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Superseding AS70991

Terminals: Lug and Splice, Crimp Style, Aluminum,
For Aluminum Aircraft Wire

FSC 5940

RATIONALE

There is no known current usage for these parts. This document needs to remain available because they have been used in the past but do not need to be maintained.

NONCURRENT NOTICE

This specification has been declared "NONCURRENT" as of October 2006. It is recommended, therefore, that this document not be specified for new designs.

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NOTICE

This document has been taken directly from U.S. Military Specification MIL-T-7099E, Supplement 1, Amendment 1 and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE technical standards. The initial release of this document is intended to replace MIL-T-7099E, Supplement 1, Amendment 1. Any part numbers established by the original specification remain unchanged.

The original Military Specification was adopted as an SAE standard under the provisions of the SAE Technical Standards Board (TSB) Rules and Regulations (TSB 001) pertaining to accelerated adoption of government specifications and standards. TSB rules provide for (a) the publication of portions of unrevised government specifications and standards without consensus voting at the SAE Committee level, and (b) the use of the existing government specification or standard format.

Under Department of Defense policies and procedures, any qualification requirements and associated qualified products lists are mandatory for DOD contracts. Any requirement relating to qualified products lists (QPL's) has not been adopted by SAE and is not part of this SAE technical document.

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1. SCOPE:

1.1 Scope:

This specification covers crimp style aluminum lug terminals and conductor splices for aluminum aircraft wire. Lug terminals and conductor splices are hereafter called "terminals".

1.2 Classification:

Terminals shall be of the types specified on applicable standards specified in 2.1 and shall be of the following classes as applicable (see 6.2):

Class 1 - Terminals which conform to this specification when installed with a crimping tool and dies as specified in Standards MS25441 and MS25442 (see 6.1.1 and 6.1.4).

Class 2 - Terminals which are replaceable by class 1 terminals and which, when installed with a tool recommended by the terminal manufacturer, conform to the performance requirements of this specification (see 6.1.2 and 6.1.3).

(Class 2 terminals and tools are not approved for use on items intended for use by the Air Force or for procurement by or for the Air Force.)

2. APPLICABLE DOCUMENTS:

2.1 Issues of documents:

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:

STANDARDS

MILITARY

MIL-STD-129	- Marking for Shipment and Storage
MIL-STD-202	- Test Methods for Electronic and Electrical Component Parts
MS25435	- Terminal Lug, Crimp Style, Straight Type for Aluminum Aircraft Wire, Class 1
MS25436	- Terminal Lug, Crimp Style, 90¼ Upright Type, for Aluminum Aircraft Wire, Class 1
MS25437	- Terminal Lug, Crimp Style, Left Angle Type, for Aluminum Aircraft Wire, Class 1
MS25438	- Terminal Lug, Crimp Style, Right Angle Type, for Aluminum Aircraft Wire, Class 1
MS25439	- Splice Permanent Crimp Style, 2 Way Type, for Aluminum Aircraft Wire, Class 1
MS25440	- Washers - for Use with Aircraft Aluminum Terminals

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2.1 (Continued):

- MS25441 - Tool, Electric, Hydraulic, for Installation of Crimp-Type Wire Terminals
- MS25442 - Dies, for MS25441, Electric, Hydraulic Crimping Tool, (for Use With Aluminum Wire Terminals)

AIR FORCE-NAVY AERONAUTICAL

- AN315 - Nut, Plain, Airframe

(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.)

2.3 Non-Government Publications:

The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the DoDISS cited in the solicitation. Unless otherwise specified, the issues of the documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)

- ASQC-Z1.4 - Sampling Procedures and Tables for Inspection by Attributes. (DoD adopted)

(Application for copies should be addressed to the American Society For Quality Control, P.O. Box 3005, 611 East Wisconsin Avenue, Milwaukee, WI 53201-4606.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM-E11 - Sieves, Wire Cloth, for Testing Purposes. (DoD adopted)
- ASTM-B117 - Salt Spray (Fog) Testing, Standard Test Method for. (DoD adopted)
- ASTM-E323 - Sieves, Perforated-Plate, for Testing Purposes. (DoD adopted)

(Application for copies should be addressed to the American Society For Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

3. REQUIREMENTS:

3.1 Qualification:

The terminals furnished under this specification shall be products which are qualified for listing on the applicable Qualified Products List at the time set for opening of bids (see 4.3 and 6.3).

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3.2 Materials:

The material used in the manufacture of terminals shall be wrought aluminum exhibiting the hardness and conductivity as specified on the applicable standard.

3.3 Design and construction:

Terminals as specified on applicable standards shall be designed for attachment to appropriate sizes of wire, by having the terminal receiving barrel reshaped around the conductor. For class 1 terminals, it shall be possible to perform this reshaping operation by means of tool and dies as specified in MS25441 and MS25442. Terminal barrels shall exhibit no evidence of fracturing or spalling as a result of the reshaping operation. For class 2 terminals, it shall be possible to perform this reshaping operation by means of tooling recommended by the terminal manufacturer.

3.3.1 Dimensions: Terminals shall conform to the dimensions after plating as shown on the applicable standard.

3.3.2 Tinning: Terminals shall be either electro or hot-dipped tin plated over their entire surface. The quality and thickness of the tin shall be sufficient to withstand the tests of Section 4.

3.3.3 Abrasive mixture: An abrasive mixture shall be provided within the conductor receiving barrel of the terminal (see 6.5). The mixture shall occupy 40 to 60 percent of the interior barrel volume. The mixture shall be uniformly composed of nickel powder or equivalent, and a suitable elastomeric binder. The nickel powder or equivalent shall be 50 percent by weight of the mixture, and the nickel powder or equivalent shall be of such size that 100 percent passes through a number 200 sieve as specified in ASTM-E11 and ASTM-E323. The elastomeric binder shall maintain its physical characteristics during the tests specified hereafter, and shall remain compatible with the metal used in the terminal, and the wire and insulation used in.

3.3.4 Inspection plug: The inspection plug shall not work loose during the insertion of the wire, the crimping operation, or the tests as specified herein (see 6.6).

3.4 Installation tool:

The installing tool for class 1 terminals shall conform to MS25441. The dies shall conform to MS25442. Only one crimp shall be necessary for wire sizes 8 through 00. Two crimps shall be necessary for wire sizes 000 and 0000.

3.5 Performance:

Terminals crimped with the tool specified in 3.4 or as specified by the manufacturer shall perform satisfactorily when subjected to the following performance requirements.

3.5.1 Voltage drop: The voltage drop through the terminals when carrying current shall not exceed the values shown in Table I.

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3.5.2 Life cycle:

- 3.5.2.1 Vibration: After the vibration test (4.7.4.1), the terminals shall conform to the requirements for voltage drop specified in Table I.
- 3.5.2.2 Thermal shock: After the thermal shock test (4.7.4.2), the terminals shall show no evidence of a physical breakdown and the measured voltage drop values shall conform to Table I.
- 3.5.2.3 Accelerated aging: After accelerated aging (4.7.4.3), the terminals shall conform to the requirements for voltage drop as specified in Table I.
- 3.5.2.4 Corrosion resistance: After the corrosion resistance test (4.7.4.4), the terminals shall not indicate blistering of the plating and the base metal shall not be exposed. Surface discoloration shall not be cause for rejection. In addition, the terminals shall conform to the requirements for voltage drop as specified in Table I.
- 3.5.2.5 Tensile strength: After being subjected to the vibration, thermal shock, accelerated aging, and corrosion resistance tests, the terminals shall be subjected to the tensile strength test (4.7.4.5). The mechanical connection of the wire and the terminal shall not break or become distorted before the minimum tensile strength as specified in Table I is reached.
- 3.5.3 Current cycling: The terminals, when subjected to the current cycling test (4.7.5), shall remain 10°C less in temperature than the conductor temperature for any given cycle, and at the end of the 60th, 70th, and 80th cycle, it shall conform to the requirements for the voltage drop as specified in Table I. In addition, the difference in voltage drop between the 60th and 80th cycle shall not exceed 20 percent.
- 3.5.4 Metal relaxation (Lug terminals only): The temperature of the terminals under test shall not exceed that of the conductor. The terminal tongue load shall not relax more than 15 percent of the preset pressure load at any time during the test and the terminals shall not exceed the maximum value for voltage drop as specified in Table I.

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TABLE I. Voltage drop.

Specification MIL-W-7072 wire size	Test current (amperes)	Maximum voltage drop (millivolts)		Tensile strength (minimum pounds)
		Initial	After test	
AL8	60	7	11	130
AL6	83	6	11	200
AL4	108	6	8	300
AL2	152	6	8	500
AL1	174	6	7	700
AL0	202	6	7	900
AL00	235	6	7	1100
AL000	266	6	7	1300
AL0000	303	6	7	1500

3.6 Manufacturer's drawing for class 2 tools:

The manufacturer shall submit to the qualifying activity a drawing indicating the critical dimensions of the crimping dies furnished with the tool used to qualify class 2 terminals. This drawing shall be identified by the manufacturer's drawing number. Upon approval by the qualifying activity, such numbers will be listed in the applicable QPL.

3.7 Identification of product:

Each terminal shall have the aircraft wire size followed by AL for which designed and the manufacturer's name or trademark legibly stamped in its surface. The marking shall be located so that it will not be obliterated during crimping or installation.

3.7.1 Use of military designations: Military designations shall not be applied to a terminal, except for qualification test samples, until notice of approval has been received from the qualifying activity.

3.8 Additional requirements:

The requirements specified herein apply to crimp-style aluminum terminals covered by applicable standards. Additional requirements will be specified on the individual standard. In the event of any conflict between requirements of this specification and the requirements of the standard, the latter shall take precedence.

3.9 Workmanship:

Workmanship shall be in accordance with high grade electrical manufacturing practice. The occurrence of defects shall not exceed the applicable acceptable quality levels.

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 facilities or any commercial laboratory 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 supplies and services conform to prescribed requirements.

4.1.1 Test equipment and inspection facilities: Test equipment and inspection facilities shall be of sufficient accuracy, quality, and quantity to permit performance of the required inspection. The supplier shall establish calibration of inspection equipment to the satisfaction of the Government.

4.2 Classification of inspection:

The inspection of terminals shall be classified as:

- (a) Qualification inspection (4.3)
- (b) Quality conformance inspection (4.4)

4.3 Qualification inspection:

The qualification inspection of terminals shall consist of all the examinations and tests of this specification specified under 4.6 and 4.7.

4.3.1 Qualification inspection samples (class 1): The qualification test samples shall consist of 50 terminals for each barrel size, and 5 terminals for each stud size for each barrel size, and in addition, 5 unplated terminals for each barrel size for which qualification is desired (see 6.2).

4.3.1.1 Identification of samples: Samples for each part number shall be separately packaged and forwarded to the activity responsible for qualification designated in the letter of authorization (see 6.3). Samples shall be identified by marking each package with the following information:

Sample for qualification test
Specification MIL-T-7099E
Type _____ Class _____
MS Part No.
Name of Manufacturer
Manufacturer's Part No.
Submitted (date) under authorization (reference letter authorizing the test)

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4.3.2 Qualification of class 2 terminals: Class 2 terminals will be approved for inclusion in the Qualified Products List upon approval of the manufacturer's test report. At the discretion of the qualifying activity, the satisfactory performance of the terminals may be checked by a Government laboratory under any of the inspection conditions specified (see 4.5 and 6.4).

4.3.2.1 Test report: The contractor shall furnish the activity responsible for qualification a certified test report, in duplicate, showing quantitative results for tests of Class 2 terminals required by this specification and further certified in the forwarding letter by an officer of the contractor. The report shall designate the MS part number of the Class 1 terminal which will replace the Class 2 terminal submitted. The report shall also include the manufacturers' drawings as specified in 3.6.

4.3.3 Qualification routine: The samples for each barrel size shall be subjected to the examination and tests in the order and quantity specified in Table II. The specimens comprising Groups I and II shall subsequently be divided for Groups III, IV and V.

4.3.4 Qualification facilities: Qualification inspection shall be conducted at a Government laboratory, or when directed by the Government, at an approved independent testing laboratory or at the place of manufacture.

4.4 Quality conformance inspection:

Quality conformance inspection shall consist of sampling plan A and sampling plan B inspections.

4.4.1 Inspection lot: An inspection lot shall consist of terminals for a particular wire and stud size made under essentially the same conditions and presented for inspection at the same time.

TABLE II. Qualification inspection sequence and number of samples.

Group	Examination or test	Requirement paragraph	Examination or test paragraph	Number of samples
I	Examination of product.....	1.2, 3.2, 3.3 to 3.3.4 inclusive	4.6.1, 4.7.1, and 4.7.2	16
II	Voltage drop...	3.5.1	4.7.3	16
III	Life cycle.....	3.5.2 (3.5.2.1 to 3.5.2.5 inclusive)	4.7.4 (4.7.4.1 to 4.7.4.5 inclusive)	6
IV	Current cycling	3.5.3	4.7.5	6
V	Metal relaxation	3.5.4	4.7.6 (4.7.6.1 to 4.7.6.3 inclusive)	4

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4.4.2 Sampling plan A:

4.4.2.1 Sampling for Examination: A random sample shall be selected from each inspection lot in accordance with table I, Inspection Level II, of ASQC-Z1.4 and subjected to the test specified in 4.6.1.

4.4.3 Sampling plan B:

4.4.3.1 Sampling for tests: A random sample shall be selected in accordance with table I of ASQC-Z1.4, once every 18 months from each lot of a given wire size and type. The inspection level shall be S-2. All provisions of ASQC-Z1.4 shall apply including acceptance numbers of one as specified in tables II-A and II-B.

TABLE III. Classification of defects for examination of product.

Examination for:	Major	Minor
(a) Dimensions		
(1) Overall length.....	X	
(2) Width of tongue (max).....	X	
(3) Stud hole (min).....	X	
(4) Washer clearance radius.....	X	
(5) Inside diameter of barrel.....	X	
(6) Outside diameter of barrel (max)....	X	
(7) All other dimensions.....		X
(b) Materials.....	X	
(c) Workmanship and marking.....		X

4.4.3.2 Sampling tests: The sampling plan B tests shall consist of the conductivity test and voltage drop test, followed by the tensile strength test (4.7.2, 4.7.3, and 4.7.4.5, respectively). Tests shall be performed on sample units that have been subjected to and passed the sampling plan A examination, unless the Government considers it more practical to select a separate sample from the lot for the sampling plan B tests. All sample units shall be selected without regard to quality.

4.5 Inspection conditions:

4.5.1 Test condition: Unless otherwise specified, all tests shall be conducted at an ambient room temperature of 25°±5°C (77°±9°F). The test area shall be free from drafts. All tests shall be initiated within 72 hours after installation. Terminals under voltage drop test (4.7.3), and thermal shock test (4.7.4.2) shall be securely bolted back-to-back as shown on figure 1, with the proper size steel bolt corresponding to the stud size and suspended in free air with a minimum clearance of 18 inches above table. The length of the bolt used shall be twice the maximum allowed thickness of the terminal tongue, plus 1/2 inch. Flat steel washers used in this test shall conform to MS25440. In addition, the wires shall be connected to the power source with terminals identical to those being tested.

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4.6 Examinations:

4.6.1 Examination of product: Samples of terminals selected in accordance with 4.4.2.1 shall be carefully examined to determine compliance with this specification and with applicable standards with respect to material, form, dimensions, and workmanship.

4.6.2 Packing, packaging, and marking: Packaging shall be examined for conformance to Section 5.

4.7 Test methods:

4.7.1 Hardness: Hardness shall be determined in accordance with Federal Standard No. 151.

4.7.2 Conductivity: Conductivity shall be determined on the tongue of the unplated terminals with a Magnatest FM-100 conductivity meter manufactured by the Magnaflux Corporation, or equivalent.

4.7.3 Voltage drop: For terminals voltage drops of the test currents specified in Table I shall be measured from the intersection of the tongue and barrel to a point on the wire 1/8 inch from the end of the support. Measurements shall be made after the temperature of the wire has stabilized. Voltage drop measurements on conductor splices shall be made from the center of the splice to a point on one end of the splice by puncturing the insulation of the current-carrying conductor 1/8 inch back from the wire-receiving end of the splice. The voltage drop reading shall not exceed that specified in Table I.

4.7.4 Life cycle: Terminals shall be attached to each end of three lengths of wire 15 inches long. The three samples shall be subjected to each of the following tests in the order shown.

4.7.4.1 Vibration: One end of the test specimen shall be mounted by clamping the terminal tongue not more than 1 inch above the vibrating member with a stable clamping device. The other end of the specimen shall be secured to a stable support external to the vibrating table with all slack or tension removed from the wire. Each test specimen shall be subjected to the test specified in 4.7.3 to determine the initial voltage drop prior to performance of this test. The specimens shall be vibrated in accordance with method 204A, condition B of MIL-STD-202 except that the cycle shall be performed 12 times in each of the two axis mutually perpendicular to each other and to the axis of the wire (a total of 24 times). Following this test, the specimens shall be tested for voltage drop (see 4.7.3).

4.7.4.2 Thermal shock: The terminals shall be exposed to at least 5 cycles of temperature changes as indicated in Table IV. The terminals shall be held at the specified maximum and minimum temperatures for not less than 30 minutes. In transferring the samples from one chamber to another for these temperature changes, the samples shall remain at room temperature for a maximum of 15 minutes between exposures to extreme conditions. Following this test, the samples shall be subjected to a physical examination and the voltage drop test (4.7.3).

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4.7.4.3 Accelerated aging: The samples shall be suspended in an air oven (gravity convection type) at an ambient temperature of $126^{\circ}\pm 2^{\circ}\text{C}$ for a period of 120 hours. After completion of the accelerated aging test, the specimens shall be cooled to between 20° and 25°C (68° to 77°F) within a period of 1 hour. When cooled, the samples shall be tested for voltage drop (4.7.3).

TABLE IV. Temperature cycle.

Sequence	Degrees centigrade	Degrees fahrenheit
Start at.....	25 + 5	77 + 9
Raise to.....	120	248
Reduce to.....	-55	-67

4.7.4.4 Corrosion resistance: The salt fog test for corrosion shall be in accordance with ASTM-B117. The test period shall be 100 hours. The samples shall be mounted in the salt fog chamber in a horizontal position. Adjoining samples shall be separated by at least 1/4 inch. During this test, the terminals shall not come in contact with metallic or wooden objects and the salt fog shall have free access to the samples. The contacting surfaces shall be visually examined for corrosion. After examination, any salt deposits on the terminal tongue shall be removed by means of a fine abrasive material and the voltage drop test shall be performed.

4.7.4.5 Tensile strength: The specimen shall be placed in a standard tensile strength testing machine and sufficient force shall be applied to pull the cable out of the terminal or break the cable or terminal. The tests shall be made at normal testing room temperature and with the speed of travel of head of 1 inch per minute. Where required, the holding surfaces or the tensile machine clamp may be serrated to provide sufficient gripping or holding strength.

4.7.5 Current cycling: Samples shall consist of terminals crimped to each end of three lengths of wire 24 inches long and suspended horizontally in a draft-free chamber. Each test specimen shall be subjected to the test specified in 4.7.3 to determine the initial voltage drop prior to the performance of this test. The samples are connected in a series circuit from the power source to new 6-foot leads crimped with terminals identical to those used in the test samples. A cycle shall be considered 1-1/2 hours total time consisting of current applied for 1 hour and the current removed while samples cool at ambient chamber temperature for the remaining half hour. The current applied shall be so adjusted that the conductor temperature specified in Table V shall remain constant. The temperature of the terminals under test shall be determined by thermocouples attached to the terminal barrels by means of water glass or Sauereisen paste. A thermocouple shall be embedded in the strands of one lead wire 30 inches from the junction with the sample and at least 6 inches from a wall within the chamber. This thermocouple shall measure the conductor temperature. The temperatures shall be determined at the end of each 1-hour period with the load on. The terminal shall be subjected to a total of 80 cycles as scheduled in Table V. At the end of the 60th, 70th, and 80th cycle the terminals shall be tested for voltage drop (4.7.3).

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TABLE V. Schedule for current cycling test.

Cycle	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
Conductor temp. °C. (±2°C)	130	140	150	160	170	180	180	180

4.7.6 Metal relaxation:

4.7.6.1 Test equipment: Each of the following shall be required:

- (a) Relaxation test fixture (Figures 2,3,4,5,6, and 7).
- (b) Ellis Associates BA-12 bridge amplifier (or equivalent).
- (c) Dumont 304-H cathode ray oscillograph (or equivalent).
- (d) Foxboro Model No. 8106 portable potentiometer indicator or equivalent).
- (e) All American Vibration machine Model 1-HA (or equivalent).
- (f) Thermocouple selector switch.

4.7.6.2 Calibration procedure: The relaxation test fixture stud shall be positioned, by suitable means, in a tensile machine and a tensile load shall be applied for the 3/8-inch stud in increments of 500 pounds, and for the 1/4-inch stud in increments of 200 pounds. The loading shall proceed until 4,000 pounds is reached for the 3/8-inch stud and 2,000 pounds is reached for the 1/4-inch stud. At each of the above specified increments, the bridge amplifier shall be balanced by the measure dial and the dial increments or units shall be noted. A graph shall be prepared showing tensile load (pounds) versus bridge dial increments or units.

4.7.6.3 Test procedure: Samples shall be prepared by crimping the terminals to each end of two 15-inch lengths of wire. Each test specimen shall be subjected to the test specified in 4.7.3 to determine the initial voltage drop prior to the performance of this test. The relaxation test fixtures, figure 6, shall be mounted to the vibration table in such a manner that the stud is parallel to the vibration table. The following procedure, with instrumentation connected as shown in Figure 5, shall be used to provide initial operating point of the instrumentation.

- (a) Set up relaxation test fixture with no load applied.
- (b) Set measure dial on amplifier at 100 units.
- (c) Rotate balance dial on amplifier until minimum bridge output is observed on the oscilloscope (balance point).
- (d) Reset measure dial to the bridge unit number indicated in Table VI (pressure load).

4.7.6.3 (Continued):

(e) Place terminals of the prepared samples on the test fixture strain gage stud and tighten nut on terminals until sufficient load is applied to indicate balance on the oscilloscope.

(1) Strain gages: Four Baldwin Bakelite No. SR-4 ABD-7 strain gages, gage factor 1.97, resistance 120.2 ohms (each arm), or equivalent, shall be used. All gages shall have the same gage factor and matched for resistance within 1/10 of an ohm.

(2) Gage mounting instructions: Baking cycle - mount one side (2 arms) one vertical and one horizontal as shown on Figure 2, using Baldwin SR-4 Bakelite cement, or equivalent. Install in oven and bake for 1 hour at 140°F. Increase temperature to 250°F and bake for 2 hours. Remove from oven at the end of 3-hour baking period and cool to room temperature. Mount the remaining 2 gages on the other side of stud diametrically opposite as shown on figure 2. Return to oven and bake for the following cycle: 40 minutes at 140°F, 1 hour at 175°F, 2 hours at 250°F, and 2 hours at 325°F.

Care shall be exercised in installing gages. Should slippage occur before or during baking, remove gages and start over. After baking cycling is completed, using the stud as ground and gage as the active lead, the strain gage stud should have a minimum resistance of 10K megohms. Cerese wax from Baldwin (or equivalent) is applied over the strain gage area for moisture proofing.

(f) The remaining two ends of the specimen are then mounted to a stable support. The specimens shall be subjected to vibration perpendicular to the plane of the contact tongue. The vibration shall be conducted in accordance with Method 204A, Condition B, of MIL-STD-202. A load current of 125 percent of test current shall be applied to the terminals for the first 25 hours and a load current of 150 percent of test current for the last 25 hours for a total of 50 hours while still under vibration. The temperature of the terminals attached to the strain gage fixture shall be taken by means of thermocouples attached with water glass or Sauereisen paste to the terminal barrels and tongues. The tongue relaxation shall be measured every hour by rotating the measure dial until balance is indicated on the oscilloscope. A thermocouple embedded in the conductor at midpoint on one of the samples under test shall determine the temperature of the conductor. At the completion of this test, the terminals, wires, and relaxation test fixture shall be allowed to return to room temperature. Then, while still attached to the relaxation test fixture, and with no vibration, the terminals shall be subjected to the voltage drop test (4.7.3).

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TABLE VI. Bridge settings for relaxation test.

Terminal size	Stud size	Total number of bridge units	Corresponding to pressure (lbs)
6	1/4	190	850
1/0	3/8	300	1830

5. PACKAGING:

5.1 Packaging:

For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the inventory control points packaging activity within the military department or defense agency, or within the military department's system command. 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:

6.1 Intended use:

Terminals covered by this specification are commonly known as solderless cable lugs and are for use on aircraft aluminum electric wire.

- 6.1.1 Class 1 terminals are intended for use by aircraft manufacturers, equipment manufacturers and Service activities. These terminals will be the only type stocked by the Services and supplied to their activities.
- 6.1.2 Class 2 terminals are intended for use by aircraft manufacturers and equipment manufacturers. These terminals will not be stocked by or supplied to the Services for maintenance modification or overhaul purposes unless specifically approved by the procuring activity.
- 6.1.3 Where Class 2 terminals are used, the installation will be such that Class 1 terminals will be adequate as a replacement without rework of the installation or terminal. Parts list will indicate the class 1 MS terminal that may be used for service replacement of class 2 terminals if used.
- 6.1.4 Crimping tools, dies, and gages conforming to MS25441, MS25442, and MS25472, as approved by the activity responsible for qualification, will be stocked by the Services for field maintenance.

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6.2 Ordering data:

Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type and class of terminal desired and applicable MS part number (MS part number will not be applied to class 2 terminals) (see 1.2).
- (c) Quantity desired.
- (d) Where qualification test will be conducted (see 4.3.4).
- (e) Applicable levels of packaging and packing (see section 5).

6.3 Qualification:

With respect to products requiring qualification, awards will be made only for such products as have, prior to the bid opening date, been tested and approved for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government, tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification.

- 6.3.1 Application for qualification: The activity responsible for the QPL of MIL-T-7099 is the Naval Air Systems Command. The Naval Weapons Support Center, Crane, Indiana, has been designated by the Naval Air Systems Command as agent for the establishment of the QPL. Requests for information pertaining to and applications for qualification should be addressed to:

Commanding Officer
Naval Weapons Support Center
Crane, Indiana 47522
Attention: Code 3064

- 6.4 Manufacturers desiring approval of Class 2 terminals should make available to the designated testing activity the tooling necessary for performing the crimping operation. At the conclusion of the testing, the tooling will be returned to the manufacturer.

6.5 Function of mixture:

The mixture supplied within the terminal barrel is designed to be a functional part of the terminal and wire assembly. This mixture should not be wiped or flushed from the terminal barrel prior to its installation on the wire. The mixture is designed to increase junction electrical reliability (see 3.3.3).

6.6 Function of inspection hole:

The inspection hole provides an accessible opening for determining the length of the conductor in the terminal barrel. The plug in this hole should not be removed during the crimping operation and should be removed only for inspection purposes and then reinserted (see 3.3.4).

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6.7 Washers:

Washers as specified in MS25440 should be used with these terminal lugs.

6.8 This paragraph was deleted as it did not pertain to the converted SAE document.

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