

INCH-POUND

MIL-DTL-27235B
28 April 2014
SUPERSEDING
MIL-P-27235A
27 November 1968

DETAIL SPECIFICATION

PIN, STRAIGHT, HEADED
(CLEVIS PINS)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers solid, metal, cylindrical, headed straight pins, which are commonly referred to as clevis pins (see 6.1).

1.2 Classification. Clevis pins shall be of the following types and sizes, as specified (see 6.2).

1.2.1 Types.

- Type I - Carbon steel
- Type II - Corrosion - resisting steel
- Type III - Brass

1.2.2 Sizes. Sizes shall be in accordance with MS35810.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

Comments, suggestions, or questions on this document should be addressed to Defense Supply Center Philadelphia (DSCP), ATTN: DSCP-NASA, 700 Robbins Avenue, Philadelphia, PA 19111-5096 or e-mail to dscpg&ispeccomments@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

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DEPARTMENT OF DEFENSE STANDARDS

MS35810	Pin, Straight, Headed (Clevis Pin) – Steel, Cadmium or Zinc Plated
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(Copies of these documents are available online at <http://quicksearch.dla.mil/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR QUALITY (ASQ)

ASQ Z1.4	Sampling Procedures and Tables for Inspection by Attributes.
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(Copies of this document are available from www.asq.org American Society for Quality Control, 600 North Plankinton Avenue, Milwaukee, WI 53203.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B16/B16M	Standard Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines
ASTM B124/B124M	Standard Specification for Copper and Copper Alloy Forging Rod, Bar, and Shapes
ASTM B633	Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM E18	Standard Test Methods for Rockwell Hardness of Metallic Materials
ASTM E1282	Standard Guide for Specifying the Chemical Compositions and Selecting Sampling Practices and Quantitative Analysis Methods for Metals, Ores, and Related Materials

(Copies of these documents are available from www.astm.org or the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AIR4127	Steel: Chemical Composition and Hardenability
SAE AMS2700	Passivation of Corrosion Resistant Steels
SAE AMS-QQ-P-416	Plating, Cadmium (Electrodeposited)

(Copies of these documents are available from www.sae.org or the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Material. Clevis pins shall be manufactured from the following materials, as specified (see 6.2).

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3.1.1 Carbon steel. Type I clevis pins shall be SAE 1010, 1111 or equivalent in accordance with SAE AIR4127. These steels shall have a minimum ultimate shear strength of 41,000 p.s.i.

3.1.2 Corrosion - resisting steel. Unless otherwise specified (see 6.2), Type II clevis pins shall be SAE 51416 or 51430F in accordance with SAE AIR4127. These steels shall have a minimum ultimate shear strength of 67,000 p.s.i.

3.1.3 Brass. Unless otherwise specified (see 6.2), Type III clevis pins shall be UNS 36000 in accordance with ASTM B16/B16M or UNS 37700 in accordance with ASTM B124/B24M and shall have a minimum ultimate shear strength of 40,000 p.s.i.

3.2 Hardness.

3.2.1 Type I. Type I clevis pins shall be cyanide hardened to Rockwell 30N 70 minimum to a depth of .005 inch minimum.

3.2.2 Types II and III. Unless otherwise specified (see 6.2), Types II and III clevis pins shall not be heat treated.

3.3 Protective finish.

3.3.1 Type I. Type I clevis pins shall be cadmium plated or zinc coated, as specified (see 6.2).

3.3.1.1 Cadmium plating. Cadmium plating shall be in accordance with Type II, Class 3 of SAE AMS-QQ-P-416.

3.3.1.2 Zinc coating. Zinc coating shall be in accordance with Type II, Class Fe/Zn 5 of ASTM B633.

3.3.2 Type II. Unless otherwise specified (see 6.2), Type II clevis pins shall be passivated in accordance with SAE AMS2700.

3.3.3 Type III. Type III clevis pins shall be uncoated.

3.4 Shear. The shear strength of clevis pins shall be not less than the minimum shear strength values specified in 3.1 or MS35810, as applicable.

3.5 Design and dimensions. Unless otherwise specified (see 6.2), the design and dimensions of clevis pins shall be in accordance with MS35810. Unless otherwise specified, dimensions and tolerances shall apply after plating or coating.

3.6 Marking. Trade marks or other markings may be applied to the pins, provided they do not interfere with dimensions or the intended use of the pins.

3.7 Workmanship. Clevis pins shall be smooth, free from burrs, sharp edges, gouges, porosity, cracks, scale, dirt or other defects which may adversely affect their intended use.

4. VERIFICATION

4.1 Conformance inspection. Conformance inspection shall include the following.

4.2 Inspection provisions.

4.2.1 Lot. A lot shall consist of clevis pins of the same type, finish and size, manufactured from the same heat under the same conditions and offered for acceptance at one time.

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4.2.2 Sampling.

4.2.2.1 Sampling for examination. A random sample of pins shall be selected from each lot in accordance with Inspection Level II of ASQ Z1.4.

4.2.2.2 Sampling for tests. A random sample of pins shall be selected from each lot in accordance with Level S-1 of ASQ Z1.4.

4.2.2.3 Sampling for passivation test. Sampling for passivation test shall be in accordance with SAE AMS2700.

4.3 Examination.

4.3.1 Visual and dimensional. Each pin taken as specified in 4.2.2.1 shall be examined to determine conformance with this specification. Examination shall be conducted in accordance with Table I. Any pin in the sample containing one or more defects shall be rejected, and if the number of defective pins in any sample exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected.

TABLE I. Classification of Defects.

<u>Categories</u>	<u>Defects</u>	<u>Inspection Method</u>
<u>Major</u>		
101	Pin diameter (3.5)	SIE*
102	Under head to centerline of drilled hole (length) (3.5)	SIE
<u>Minor</u>		
201	Head diameter (3.5)	SIE
202	Head height (3.5)	SIE
203	Under head to end (shank) (3.5)	SIE
204	Overall length (3.5)	SIE
205	Shank chamfer diameter (3.5)	SIE
206	Head chamfer length (3.5)	SIE
207	Hole size (3.5)	Gage
208	Protective finish missing or incomplete (3.3)	Visual
209	Evidence of rust, pitting or spotting after Passivation test (4.4.4)	Visual

*SIE - Standard Inspection Equipment

4.4 Tests.

4.4.1 Chemical analysis. Pins taken as specified in 4.2.2.2 shall be subjected to a chemical analysis to determine conformance to 3.1.1, 3.1.2 or 3.1.3, as applicable. The test shall be conducted in accordance with ASTM E1282. A manufacturer's material certificate may be accepted in lieu of this test.

4.4.2 Hardness. Pins taken as specified in 4.2.2.2 shall be subjected to a hardness test to determine conformance to 3.2. The test shall be conducted in accordance with ASTM E18.

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4.4.3 Shear strength. Pins taken as specified in 4.2.2.2 shall be subjected to a shear strength test to determine conformance to 3.4. The pin shall be placed in a hole that passes through a shear block and a plunger within the block. The maximum clearance between the shearing planes of the block and the plunger shall be 0.005 inch. The block and plunger shall be constructed so that the shear planes are normal to the longitudinal axis of the pin being tested. The block and plunger shall be made of hardened steel or shall have steel inserts with a minimum shearing – surface hardness of Rockwell C65. The clearance or interference between the pin and pinhole of the block and plunger shall be within the limits of Table II. The pin to be tested shall be assembled to the block and plunger, with the two ends of the pin at least one pin diameter away from the shear planes. For pins covered by MS35810, the load applied to the plunger shall be as shown on the standard for minimum double shear. For other pins, the load applied to the plunger shall be calculated from the minimum ultimate shear specified in 3.1.1, 3.1.2 or 3.1.3, as applicable. If fracture occurs in the pin under the applied shear load, the pin shall be considered defective. Pins too short to be tested in double shear shall be tested by applying the test to two pins simultaneously in single shear. Pins shall be tested in full size (diameter) whenever practicable. If it is not practical to test the full size pin, a test specimen shall be cut from the pin and machined to the diametrical dimensions of a smaller size pin, and tested as above.

TABLE II. Pin Clearance and Interference.

<u>Pin size (Inch)</u>	<u>Max. Clearance (Inch)</u>	<u>Max. Interference (Inch)</u>
1/16 to 3/16	0.0003	0.0002
1/4 to 7/16	0.0004	0.0003
1/2 to 5/8	0.0005	0.0003
3/4 to 1	0.0006	0.0004

4.4.3.1 Alternate shear test. If so desired by the supplier, pins may be tested in single shear provided that all requirements, other than double shear, of 4.4.3 are met.

4.4.4 Passivation. Each pin selected as specified in 4.2.2.3 shall be subjected to a passivation test conducted in accordance with SAE AMS-QQ-35.

4.5 Rejection and resubmission. Rejection and resubmission of lots shall be in accordance with ASQ Z1.4.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Clevis pins are intended for use in equipment for fastening clevises and eyes.

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6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Title, number and date of applicable Military standard(s) (see 3.5).
- c. Applicable MS part number (see 3.5).
- d. Copies and distribution of test certifications.
- e. Packaging requirements (see 5.1).

6.3 Subject term (key word) listing.

Cylindrical
Metal
Solid

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodian:

Army - AR
Navy - OS
Air Force - 99

Preparing Activity:

DLA - IS

(Project 5315-2014-001)

Review Activity:

Army - AV, CE, CR4, MI
Navy - MC
Air Force - 71

NOTE: The activities listed above were interested in this document as of the date of document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.