

MIL-C-45918
4 December 1968

MILITARY SPECIFICATION
CLEVISES AND CONNECTORS
(ROD END)

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

1. SCOPE

1.1 Scope. This specification covers adjustable and plain rod end clevises and rod end connectors.

1.2 Classification. Clevises and connectors shall be of the following types, styles, sizes, and compositions, as specified (see 6.2).

1.2.1 Types and styles.

Type I - Adjustable clevis

Style 1 - Wide fork (MS27975 and MS35812)

Style 2 - Narrow fork (MS27975)

Type II - Plain clevis

Style 1 - Wide fork (MS27976 and MS35812)

Style 2 - Narrow fork (MS27976)

Type III - Connector

Style 1 - Plain (MS35812)

Style 2 - Rigid linkage (MS63043)

Style 3 - Threaded (AN490)

1.2.2 Sizes. Clevises and connectors shall be of the sizes listed in the applicable MS standard.

1.2.3 Compositions. Clevises and connectors shall be made of the compositions listed on the applicable MS Standard and shall be in accordance with 3.1.

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 the specification to the extent specified herein.

FSC 5340

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SPECIFICATIONS

Federal

- QQ-P-416 - Plating, Cadmium (Electrodeposited)
- QQ-Z-325 - Zinc Coating, Electrodeposited, Requirements for
- PPP-B-585 - Boxes, Wood, Wirebound
- PPP-B-601 - Boxes, Wood, Cleated-Plywood
- PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner
- PPP-B-636 - Boxes, Fiberboard
- PPP-B-640 - Box, Fiberboard, Corrugated, Triple-Wall
- PPP-T-60 - Tape, Pressure-Sensitive Adhesive, Waterproof, for Packaging
- PPP-T-76 - Tape, Pressure-Sensitive Adhesive Paper, Water Resistent (For Carton Sealing)

Military

- MIL-P-116 - Preservation, Methods of
- MIL-B-121 - Barrier Material, Greaseproofed, Waterproofed, Flexible
- MIL-S-6758 - Steel, Chrome-Molybdenum (4130), Bars and Reforging Stock (Aircraft Quality)
- MIL-S-7742 - Screw Threads, Standard, Optimum Selected Series: General Specification for

STANDARDS

Federal

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

Military

- 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
- MIL-STD-130 - Identification Marking of U.S. Military Property
- MS27975 - Clevis, Rod End-Adjusting, Wide and Narrow Forks
- MS27976 - Clevis, Rod End-Plain, Wide and Narrow Forks
- MS35812 - Clevis, Rod End - Adjustable and Plain, Steel
- MS35813 - Connector, Rod End-Steel
- MS63043 - Connector, Rod End-Linkage, Rigid

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Air Force - Navy Aeronautical

AN490 - Rod End-Threaded, Aircraft

(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.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issues in effect on date of invitations for bid or request for proposal shall apply.

United States of America Standards Institute (USASI) Standard:

USAS B46.1 - Surface Texture

(Application for copies should be addressed to the United States of America Standards Institute, 10 East 40th Street, New York, N.Y. 10016.)

American Society for Testing and Materials (ASTM) Specification:

ASTM A123 - Zinc (Hot-Galvanized) Coatings on Products Fabricated From Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip

ASTM E8 - Methods of Tension Testing of Metallic Materials

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

National Bureau of Standards (NBS) Handbook:

H28, Part I - 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.)

3. REQUIREMENTS

3.1 Material. Clevises and connectors shall be of the following compositions, as specified (see 6.2).

3.1.1 Composition A. Carbon steel shall be SAE 1010 or 1111 or AISI 1015-1029 or equivalent in accordance with

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Fed. Std. No. 66. These steels shall have a minimum ultimate tensile strength of 55,000 PSI.

3.1.2 Composition B. Carbon steel shall be AISI 1035 or 1042 in accordance with Fed. Std. No. 66. These steels shall have a minimum ultimate tensile strength of 65,000 PSI.

3.1.3 Composition C. Alloy steel shall be AISI 4130 in accordance with MIL-S-6758. This steel shall be heat treated to an ultimate tensile strength of 125,000-145,000 PSI.

3.2 Design and construction. The design and construction of clevises and connectors shall be as specified on the applicable MS standard.

3.2.1 Dimensions and tolerances. Dimensions and tolerances shall be as specified on the applicable MS standard.

3.3 Mechanical properties. Clevises and connectors shall be capable of withstanding the ultimate axial loads specified on the applicable MS standard.

3.4 Protective finish. When specified (see 6.2), protective finishes shall be as follows.

3.4.1 Cadmium plating. Cadmium plating shall be Type II, Class 3 in accordance with QQ-P-416.

3.4.2 Zinc coating. Zinc coating shall be Type II, Class 2 in accordance with QQ-Z-325 or hot dipped galvanized in accordance with ASTM A123.

3.5 Threads. The threads shall be as specified on the applicable MS standard and shall be in accordance with Handbook H28 or MIL-S-7742, as applicable.

3.6 Surface roughness. Surface roughness shall be as specified on the applicable MS standard and shall be in accordance with USAS B46.1.

3.7 Workmanship. Clevises and connectors shall be free of burrs, slivers, sharp edges, surface contamination, cracks and ruptures.

3.8 Marking. When specified (see 6.2), clevises and connectors shall be marked in accordance with MIL-STD-130.

4. QUALITY ASSURANCE PROVISIONS

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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.

4.1.1 Quality assurance terms and definitions. Quality assurance terms and definitions used herein are in accordance with MIL-STD-109.

4.2 Inspection provisions.

4.2.1 Lot. A lot shall consist of all clevises or connectors of the same type, style, size, composition and heat of steel, manufactured under essentially the same conditions, and offered for acceptance at one time.

4.2.2 Sampling.

4.2.2.1 Sampling for examination. One random sample of clevises or connectors shall be taken from each lot in accordance with MIL-STD-105, Inspection Level II.

4.2.2.2 Sampling for axial load test. A random sample of clevises or connectors shall be taken from each lot in accordance with MIL-STD-105, Inspection Level S-4.

4.2.2.3 Sampling for tensile strength test. Two samples shall be taken from each lot for the tensile strength test.

4.2.2.4 Sampling for tests of protective finish. Sampling for tests of protective finish shall be in accordance with the applicable specification of 3.4.

4.2.2.5 Sampling for chemical analysis. One sample shall be taken from each lot for chemical analysis.

4.3 Examination. Each clevis or connector taken in accordance with 4.2.2.1 shall be examined to determine compliance with the requirements of this specification. Examination

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shall be conducted as specified in Table I, as applicable. Any clevis or connector containing one or more defects shall be rejected, and if the number of defective clevises or connectors in the sample exceeds the acceptance number for that sample, the represented lot shall be rejected. Table I shall be applied separately to major and minor defects for purposes of lot acceptance or rejection.

Table I

Classification of Defects

<u>Categories</u>	<u>Defects</u>	<u>Inspection Method</u>
Critical	None defined	
Major	AQL = 2.5	
101	Type, style, size and composition not as specified	Visual, SIE *
102	Threads not as specified	SIE
103	Jaw opening not as specified	SIE
104	Hole diameter not as specified	SIE
Minor	AQL = 6.5	
201	Length not as specified	SIE
202	Web thickness not as specified	SIE
203	Overall width of jaw not as specified	SIE
204	Body diameter not as specified	SIE
205	Boss diameter not as specified	SIE
206	Protective coating missing or incomplete	Visual
207	Surface roughness not as specified	SIE
208	Workmanship (3.7)	Visual
209	Marking of items not as specified	Visual

* Standard Inspection Equipment

4.4 Tests.

4.4.1 Axial load test. Each clevis and connector taken in accordance with 4.2.2.2 shall be subjected to an axial load test using the ultimate axial load values specified on the applicable MS standard. After testing there shall be no evidence of stripped threads or other thread deformations (when applicable) and no signs of cracks or ruptures.

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4.4.2 Tensile strength test. Samples selected in accordance with 4.2.2.3 shall be subjected to a tensile strength test in accordance with ASTM E8 to determine conformance to the tensile strength requirements of 3.1.

4.4.3 Protective finish test. Samples selected in accordance with 4.2.2.4 shall be tested for protective finish in accordance with the applicable specification of 3.4. Acceptance/rejection criteria shall be in accordance with the applicable specification.

4.4.4 Chemical analysis. Samples selected in accordance with 4.2.2.5 shall be analyzed by the applicable wet chemical or spectographic methods of Fed. Test Method Std. No. 151. In case of dispute, chemical analysis by wet chemical methods shall be basis for acceptance. Mill certification that the material complies with the chemical composition requirements of 3.1 will be acceptable in lieu of the above test.

4.4.5 Any sample failing to pass the tests specified in 4.4.1, 4.4.2 or 4.4.4 shall be cause for rejection of the represented lot.

4.4.6 Preservation, packaging, packing and marking. Preservation, packaging, packing and marking shall be examined to determine conformance to Section 5 of this specification.

5. PREPARATION FOR DELIVERY

5.1 Preservation and Packaging. Preservation and Packaging shall be level A, B or C as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Cleaning. Clevises and connectors shall be cleaned in accordance with Process C-1 of MIL-P-116.

5.1.1.2 Drying. Clevises and connectors shall be dried in accordance with any applicable procedure of MIL-P-116.

5.1.1.3 Preservative. Clevises and connectors not required to have a protective finish shall be coated with type P2 preservative of MIL-P-116. Plated or coated items require no preservative.

5.1.1.4 Unit Packaging. Clevises and connectors coated with a contact preservative shall be wrapped with barrier material conforming to Grade A, Type 1, Class 1 of MIL-B-121. The wrap shall be secured with tape conforming to Type V,

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Class 2 of PPP-T-60. Preserved and wrapped clevises and connectors shall be packaged Method I, and unpreserved items Method III of MIL-P-116, in fiberboard boxes conforming to Style RSC, Grade W5C of PPP-B-636. Closure of the boxes shall be accomplished by sealing all seams and joints with tape conforming to PPP-T-76.

5.1.1.5 Intermediate Packaging. Unit packages not exceeding 10 pounds shall be intermediate packaged in fiberboard boxes conforming to Style RSC, Grade W5C of PPP-B-636. Closure shall be in accordance with the appendix to PPP-B-636.

5.1.2 Level B.

5.1.2.1 Cleaning, drying and preservation shall be the same as specified for level A.

5.1.2.2 Unit Packaging. Level B unit packaging shall be the same as level A except the fiberboard boxes shall conform to Style RSC, type CF, class domestic of PPP-B-636. Closure shall be in accordance with the appendix to PPP-B-636.

5.1.3 Level C. Clevises and connectors shall be cleaned, dried, preserved and packaged in a manner which will afford adequate protection against corrosion, deterioration and physical damage during shipment from the supply source to the first receiving activity for immediate use.

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

5.2.1 Level A. Interior packages shall be packed in shipping containers conforming to Style 1 or 2, class 3 of PPP-B-585, Style 2 or 4, class II of PPP-B-621 or overseas type, Style A, B, I or J of PPP-B-601. The maximum gross weight of each shipping container shall not exceed 200 pounds. Closure shall be in accordance with the appendix to the applicable specification.

5.2.2 Level B. Interior packages shall be packed in shipping containers conforming to Style 1 or 2, Class 1 of PPP-B-585, Style 2, Class 1 of PPP-B-621, domestic type, Styles A thru K of PPP-B-601, Styles A thru G, Class 2 of PPP-B-640 or any style, Class weather-resistant of PPP-B-636. Closure shall be in accordance with the appendix to the applicable specification.

5.2.3 Level C. Clevises and connectors shall be packed in shipping containers to insure carrier acceptance and delivery

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without damage from the supply source to the first receiving activity.

5.3 Marking. In addition to any special marking specified in the contract or order (see 6.2), each interior package and exterior shipping container shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. Clevises and connectors are intended to be attached to a shaft or rod by welding, threading or pinning to provide a means of fastening or attaching the shaft or rod to another part.

6.2 Ordering data. Procurement documents should specify the following.

- (a) Title, number and date of this specification.
- (b) Type, style and size required (see 1.2).
- (c) Material (see 3.1).
- (d) Applicable MS standard (see 1.2).
- (e) Protective coating, if required (see 3.4).
- (f) Marking, if required (see 3.8 and 5.3).
- (g) Selection of applicable levels of packaging and packing.

Custodians:

Army - WC
Navy - AS
Air Force - 82

Preparing activity:

Army - WC

Project No. 5340-0726

Reviewer activities:

Army - AT, AV, MI
Navy - SH
Air Force - 85
DSA - IS

User activities:

Army - GL, ME
Navy - MC
Air Force - None

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No 119-R004
INSTRUCTIONS		
This sheet is to be filled out by personnel either Government or contractor involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity.		
SPECIFICATION		
ORGANIZATION		CITY AND STATE
CONTRACT NO	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT \$
MATERIAL PROCURED UNDER A		
<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1 HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A GIVE PARAGRAPH NUMBER AND WORDING		
B RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES		
2 COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3 IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO IF 'YES' IN WHAT WAY?		
4 REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity)		DATE

DD FORM 1 APR 63 1426

REPLACES NAVSHIPS FORM 4863 WHICH IS OBSOLETE

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