

FF-S-200A
October 24, 1969
SUPERSEDING
Fed. Spec. FF-S-200
August 27, 1963

FEDERAL SPECIFICATION

SETSCREWS: HEXAGON SOCKET AND SPLINE SOCKET, HEADLESS

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 hexagon socket and spline socket headless setscrews.

1.2 Classification.

1.2.1 Types. Setscrews shall be of the following types, as specified (see 6.2).

Type I - Hexagon socket, headless.

Type II - Spline socket, headless.

1.2.2 Styles. Setscrews shall be of the following styles, as specified (see 6.2).

Style 1 - Flat point.

Style 2 - Cone point.

Style 3 - Oval point.

Style 4 - Cup point.

Style 5 - Full-dog point.

Style 6 - Half-dog point.

1.2.3 Size. Setscrews shall be classified by size in accordance with the basic major diameter of the thread (see 6.2).

1.2.4 Length. Setscrews shall be of the length specified in 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.

FSC 5305

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Federal Specifications:

- QQ-B-626 - Brass, Leaded and Nonleaded: Rod, Shapes, Forgings, and Flat Products with Finished Edges (Bar and Strip).
- QQ-P-35 - Passivation Treatments for Austenitic, Ferritic, and Martensitic Corrosion-Resisting Steel (Fastening Devices).
- QQ-P-416 - Plating, Cadmium (Electrodeposited).
- QQ-W-321 - Wire, Copper Alloy.

Federal Standards:

- Fed. Std. No. 66 - Steel: Chemical Composition and Hardenability.
- Fed. Std. No. 123 - Marking for Domestic Shipment (Civilian Agencies).
- Fed. Test Method Std. No. 151 - Metals; Test Methods.

(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 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, D. C. 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, D. C., Atlanta, Chicago, Kansas City, Mo., Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, Washington.

(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-3982 - Hardware (Fasteners and Related Items), Packaging and packing for Shipment and Storage of.
- MIL-H-6875 - Heat Treatment of Steels (Aircraft Practice, Process for).
- MIL-S-7742 - Screw Threads, Standard; Optimum Selected.
- MIL-C-13924 - Coating, Oxide, Black for Ferrous Metals.
- MIL-I-17214 - Indicator, Permeability; Low-Mu (Go-No Go).

Military Standards:

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-109 - Quality Assurance Terms and Definitions.
- MIL-STD-129 - Marking for Shipment and Storage.

(Copies of Military Specifications and Standards required by contractors in connection with specification 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 a specific issue is identified, the issue in effect on date of invitation for bids or request shall apply.

American National Standards Institute (ANSI) Inc. Standard:

ANSI B18.3 - Socket Cap, Shoulder and Set Screws

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

American Society for Testing and Materials (ASTM) Standard:

ASTM E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

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

3. REQUIREMENTS

3.1 Material. Setscrews shall be made of one of the following materials as specified (see 6.2).

3.1.1 Alloy steel. Alloy steel shall be AISI 4032, 4037, 4137, 4140, 8630, 8740 or equivalent, in accordance with Fed. Std. No. 66, which can be heat treated in accordance with MIL-H-6875 to meet the hardness requirement of 3.3.

3.1.2 Corrosion-resisting steel.

3.1.2.1 Austenitic. Austenitic corrosion-resisting steel shall be of the 300 Series in accordance with Fed. Std. No. 66 or any other austenitic corrosion-resisting steel developed for cold heading or free machining.

3.1.2.1.1 Magnetic permeability. Austenitic corrosion-resisting steel setscrews shall have a magnetic permeability of 2.0 max (air = 1.0) for a field strength of $H = 200$ oersteds when using a magnetic indicator in accordance with MIL-I-17214.

3.1.2.2 Martensitic. Martensitic corrosion-resisting steel shall be Steel Nos. 410 or 416 in accordance with Fed. Std. No. 66.

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3.1.3 Brass. Brass shall be in accordance with alloy no. 260 or 268 of QQ-B-626 or alloy no. 260, 270 or 274 of QQ-W-321.

3.2 Protective finish. Unless otherwise specified (see 6.2), setscrews shall be furnished uncoated. When specified (see 6.2), protective finishes shall be as follows.

3.2.1 Cadmium plating. Alloy steel setscrews shall be cadmium plated in accordance with QQ-P-416, type II, class 3. When plating is required for setscrews of 48 pitch or finer, thickness may be reduced below 0.0002 inch.

3.2.2 Passivation. Corrosion-resisting steel setscrews shall be passivated in accordance with QQ-P-35.

3.2.3 Black oxide.

3.2.3.1 Brass. Brass setscrews shall be black oxide coated in accordance with MIL-F-495.

3.2.3.2 Corrosion-resisting steel. Corrosion-resisting steel setscrews shall be black oxide coated in accordance with MIL-C-13924, class 4.

3.2.4 Hydrogen embrittlement. Cadmium plated alloy steel setscrews shall be subjected to an embrittlement relief treatment in accordance with QQ-P-416 as soon as possible after plating to minimize the resulting embrittlement.

3.3 Hardness. Alloy steel setscrews shall be hardened by quenching in oil from the hardening temperature and tempered to a hardness of Rockwell C45-53. Martensitic corrosion-resisting steel setscrews shall be hardened by heat treatment to Rockwell C35-45.

3.3.1 Decarburization. The complete and partial decarburization of the threads of heat-treated setscrews shall not exceed the amounts shown in Figure 1 or the amount for such other class as may be specified in the contract or order. A carbon content throughout the threads equivalent to that of the core is desirable.

3.4 Design.

3.4.1 Dimensions. Dimensions and tolerances of setscrews shall be in accordance with ANSI B18.3. For acceptable designs of cup points for military use, see applicable MS Standards.

3.4.2 Threads. Unless otherwise specified (see 6.2), the threads shall be class 3A in both UNC and UNF series in accordance with MIL-S-7742.

3.5 Workmanship. Setscrews shall be free from burrs, seams, laps, loose scale, irregular surfaces and any other defects which may affect 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, the supplier may utilize his own or any other inspection facilities and services acceptable to 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 provisions.

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

4.2.2 Lot. A lot shall consist of all setscrews of the same type, style, material, protective finish, size and thread produced under essentially the same conditions and offered for acceptance at one time.

4.2.3 Sampling for examination. A random sample of setscrews shall be taken from each lot in accordance with MIL-STD-105, Inspection Level II. The Acceptable Quality Level (AQL) shall be as specified in Table I.

4.2.4 Sampling for hardness and decarburization tests. A random sample of setscrews shall be taken from each lot in accordance with MIL-STD-105, Inspection Level S-1, with an AQL of 1.0 percent defective.

4.2.5 Sampling for protective finish tests. Sampling for tests of protective finishes shall be in accordance with the applicable specifications in 3.2.

4.2.6 Sampling for chemical analysis. When specified (see 6.2), a random sample of setscrews shall be taken from each lot in accordance with MIL-STD-105, Inspection Level S-1, with an AQL of 1.5 percent defective. Samples previously selected for examination or for the hardness and decarburization tests may be used.

4.2.7 Sampling for examination of packaging and packing. Sampling for examination and test of preservation, packaging, packing and marking shall be in accordance with MIL-H-3982.

4.3 Examination. Each setscrew taken as specified in 4.2.3 shall be examined to verify conformance with this specification. Examination shall be conducted in accordance with Table I. Any setscrew in the sample containing one or more defects shall be rejected and if the number of defective setscrews in any sample exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected.

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Table I
Classification of Defects

<u>Categories</u>	<u>Defects</u>	<u>Inspection Method</u>
Critical	None defined	
Major	AQL = 2.5	
101	Thread	SIE*
102	Socket dimensions	SIE
Minor	AQL = 4.0	
201	Magnetic permeability (3.1.2.1.1)	SIE
202	Applicable point dimensions	SIE
203	Setscrew length	SIE
204	Chamfer angle	SIE
205	Eccentricity	SIE
206	Workmanship (3.5)	Visual

* SIE = Standard Inspection Equipment

4.4 Tests.

4.4.1 Hardness. Each setscrew taken as specified in 4.2.4 shall be subjected to a hardness test conducted in accordance with ASTM E18.

a. Setscrews having a length of 2 diameters or longer shall be tested on a transverse section through the threads at a point one-quarter of the nominal diameter from the axis and one nominal diameter from the point.

b. Setscrews having a length less than 2 diameters shall be tested on a transverse section through the threads at a point one-quarter of the nominal diameter from the axis and located at the first full thread from the point.

c. Setscrews having nominal diameters of 1/4" and larger shall be tested using the Rockwell C Scale. For sizes smaller than 1/4" the Rockwell 30N Scale shall be used.

4.4.2 Decarburization. Each setscrew taken as specified in 4.2.4 shall be subjected to a decarburization test conducted as follows: The threaded part of the setscrew shall be sectioned longitudinally through the axis and polished so that rounding of the thread edges is held to a minimum. The section shall be etched with the usual metallographic etchants (such as nital) and examined with a metallurgical microscope. Measurements shall be made from the crest of the thread to the end of the decarburized zone. This distance shall not exceed that indicated in Figure 1. Measurements shall

made with a fixed-scale micrometer eyepiece. This test does not apply to austenitic corrosion-resisting steel.

4.4.3 Protective finish. Protective finish tests shall be conducted in accordance with the applicable specifications in 3.2.

4.4.4 Chemical analysis. Each setscrew selected as specified in 4.2.6 shall be subjected to a chemical analysis conducted in accordance with Fed. Test Method Std. No. 151, to verify conformance to the applicable material specification. A steel mill certification will be acceptable in lieu of this test.

4.4.5 Examination and test of packaging and packing. Examination and test of preservation, packaging, packing and marking shall be in accordance with MIL-H-3982.

4.4.6 Hydrogen embrittlement. The contractor shall furnish the Government certification that cadmium plated alloy steel setscrews have been subjected to the embrittlement relief treatment specified in 3.2.4.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging and packing. Setscrews shall be preserved and packaged levels A or C, and packed levels A, B or C in accordance with MIL-H-3982, as specified (see 6.2).

5.1.1 Unless otherwise specified, setscrews exceeding 1 inch in diameter shall be prepared for shipment in accordance with MIL-H-3982, except that the unit package shall not exceed a gross weight of 20 pounds.

5.2 Marking.

5.2.1 Civil agencies. In addition to any special marking required in the contract or order, all containers shall be marked in accordance with Fed. Std. No. 123.

5.2.2 Military agencies. In addition to any special marking required in the contract or order, all containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. Setscrews covered by this specification are intended to be used to locate machine parts in relation to each other, either permanently or temporarily. It is recommended that cup point setscrews, style 4, be used wherever possible. For hardened shafts or when the cutting in of the cup point is objectionable, styles 1 or 6 should be used. It is recommended that styles 2, 3 or 5 be used only when it is impractical to use the other styles.

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

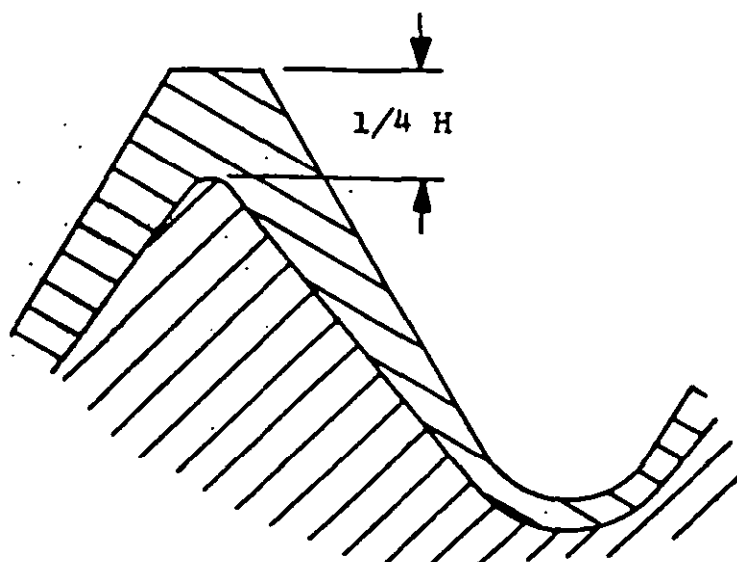
- (a) Title, number and date of this specification.
- (b) Type, style, size, length, thread series and class (1.2).
- (c) Material (3.1).
- (d) Protective finish, if required (3.2).
- (e) Chemical analysis, when required (4.2.6).
- (f) Level of preservation, packaging and packing (5.1).
- (g) Special markings, if required (5.2).

6.3 Level B packaging. When level B packaging is required for civil agency procurements, the level A requirements of 5.1 shall apply.

6.4 Military procurement. Items procured under this specification for military use are to be limited to the variety shown on the applicable Military Standards. Personnel of military departments are requested to refer to these documents for guidance.

6.5 Supersession data. Cross reference between the types and styles of setscrews covered in part by this specification and FF-S-210, and the types and styles of the superseded FF-S-103, dated October 7, 1958, is as follows:

FF-S-103	FF-S-210	FF-S-200
Types	Types	Types
Type I - Square Head	Type I - Square Head	---
Type II - Slotted Headless	Type II - Slotted Headless	---
Type III - Hexagon Socket, Headless	---	Type I - Hexagon Socket, Headless
Type IV - Fluted Socket, Headless	---	Type II - Spline Socket, Headless
Styles	Styles	Styles
Style 1 - Flat point	Style 1 - Flat point	Style 1 - Flat point
Style 2 - Cone point	Style 2 - Cone point	Style 2 - Cone point
Style 3 - Oval point	Style 3 - Oval point	Style 3 - Oval point
Style 4 - Cup point	Style 4 - Cup point	Style 4 - Cup point
Style 5 - Full-dog point	Style 5 - Full-dog point	Style 5 - Full-dog point
Style 6 - Half-dog point	Style 6 - Half-dog point	Style 6 - Half-dog point



FULL CARBON
ZONE



PARTIAL
DECARBURIZED ZONE

Thds per inch	1/4 H
80	.002
72	.002
64	.003
56	.003
48	.003
44	.004
40	.004
36	.005
32	.005
28	.006
24	.007
20	.008
18	.009
16	.010
14	.012
13	.012
12	.014
11	.015
10	.016
9	.018
8	.020
7	.023
6	.027

1/4 H = 1/4 BASIC THREAD DEPTH

Figure 1. - Decarburization limits.

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MILITARY CUSTODIANS :

Army - WC
Navy - SH
Air Force - 82

Reviewer activities:

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

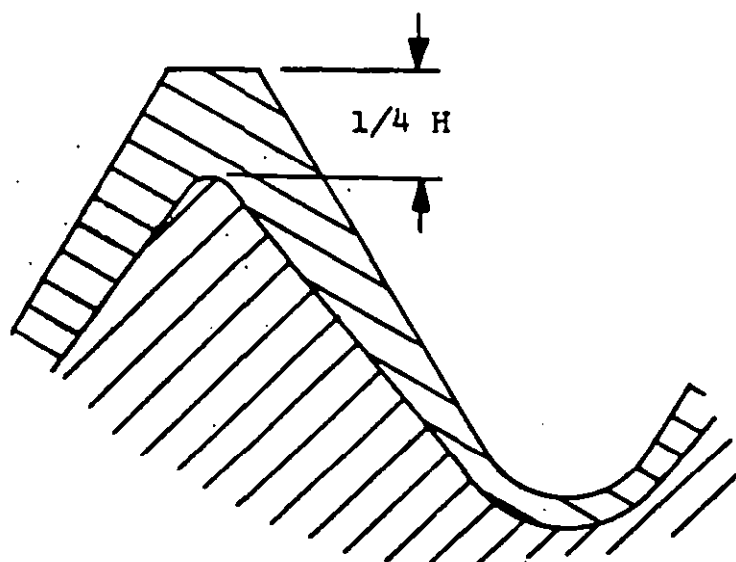
User activities:

Army - CE, EL, ME
Navy - AS, MC, OS
Air Force - None

Preparing activity:
Army - WC

CIVIL AGENCIES INTEREST
AG, DC, GSA, JU

Orders for this publication are to be placed with 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 15 cents each.



FULL CARBON
ZONE



PARTIAL
DECARBURIZED ZONE

Thds per inch	1/4 H
80	.002
72	.002
64	.003
56	.003
48	.003
44	.004
40	.004
36	.005
32	.005
28	.006
24	.007
20	.008
18	.009
16	.010
14	.012
13	.012
12	.014
11	.015
10	.016
9	.018
8	.020
7	.023
6	.027

1/4 H = 1/4 BASIC THREAD DEPTH

Figure 1. - Decarburization limits.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)*

1. DOCUMENT NUMBER		2. DOCUMENT TITLE	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
3b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
		<input type="checkbox"/> USER	
		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	

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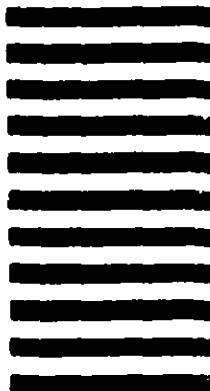


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