

FF-S-92B  
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SUPERSEDING  
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FEDERAL SPECIFICATION

SCREW, MACHINE: SLOTTED, CROSS-RECESSED HEXAGON HEAD

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 slotted, cross-recessed and hexagon head machine screws.

1.2 Classification.

1.2.1 Type and style. Machine screws shall be of the following types and styles (see 6.2).

Type I - Slotted (see fig. 1)

Style 1s - Round head	Style 6s - Oval bead, 82 deg.
Style 2s - Flat head, 82 deg.	Style 7s - Truss head
Style 3s - Flat head, 100 deg.	Style 8s - Binding head
Style 4s - Fillister head	Style 9s - Pan head
Style 5s - Fillister head, drilled	Style 10s - Hexagon head

Type II - Hexagon, Plain (see fig. 1)

Style 10p - Hexagon

Type III - Cross-Recessed, Recess Designs I and 11 (see fig. 2).

Style 1c - Round head	Style 6c - Oval head, 82 deg.
Style 2c - Flat head, 82 deg.	Style 7c - Truss head
Style 3c - Flat head, 100 deg.	Style 8c - Binding head
Style 4c - Fillister head	Style 9c - Pan head

NOTE: Use of cross-recess design II is not recommended.

FF-S-92B

1.2.2 Size. Machine screws shall be classified according to size by the nominal diameter of the body.

## 2. APPLICABLE DOCUMENTS

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

### Federal Specifications

- QQ-A-200/3 - Aluminum Alloy Bar, Rod, Shapes, Tube and Wire, Extruded, 2024.
- 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, Shapes, Forgings and Flat Products and 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-B-750 - Bronze, Phosphor; Bar, Plate, Rod, Sheet, Strip, Flat Wire and Structural and Special Shaped Sections.
- QQ-C-586 - Copper-Nickel-Zinc Alloy; Rod, Shapes and Flat Products with Finished Edges (Flat Wire, Strip and Bar).
- 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, Rod, Sheet, Strip, Wire, Forgings and Structural and Special Shaped Sections.
- QQ-N-286 - Nickel-Copper-Aluminum Alloy, Wrought.
- QQ-P-35 - Passivation Treatments For Corrosion-Resisting Steel.
- QQ-P-416 - Plating, Cadmium (Electrodeposited).
- QQ-S-634 - Steel Bar, Carbon, Cold Finished (Standard Quality).
- QQ-S-637 - Steel Bar, Carbon, Cold Finished (Standard Quality, Free Machining).
- QQ-S-763 - Steel Bars, Wire, Shapes and Forgings, Corrosion-Resisting.
- QQ-W-321 - Wire, Copper Alloy.
- 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. Std. No. 123 - Marking For Domestic Shipment (Civil Agencies).
- Fed. Test Method Std. No. 151 - Metals; Test Methods

(Activities outside the Federal Government may obtain copies of Federal Specifications and Standards 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 or a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

(Single copies of specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge 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 and Standards 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-A-562 - 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-1-17214 - Indicator, Permeability; Low-MU (Go-No Go).
- MIL-M-20693 - Molding Plastic, Polyamide (Nylon), Rigid.
- MIL-B-24059 - Bronze, Nickel Aluminum: Rod, Flat Products with Finished Edges, Shapes and Forgings.
- MIL-C-81562 - Coatings, Cadmium, Tin-Cadmium and Zinc (Mechanically Deposited).

#### Military Standards:

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-1312 - Fasteners, Test Methods.
- MS18116 - Bolt, Bolt-Stud, Stud, Stud-Bolt; Nickel-Copper-Aluminum Alloy; Special Requirements.
- MS18211 - Screw, Machine - 80 deg. and 100 deg., Flat Countersunk Head, Slotted, Plastic (Nylon).
- MS18212 - Screw, Machine - Pan Head, Slotted, Plastic (Nylon), UNC-2A.

(Copies of specifications, standards, drawings and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

FF-S-92B

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 date of invitation for bids or request for proposal shall apply.

National Bureau of Standards Handbook:

H28, Part 17 - 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.)

American National Standards Institute (ANSI) Standard:

ANSI B18.6.3 - Machine Screws and Machine Screw Nuts.

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

### 3. REQUIREMENTS

3.1 Materials. Unless otherwise specified (see 6.2), screws shall be made of the materials specified in 3.1.1 through 3.1.9.

3.1.1 Carbon steel. Carbon steel shall be in accordance with QQ-S-634, QQ-S-637 or Fed. Std. No. 66. Capped or rimmed steels shall be permitted. The minimum ultimate tensile strength shall be 60,000 PSI.

3.1.2 Corrosion-resisting steel. Corrosion-resisting steel shall be the 300 series in accordance with QQ-S-763 and Fed. Std. No. 66 or equal to or interchangeable with 16-18 or 18-8 chromium nickel alloy steel (developed for cold heading). The minimum ultimate tensile strength shall be 80,000 PSI. Straight chromium alloys of the 400 series shall not be used.

3.1.2.1 Magnetic permeability. Corrosion-resisting steel screws shall have a magnetic permeability of 2.0 maximum (air = 1.0) for a field strength of H = 200 oersteds using a magnetic indicator per MIL-I-17214.

3.1.3 Brass. Brass shall be in accordance with QQ-B-613, QQ-B-626 or QQ-W-321. The minimum ultimate tensile strength shall be 51,000 PSI.

3.1.4 Aluminum alloy. Aluminum alloy, 2024, shall be in accordance with QQ-A-200/3 or QQ-A-225/6. The minimum ultimate tensile strength shall be 62,000 PSI.

3.1.5 Copper alloys. Copper alloys shall be in accordance with QQ-B-637, QQ-B-728, QQ-B-750, QQ-C-586 or QQ-C-591. The mechanical properties shall be as specified in Table II.

3.1.6 Nickel-copper alloy. Nickel-copper alloy shall be in accordance with QQ-N-281, Class A. The mechanical properties shall be as specified in Table II.

3.1.7 Nickel-copper-aluminum alloy. Nickel-copper aluminum alloy shall be in accordance with QQ-N-286, Class A. The mechanical properties shall be as specified in Table II.

3.1.8 Nickel-aluminum-bronze. Nickel-aluminum-bronze shall be in accordance with MIL-B-24059. The mechanical properties shall be as specified in Table II.

3.1.9 Plastic (nylon). Plastic (nylon) shall be in accordance with MIL-M-20693, composition A, type 1. Plastic machine screws shall be as specified on MS18211 and MS18212.

3.2 Protective finish. Unless otherwise specified (see 6.2), screws shall be furnished uncoated with a naturally bright finish, not heat treated. When finishes are specified, they shall be in accordance with the following paragraphs.

3.2.1 Carbon steel screws.

3.2.1.1 Cadmium plating. Cadmium plating shall be in accordance with QQ-P-416, Type II, Class 3 or MIL-C-81562, Type II, Class 3.

3.2.1.2 Zinc coating. Zinc coating shall be in accordance with QQ-Z-325, Type II, Class 3 or MIL-C-81562, Type II, Class 3.

3.2.1.3 Phosphate coating. Phosphate coating shall be in accordance with MIL-P-16232, Type Z, Class 2.

3.2.1.4 Embrittlement relief. Electrodeposited carbon steel screws having a Rockwell Hardness of C40 or higher shall be subjected to an embrittlement relief treatment conducted in accordance with the applicable plating or coating specification.

3.2.2 Corrosion-resisting steel screws.

3.2.2.1 Passivation. Passivation treatment shall be in accordance with QQ-P-35.

3.2.2.2 Black oxide. Black oxide coating shall be in accordance with MIL-C-13924, Class 4.

3.2.3 Brass screws.

3.2-3.1 Black chemical. Black chemical finish shall be in accordance with MIL-F-495.

FF-S-92B

3.2.4 Aluminum alloy screws.

3.2.4.1 Anodizing. Anodizing shall be in accordance with MIL-A-8625, Type I or II, Class 1.

3.3 Dimensions. Dimensions and tolerances shall be in accordance with the applicable Military Standard (MS) and ANSI B18.6.3.

3.4 Threads. Threads shall be Class 2A, UNC or UKF series, as specified (see 6.2), in accordance with Handbook H28. The method of forming shall be at the manufacturer's option.

3.5 Workmanship. Screws shall be free from fins, burrs, sharp edges, cracks and surface contamination.

#### 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 facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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

4.3 Sampling.

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

4.3.2 Sampling for tests. A random sample of screws shall be selected from each lot in accordance with MIL-STD-105, Inspection Level S-1. The AQL shall be 2.5 percent defective.

4.4 Examination. Each screw taken as specified in 4.3.1 shall be examined to verify conformance with this specification. Examination shall be conducted in accordance with Table I. Any screw in the sample containing one or more defects shall be rejected, and if the number of defective screws in any category exceeds the acceptance number for that category, lot represented by the sample shall be rejected.

TABLE I. Classification of defects

<u>Category</u>	<u>Defect</u>	<u>Inspection Method</u>
Critical	None defined	
Major	AQL = 2.5 percent defective	
101	Size (1.2.2)	SIE*
102	Length (3.3)	SIE
103	Thread (3.4)	SIE
104	Slot or recess dimensions (3.3)	SIE
105	Bearing surface of flat head screws (3.3)	SIE
Minor	AQL = 4.0 percent defective	
201	Magnetic permeability (3.1.2.1)	SIE
202	Other dimensions (13.3)	SIE
203	Protective finish missing or incomplete (3.2)	Visual
204	Workmanship (3.5)	Visual

\*SIE = Standard Inspection Equipment

#### 4.5 Tests.

4.5.1 Tensile strength. Each screw taken as specified in 4.3.2 shall be tensile strength tested in accordance with Test No. 8 of MIL-STD-1312 to verify conformance with 3.1.

4.5.1.1 Screws too short to be tensile strength tested shall be hardness tested in accordance with Test No. 6 of MIL-STD-1312. Screws shall meet the minimum hardness requirement of the material from which they were made.

4.5.2 Bending. When ferrous screws are of sufficient length in the unthreaded portion to permit cold bending, each screw taken as specified in 4.3.2 shall withstand being bent 180 deg. without fracture, to a curve having an inner radius equal to the major body diameter of the screw.

4.5.2.1 When the bending test cannot be applied, each test sample shall withstand flattening cold to a thickness equal to one-half of its body diameter, without cracking.

4.6 Protective finish. Examination and test of protective finishes shall be in accordance with the applicable specification or 3.2.

4.7 Preparation for delivery. Examination and test of preparation for delivery shall be in accordance with PPP-H-1581, to verify conformance with Section 5.

FF-S-92B

4.8 Chemical analysis. The supplier shall furnish a still certificate specifying the chemical composition of the material used in the manufacture of the screws. When specified (see 6.2), chemical analysis shall be in accordance with Method 11.1.2 or 112.2 of Fed. Test Method Std. No. 151. In case of dispute, Method 112.2 shall apply.

#### 5. PREPARATION FOR DELIVERY

5.1 Packaging and marking. Packaging shall be Level A or C and packing shall be Level A, B or C in accordance with PPP-H-1581, as specified (see 6.2).

#### 5.2 Marking.

5.2.1 Civil agencies. In addition to marking required by the contract or order, all interior packages and shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.2.2 Military agencies. In addition to marking required by the contract or order, all interior packages and shipping containers shall be marked in accordance with MIL-STD-129.

#### 6. NOTES

6.1 Intended use. Machine screws are intended to be used in the assembling of parts in relation to each other, either permanently or temporarily.

6.2 Ordering data. Purchasers should exercise any desired options offered herein, and procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type, style and size (1.2).
- (c) Material (3.1).
- (d) Protective finish, when required (3.2).
- (e) Thread series (3.4).
- (f) Chemical analysis, when required
- (g) Selection of applicable level of packaging and packing (5.1).
- (h) Applicable MS part number.

6.3 Military procurement. Items procured under this specification for military use are to be limited, wherever possible, to the variety shown on the applicable Military Standard (MS).

6.4 Preferred screws. It is recommended that pan head screws be used in lieu of round, truss or binding head screws and that cross-recessed drive (design I) be used in lieu of slotted drive.



FF-S-92B

TABLE 11. Mechanical properties of nonferrous machine screws

Material	Applicable Document	Composition or class	Condition	Ultimate Tensile Strength psi. Min	Tensile Strength psi. Min	Elongation $\frac{1}{2}$ (min.) Percent
Copper-nickel-steel	QQ-C-506	Optional	Quarter-hard	55,000	-----	None bend test
Phosphor bronze	QQ-B-708	Class A	Soft	35,000	27,000 $\frac{1}{2}$	20
Nickel-aluminum-bronze	MSL-B-26009	-----	Extruded and annealed	90,000	50,000 $\frac{1}{2}$	18
Phosphor bronze	QQ-B-710	Comp. B	Hard	60,000	35,000 $\frac{1}{2}$	15
Bilicon bronze	QQ-C-500	Copper alloy No. 510	Hard	60,000	40,000 $\frac{1}{2}$	10
Naval brass	QQ-B-431	Copper alloy No. 442 or 443	-----	60,000	27,000 $\frac{1}{2}$	20
Nickel-copper alloy	QQ-B-270	Class B	-----	80,000	40,000 $\frac{1}{2}$	20
Nickel-copper-aluminum alloy	QQ-B-276 MS18116	Class B	Annealed and age hardened	110,000	90,000 $\frac{1}{2}$	20

- $\frac{1}{2}$  In 7-inch gage length.  
 $\frac{1}{2}$  0.2 percent offset.  
 $\frac{1}{2}$  0.5 percent extension under load.

FF-S-92B

FIGURE 1: Type I - Slotted and Type II - Hexagon, Plain

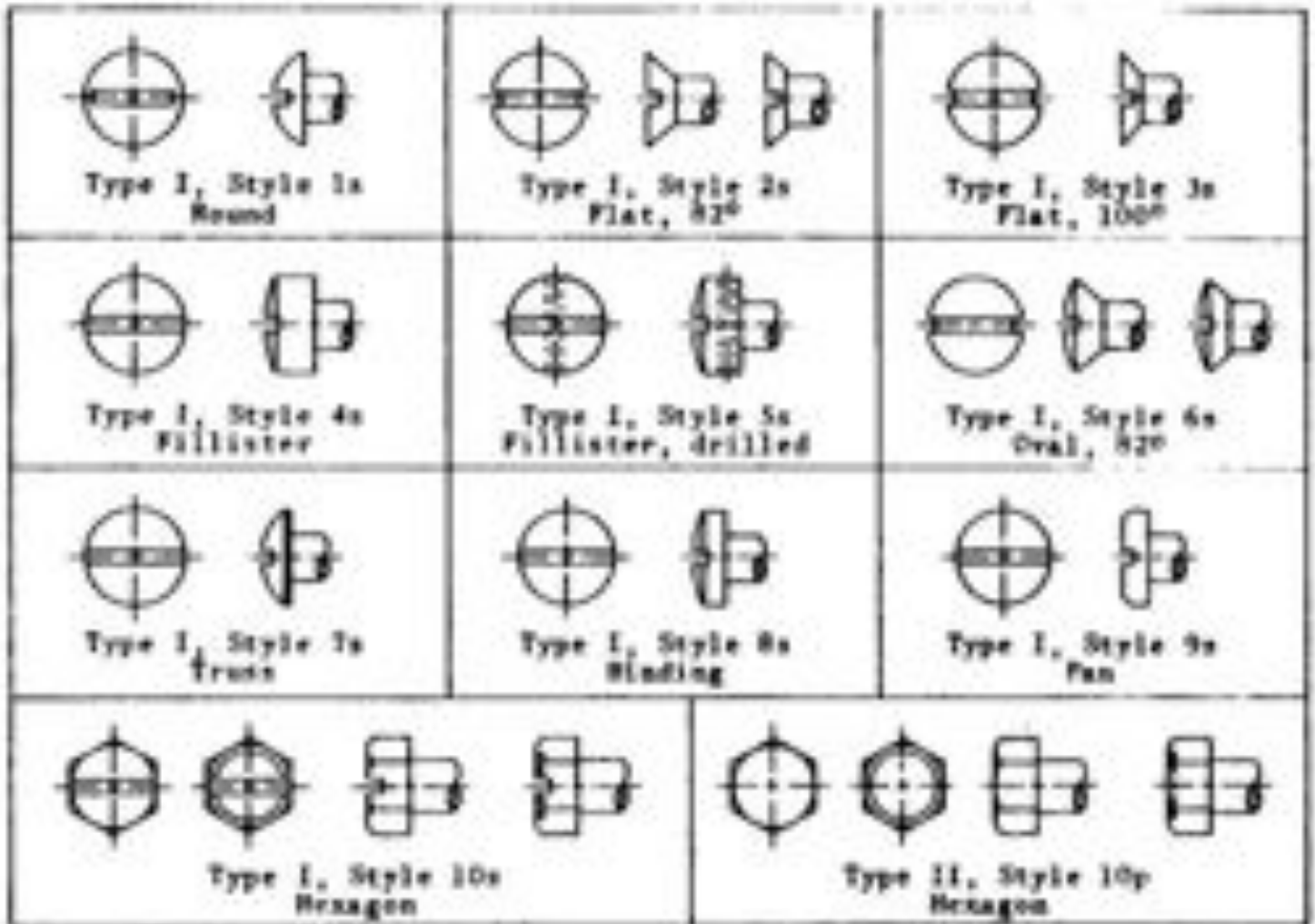
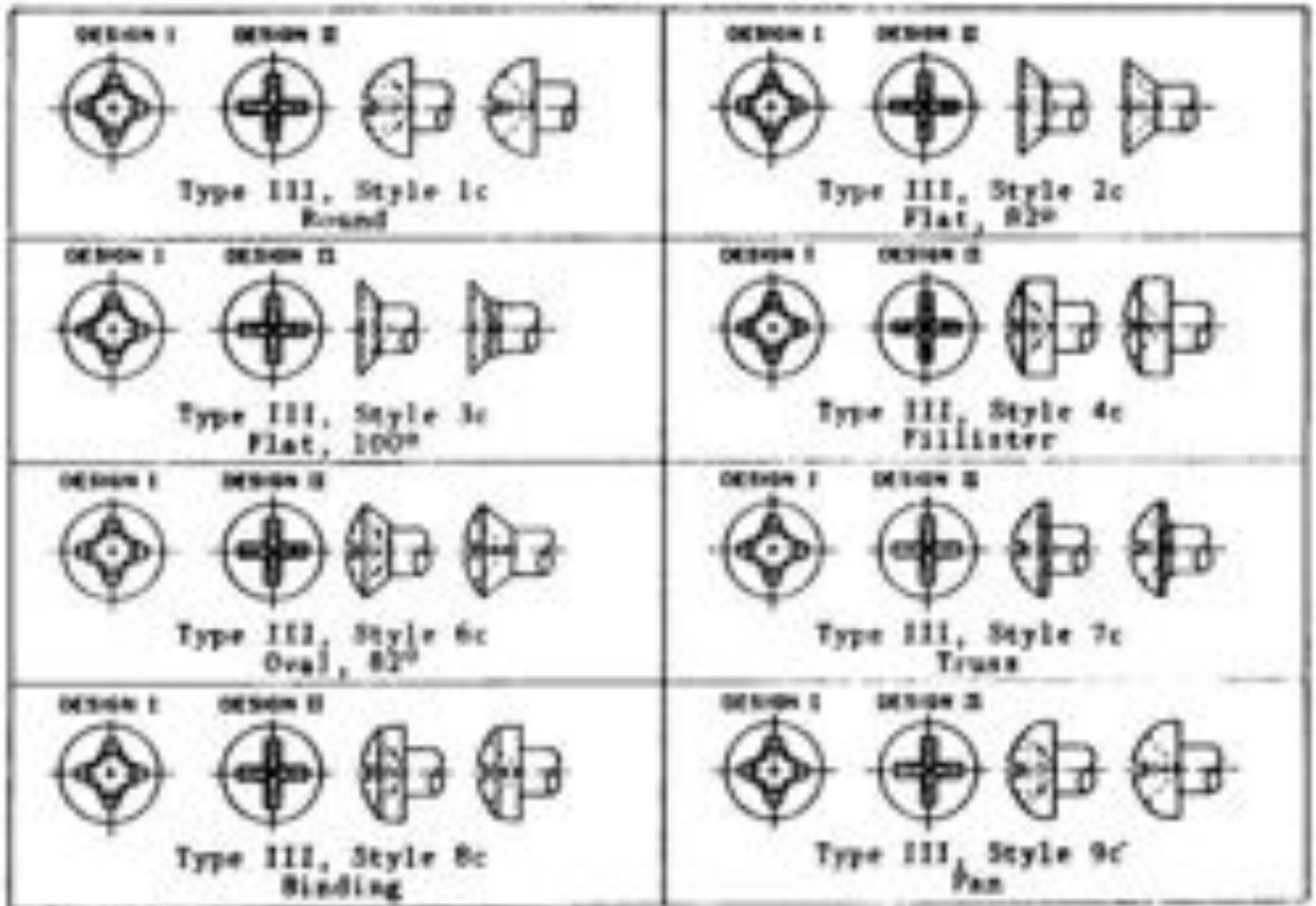


FIGURE 2: Type III - Cross Recessed



FF-S-92B

Military Custodians:

Army - WC  
Navy - None  
Air Force - 82

Preparing Activity:

Army - WC

Project No. 5305-1221

Reviewer Activities:

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

Civil Agencies Interest:

GSA-FSS  
COM-NBS

User Activities:

Army - AT, CE, ME, PA, WT  
Navy - AS, MC, OS, SH, YD  
Air Force - None

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