

FF-B-584F
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SUPERSEDING
FF-B-584E
June 17, 1976

FEDERAL SPECIFICATION

BOLTS, SQUARE NECK AND TEE HEAD

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

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers bolts, 0.190 inch in diameter and larger, with heads which are either semispherical or designed to set flush with the surface of the item being fastened.

1.2 Classification. Bolts covered by this specification shall be of the following types, classes, styles, and forms as specified (see 6.2):

Type I - Bolt, square neck.

Class 1 - Semispherical head.

Style A - Regular.
Style B - Short neck.
Style C - Step.

Class 2 - Flush head, countersunk.

Style A - Regular.
Style B - Elevator.
Style C - Plow bolt.

Form 1 - Regular head.
Form 2 - Repair head.

Type V - Bolt, tee head.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data which may improve this document should be sent to: General Services Administration, Industrial Engineering Group (7FXEI), 819 Taylor St., Fort Worth, TX 76102

2. APPLICABLE DOCUMENTS

2.1 Issues of document. The following documents, of the issue in effect on the date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

Federal Specifications:

- FF-N-836 - Nut: Square, Hexagon, Cap, Slotted, Castle, Knurled, Welding and Single Ball Seat.
- QQ-A-225/6 - Aluminum Alloy Bar, Rod, and Wire; Rolled, Drawn, or Cold Finished, 2024.
- QQ-B-637 - Brass, naval: Rod, Wire, Shapes, Forgings, and Flat Products With Finished Edges (Bar Flat Wire, and Strip).
- QQ-B-639 - Brass, Naval: Flat Products (Plate, Bar, Sheet, and Strip).
- QQ-B-728 - Bronze Manganese; Rod, Shapes, Forgings, and Flat Products (Flat Wire, Strip, Sheet, Bar, and Plate).
- QQ-B-750 - Bronze, Phosphor; Bar, Plate, Rod, Sheet, Strip, Flat Wire, and Structural and Special Shaped Sections.
- 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 Bar, Plate, Sheet, Strip, Wire, Forgings, and Structural and Special Shaped Sections).
- QQ-N-286 - Nickel-Copper-Aluminum Alloy, Wrought.
- QQ-P-416 - Plating, Cadmium (Electrodeposited).
- QQ-S-763 - Steel Bars, Wire, Shapes, and Forgings, Corrosion-Resisting.
- PPP-H-1581 - Hardware (Fasteners and Related Items), Packaging and Packing for Shipment and Storage of.

Federal Standards:

- Fed. Std. No. 123 - Marking for Shipment (Civil Agencies).
- Fed. test Method Std. No. 151 - Metals, Test Methods.
- FED-STD-H28 - Screw-Thread Standards for Federal Services.

(Activities outside 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 Federal 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 from established distribution points in their agencies.)

Military Specifications:

MIL-H-6088 - Heat treatment of Aluminum Alloys.
DOD-P-16232 - Phosphate Coatings, Heavy, Manganese or Zinc Base (For Ferrous Metals).

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by attributes.
MIL-STD-129 - Marking for Shipment and Storage.

(Copies of Military Specifications and Standards required by contractors 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 indicated, the issue in effect on the date of invitation for bids or request for proposal shall apply.

American National Standards Institute (ANSI) Standards:

B18.5 - Round Head Bolts.
B18.9 - Flange Bolts.

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

ASTM Standards:

- B117 - Salt Spray (Fog) Testing.
- B 633 - Standard specification for Electrodeposited Coatings of Zinc on Iron and Steel.
- E8 - Tension Testing of Metallic Materials.
- E10 - Brinell Hardness and Rockwell Superficial Hardness Hardness of Metallic Materials.

(Application for copies should be addressed to ASTM, 1916 Race Street Philadelphia, PA 19103).

National Motor Freight Traffic Association, Inc. Agent

National Motor Freight Classification.

(Application for copies should be addressed to the National Motor Traffic Association, Inc., Tariff Order Section, 1616 P Street, N.W., Washington, DC 20036).

Uniform Classification Committee, Agent

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, Tariff Publishing Officer, Room 1106, 222 South Riverside Plaza, IL 60606).

3. REQUIREMENTS

3.1 Material.

3.1.1 Carbon steel. Unless otherwise specified (see 6.2), the bolts shall be made of carbon or alloy steel conforming to the requirements of Table I.

3.1.2 Corrosion-resistant steel. When specified, bolts of corrosion-resistant steel shall be made of material conforming to class.302B, 304B, 316B, or QQ-S-763.

3.1.3 Brass (Naval Brass). When specified, bolts shall be made of Naval Brass conforming to QQ-B-637 or QQ-B-639. Cold worked brass bolts shall be stress-relieved by heating at 600° Fahrenheit for a minimum of 1 hour per inch of shank diameter.

3.1.4 Aluminum. When specified, bolts shall be made of Aluminum alloy conforming to QQ-A-225/6 and heat-treated in accordance with MIL-H-6088.

3.1.5 Nickel-copper. When specified, bolts shall be made of nickel-copper alloy in accordance with QQ-N-281.

3.1.6 Bolts of other materials. When specified, bolts shall be made of alloys covered by QQ-B-750, QQ-C-591, QQ-N-286, or as otherwise specified.

3.1.7 Protective coating. Unless otherwise specified (see 6.2), bolts shall be furnished uncoated, except for black oxide coating, which is acceptable. Bolts required to be plated or phosphate-coated shall be to one of following:

- (a) Cadmium plating conforming to QQ-P-416, type II, class 3.
- (b) Zinc coating conforming to ASTM B633, type III, classification Fe/Zn 5.
- (c) Phosphate coating conforming to DOD-P-16232, type I, class 2.

3.1.7.1 Hydrogen embrittlement. Bolts required to be plated or phosphate-coated shall be subjected to a relief treatment in accordance with the applicable plating or coating specification. This treatment shall follow the plating or coating operation, to reduce to a minimum any tendency to brittleness resulting from these processes.

3.2 Fabrication. Unless otherwise specified (see 6.2), the method of fabrication shall be at the option of the manufacturer.

3.2.1 Body blanks. Body blanks shall be made from wire or rods by hot or cold upsetting, extrusion, or machining at the option of the manufacturer. Cold upset blanks shall be stress-relieved, except when heat treated to meet the specified mechanical properties.

3.3 Detail requirements. Bolt lengths, bolt length tolerance, thread lengths, fillets, and head dimensions shall conform to the applicable tables of ANSI B18.5 and B18.9 for the specific type, class, style and form of bolt required. Threads shall be UNC, Class 2A in accordance with FED-STD-H28.

3.4 Nuts. When specified (see 6.2), the bolt shall be furnished with a mating nut that conforms to FF-N-836. Unless otherwise specified (see 6.2), the nut shall conform to type 1, style 1 of FF-N-836.

TABLE I. Mechanical properties of carbon and alloy steel bolt

Grade designation	Nominal size diameter inches	Full size bolts, screws, studs, sems		Machine test specimens of bolts, screws, and studs				Surface hardness	Core hardness		Grade identification marking
		Proof load (Stress) psi	Tensile strength (Stress) min psi	Yield strength (Stress) min psi	Tensile strength (Stress) min psi	Elongation min, percent	Reduction of area, min, percent	Rockwell 30N max.	Rockwell		
									Min	Max.	
1	1/4 through 1-1/2	33,000	60,000	36,000	60,000	18	35		B70	B100	None
2	1/4 through 3/4	55,000	74,000	57,000	74,000	18	35		B80	B100	
	Over 3/4 to 1-1/2	33,000	60,000	36,000	60,000	18	35		B70	B100	None
4	1/4 through 1-1/2	-	115,000	100,000	115,000	10	35		C22	C32	None
5	1/4 through 1 Over 1 to 1-1/2	85,000	120,000	92,000	120,000	14	35	54	C25	C34	
		74,000	105,000	81,000	105,000	14	35	50	C19	C30	
5.1	No. 6 through 3/8 Sems only, through 5/8	85,000	120,000	-	-	-	-	59.59	C25	C40	
5.2	1/4 through 1	85,000	120,000	92,000	120,000	14	35	56	C26	C36	
7	1/4 through 1-1/2	105,000	133,000	115,000	133,000	12	35	54	C28	C34	
8	1/4 through 1-1/2	120,000	150,000	130,000	150,000	12	35	58.6	C33	C39	
8.1	1/4 through 1-1/2	120,000	150,000	130,000	150,000	10	35		C32	C38	None
8.2	1/4 through 1	120,000	150,000	130,000	150,000	10	35	61	C35	C42	

TABLE II. Chemical properties of carbon and alloy steel bolts

Grade	Material and treatment	Element, percent					
		C		Mn	P	S	B
		Min	Max.	Min	Max.	Max.	Min
1	Low or medium carbon steel	--	0.55	--	0.048	0.058	--
2	Low or medium carbon steel	--	0.28	--	0.048	0.058	--
4	Medium carbon cold drawn steel	--	0.55	--	0.048	0.058	--
5	Medium carbon steel, quenched and tempered	0.28	0.55	--	0.048	0.058	--
5.1	Low or medium carbon steel, quenched and tempered	0.15	0.30	--	0.048	0.058	--
5.2	Low carbon martensite steel, fully killed, fine grain, quenched and tempered	0.15	0.25	0.74	0.048	0.058	0.0005
7	Medium carbon alloy steel, quenched and tempered	0.28	0.55	--	0.040	0.045	--
8	Medium carbon alloy steel, quenched and tempered	0.28	0.55	--	0.040	0.045	--
8.1	Elevated temperature drawn steel - medium carbon alloy or SAE 1541 (formerly SAE 1041)	0.28	0.55	--	0.048	0.058	--
8.2	Low carbon martensite steel, fully killed, fine grain, quenched and tempered	0.15	0.25	0.74	0.048	0.058	0.0005

3.5 Workmanship. The quality of workmanship shall be such as to produce bolts that meet the requirements of this specification and insure proper functioning of all parts of the unit.

3.6 Regulatory requirements. In accordance with section 23.403 of the Federal Acquisition Regulations, the Government's policy is to acquire items composed of the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification unless otherwise specified.

Caution should be taken during any coating or plating process. The contractor is responsible for the safe reutilization and disposal of all material generated by the coating or plating process in accordance with all applicable laws and regulations.

4. QUALITY ASSURANCE PROVISIONS

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 that supplies and services conform to prescribed requirements.

4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

- (a) Quality conformance inspection (see 4.2.2).
- (b) Preparation for delivery inspection (see 4.6).

4.2.1 Quality conformance inspection. Quality conformance inspection shall be performed on the sample bolts selected in accordance with 4.4. This inspection shall include the examination of 4.3.1 and the tests of 4.3.2.

4.2.2 Inspection lot. All units of the same size, type, form, coating material, style, thread and class, offered to the Government at one time, shall be considered a lot for purpose of inspection. The sample unit shall be one complete bolt.

4.3 Sampling. A random sample of bolts shall be selected from each lot in accordance with MIL-STD-105.

4.3.1 Sampling for examination. Examination of the bolts shall be based on inspection level I, and an Acceptable Quality Level (AQL), of 2.5 percent defective for major defects and 4.0 percent defective for minor defects.

4.3.2 Sampling for tests. Tests of the bolts shall be based on inspection level S2 and an AQL of 2.5 percent defective.

4.4 Examination. Each sample selected in accordance with 4.3.1 shall be examined for defects listed in Table III.

TABLE III. Classification of defects

Examine	Defects	Major	Minor
End item	Threads not as specified	X	
	Pitch incorrect	X	
	Dimensions of head characteristics incorrect	X	
	Length of bolts incorrect	X	
	Thread lengths incorrect	X	
	Finish not as specified		X
	Filletts under bolt head incorrect		X
	Damage or defects not affecting function or serviceability		X
	Type, class, style, and form not as specified	X	

4.5 Tests. Each sample selected in accordance with 4.3.2 shall be tested to determine compliance with this specification. Tests shall be conducted as specified in 4.5.1 through 4.5.6.

4.5.1 Yield strength. When determination of yield strength is required the methods used shall be in accordance with ASTM E8.

4.5.2 Hardness. When the length of bolt or thread length is too short for a tension test, a hardness test in accordance with ASTM E10 or E18 shall be substituted.

4.5.3 Chemical analysis. Samples selected in accordance with 4.3 shall be tested for chemical composition, in accordance with method 111.2 of Fed. Test Method Std. No. 151. A certificate of compliance may be accepted in lieu of this test as evidence that the material is as specified herein.

4.5.4 Salt-spray test. When specified (see 6.2), the salt-spray test described in ASTM B117 shall be applied to samples selected in accordance with 4.3. The test for zinc- or cadmium-plating shall extend for a period of 32 hours.

4.5.5 Tensile strength. Samples selected in accordance with 4.3 shall be tested for tensile strength in accordance with ASTM E8.

4.5.6 Turned shank specimens. To test bolts having tensile properties greater than can be measured on available test equipment, the test specimen shall be turned down around the axis, to gage dimensions specified in ASTM E8. To test bolts or test specimens too large for full size testing, the specimen shall be turned, have its axis midway between the axis of the shank and the surface of the shank, as illustrated in figure 4 of ASTM E8.

4.6 Preparation for delivery inspection. The preservation, packaging, packing, and marking shall be inspected to verify conformance to the requirements of section 5.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. The preservation and packaging shall be level A or C or as otherwise specified (see 6.2).

5.1.1 Level A. The bolts shall be preserved and packaged in accordance with the applicable level A requirements of PPP-H-1581.

5.1.2 Level C. The bolts shall be preserved and packaged in accordance with the contractor's standard practice.

5.2 Packing. Packing shall be level A, B, C or as otherwise specified (see 6.2).

5.2.1 Level A. The bolts shall be packed in accordance with the applicable level A requirements of PPP-H-1581.

5.2.2 Level B. The bolts shall be packed in accordance with the applicable level B requirements of PPP-H-1581.

5.2.3 Level C. The bolts shall be packed in a manner which will insure arrival at destination in satisfactory condition and be acceptable to the carrier at lowest rates. Containers and packing shall comply with Uniform Freight Classification rules or with National Motor Freight Classification rules.

5.3 Marking. In addition to any special marking required by the contract, interior packages and shipping containers shall be marked in accordance with Fed. Std. No. 123 or MIL-STD-129, as applicable (see 6.2).

6. NOTES

6.1 Intended use. This specification covers various types of bolts which are used with nuts as fastening devices.

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

- (a) Title, number, and date of this specification.
- (b) Type, class, style, and form of bolt required (see 1.2).
- (c) Material, if other than carbon steel (see 3.1.1).
- (d) Type of protective coating, if required (see 3.1.7).
- (e) Method of fabrication, if different (see 3.2).
- (f) Nut, if required (see 3.4).
- (g) Type and style of nut, if different (see 3.4).
- (h) Salt-spray test, when required (see 4.5.4).
- (i) Levels of packaging and packing required (see 5.1 & 5.2).
- (j) Marking required (see 5.3).

6.3 Part Number. Bolts covered by this specification shall be identified by a part number configuration consisting of identification of the general specification number, type, class, style, form (if applicable) and size. An example of the part number configuration is shown below. This part numbering system is intended for identification and cross-indexing of the item within the Federal cataloging system. Part numbers are not required to be placed on the product or container.

EXAMPLE:

F58412A2S3162.5

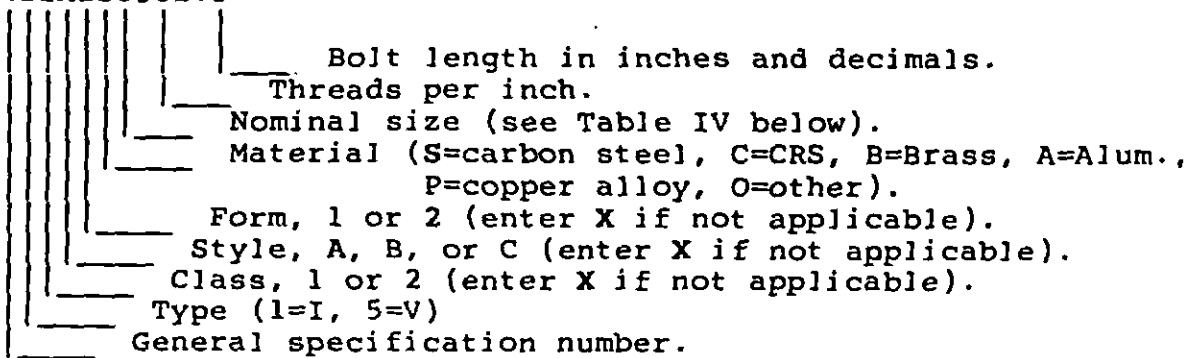


TABLE IV. Bolts sizes for part number coding

size designation for part numbering	Nominal trade size (diameter)
1	No. 10
2	1/4
3	5/16
4	3/8
5	7/16
6	1/2
7	9/16
8	5/8
9	3/4
10	7/8
11	1

6.4 Supersession. Types II, III, IV, and VI have become obsolete for Government procurement purposes and have been deleted from this revision.

MILITARY INTEREST:

Review activity:

DLA - IS

PREPARING ACTIVITY:

GSA - FSS

CIVIL AGENCY INTEREST:

AGR - AFS