance with ASTM B633, FeZn 5, Type II. Electrodeposited finish shall be used only on .500 inch (nominal size) and smaller."

ADD: New paragraph as follows: "3.6.2.3 Zinc, mechanically deposited: Mechanically deposited zinc shall conform to MIL-C-81562."

Page 12

Paragraph 4.5.7.1, First sentence

DELETE: "MIL-I-6868". SUBSTITUTE: "MIL-STD-1949"

Page 13

Paragraph 4.5.7.2, First Sentence

DELETE: "MIL-I-6866". SUBSTITUTE: "MIL-STD-6866".

Page 15, Table IV

Change the nominal size for Grade C material from ".500-3.000" to ".250-3.000".

ADD: "L1" for "Grade A" and "L2" for "Grade B" with footnotes as follows:

"L1" Optional material - Steel, Grade 12L14 (UNS G12144) per ASTM A108.

"L2" Optional material - Steel, Grade 11L37 (UNS G11374) per AMS 5020."

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Page 16, Table VI

Add the following minimum proof loads for Grade C material:

NOM SIZE	GRADE C	
	HEX & SQUARE	HEAVY AND THICK
.250	4,575	5,085
.3125	7,545	8,380
.375	11,160	12,400
.4375	15,300	17,000

Page 17, Table VII

Add the following minimum proof loads for Grade C material:

NOM SIZE	GRADE C	
	HEX & SQUARE	HEAVY AND THICK
.250	4,730	5,240
.3125	7,540	8,350
.375	11,410	12,640
.4375	15,430	17,090

MILITARY INTERESTS:

CIVIL AGENCY COORDINATING ACTIVITIES:

Custodians:

GSA-FSS

Army - AR

Navy - SH

Air Force - 99

PREPARING ACTIVITY:

Army - AR

Review Activities:

DOD Project 5310-1698

Army - AV, EA, MI

Navy - OS

Air Force - 82

DLA - IS

User Activities:

Army - AT, GL

Navy - AS, MC, YD