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Superseding AS81790

Connectors, Receptacle, External Electric Power, Aircraft
General Specification for

FSC 5935

RATIONALE

Limit scope revision required to incorporate AS81790-A3.

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

1. SCOPE**1.1 Scope**

This specification covers the requirements for aircraft external electric power receptacles.

1.2 Part Numbers

Receptacles, covers and shields shall be identified by the MS part numbers shown on the applicable military standard.

2. APPLICABLE DOCUMENTS**2.1 SAE Publications**

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS-QQ-A-250	Aluminum and Aluminum Alloy, Plate and Sheet, General Specification for
J452	General Information – Chemical Compositions, Mechanical and Physical Properties of SAE Aluminum Casting Alloys
AMS4290	Aluminum Alloy, Die Castings, 9.5Si – 0.50Mg (360.0-F) As Cast
AMS4291	Aluminum Alloy, Die Castings, 8.5Si – 3.5Cu (A380.0-F) As Cast
AS7974	Cable Assemblies and Attachable Plugs, External Electrical Power, Aircraft, General Specification For
AS17845	Shield for Use with MS90362 External Power Receptacles
AS25018	Connector, Receptacle, External Electric Power, Aircraft, 28 Volt DC, Jet Starting
AS35051	Cover for Use with MS90362 External Power Receptacle

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Documents
Document Sharing Hub

AS35061 Connector, Receptacle External Electric Power, Aircraft, 28 Volt DC Operating Power

AS90362 Connector, receptacle, External Electric Power, Aircraft, 115/200 Volt, 400 Hertz

2.2 U.S. Government Publications

Available from the Document Automation and Production Service (DAPS), Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, <http://assist.daps.dla.mil/quicksearch/>.

2.2.1 Specifications and Standards: The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

Federal

TT-P-1757 Primer Coating, Zinc Chromate, Low-Moisture Sensitivity

Military

MIL-DTL-5541 Detail Specification: Chemical Conversion Coatings on Aluminum and Aluminum Alloys

MIL-S-7742 Screw Threads, Standard, Optimum Selected Series, General Specification for

MIL-A-8625 Anodic Coatings, for Aluminum and Aluminum Alloys

MIL-PRF-85582 Performance Specification: Primer Coatings: Epoxy,, Waterborne

STANDARDS

Military

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-130 Identification Marking of U.S. Military Property

MIL-STD-202 Test Methods for Electronic and Electrical Component Parts

MIL-STD-889 Dissimilar Metals

MIL-STD-1285 Marking of Electrical and Electronic Parts

MIL-STD-2073-1 Standard Practice for Military Packaging

MS35335 Washer, Lock, Flat-External Tooth

2.2.2 Other Government Documents, Drawings and Publications: The following other Government documents, drawings and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

2.3 Non-Government Publications: The following document(s) 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 issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

2.3.1 AIA Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NASM961 Washer, Flat, Electrical

NASM35650 Nut, Plain, Hexagon, Machine Screw, UNF-2B

2.3.2 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ANSI/ISO 10012-1 Quality Assurance Requirements for Measuring Equipment

2.3.3 ASQ Publications

Available from American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203, Tel: 800-248-1946 (United States or Canada)) or +1-414-272-8575 (International), www.asq.org.

ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes

2.3.4 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B26 Standard Specification for Aluminum Alloy Sand Castings

ASTM B85 Standard Specification for Aluminum Alloy Die Castings

ASTM B108 Standard Specification for Aluminum Alloy Permanent Mold Castings

ASTM B193 Resistivity of Electrical Conductor Materials

ASTM B209 Standard Specification for Aluminum-Alloy Sheet and Plate

ASTM B700 Standard Specification for Electrodeposited Coatings of Silver for Engineering Use

ASTM D5948 Standard Specification for Molding Compounds, Thermosetting

2.3.5 NCSL Publications

National Conference of Standards Laboratories, 2995 Wilderness Place, Suite 107, Boulder, CO 80301-5404, Tel: 303-440-3339, www.nclsi.org.

NCSL Z540-1 General Requirements for Calibration Laboratories and Measuring and Test Equipment

2.4 Order of Precedence

In the event of a conflict between the text of this specification and the references cited herein (except for associate detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Specification Sheets

The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification

Power receptacles furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable Qualified Products List (QPL) at the time of award of contract (see 4.4 and 6.7).

3.3 Materials

Materials shall conform to the applicable specification as specified and shall be suitable for the performance required herein. Unless suitably protected against electrolytic corrosion, dissimilar metals shall not be employed in intimate contact with each other. Dissimilar metals are defined in MIL-STD-889. Materials used in the construction of connectors, bases, covers and shields shall be fungus inert in accordance with requirement 4 of MIL-STD-454. All materials shall be certified as specified in 4.6.9.

3.3.1 Bases: Bases shall be fabricated using a fiber filled, impact resistant, polyethylene terephthalate material conforming to MIL-M-14 type SDI-30, an impact resistant fiber filled polyester material, or an impact resistant fiber filled epoxy material. Alternate materials may be used if approved by the qualifying activity (see 6.7). Such materials must be equivalent or superior to type SDI-30 material.

3.3.2 Shields: Cast shields shall be 356-T6 aluminum alloy in accordance with QQ-A-596 or shall be die cast aluminum alloy A380 in accordance with QQ-A-591. Shields made from sheet stock shall be 5052 aluminum alloy in accordance with QQ-A-250/8; minimum thickness .060 inch. Shields shall be anodized in accordance with MIL-A-8625 Types I or II, or chemically surface-treated in accordance with MIL-C-5541, Class 2. Coat with one coat of zinc chromate primer according to TT-P-1757 or with water borne epoxy primer according to MIL-P-85582.

3.3.3 Contacts: The small pin contacts shall be tellurium copper, leaded copper, or brass, with a minimum of 0.0002 inch of silver plate. The large pin contacts shall be tellurium copper, or leaded copper or equivalent materials approved by the qualifying activity with a minimum of 0.0002 inch of silver plate. When tested in accordance with 4.6.11, the conductivity of the material used to make the large gage contacts shall be a minimum of 90% of the International Annealed Copper Standard (IACS).

3.3.4 Covers: Covers used for protecting the rear of receptacles shall be of a shatterproof synthetic rubber or phenolic compound of 85 to 95 shore hardness and suitable to meet the performance specified herein.

3.4 Design and Construction

Receptacle assemblies and covers shall be designed and constructed in accordance with the applicable military standards and as specified herein.

3.4.1 Contacts: Unless approved by the qualifying activity, the contact shall be designed from a one piece alloy material. Contacts must conform to the physical dimensions of this specification and related military standards (see 4.6.2).

3.4.1.1 Identification: Contact identification shall be permanently and legibly marked on the front and rear of the base.

3.4.1.2 Method of attachment: A positive means shall be provided to anchor contacts in the base.

- 3.4.1.3 Cross-sectional area: The cross-sectional area throughout each contact shall be no less than the root area of the thread at any point.
- 3.4.1.4 Terminal pads: Each terminal shall include an integral or force-fitted pad.
- 3.4.1.5 Threads on terminals: Threads on terminals shall conform to MIL-S-7742. Each large terminal shall be threaded to within 0.125 inch of its pad and each small terminal shall be threaded to within 0.062 inch of its pad.
- 3.4.1.6 Terminal hardware: Each base shall be provided with one nut MS35650-3385T, one lockwasher MS35335-91, and one flat washer AN961-616 for each large terminal; one nut MS35650-305T, one lockwasher MS35335-88, and one flat washer AN961-10 for each small terminal.
- 3.4.1.7 Hardness of contacts: The hardness at all points on the sides of each pin shall be at least 86 to 100 Brinell or Rockwell B 40-56 (see 4.6.16).
- 3.4.2 Shields: Each shield, including all rivets and welds, shall be contained within the maximum dimensions shown on the standard. The inside of each shield shall be smooth and free from protrusions and sharp edges.
- 3.4.3 Dimensions (see 3.1): The dimensions of the receptacle assemblies and associated parts shall be in accordance with the applicable MS sheet.
- 3.4.4 Weight: When tested as specified in 4.6.3, the weight of each item shall not exceed the value specified on the applicable Military Standard.

3.5 Performance

Each item shall perform satisfactorily when subjected to the following conditions applicable to that item.

- 3.5.1 Impact: There shall be no fractures or cracks of the receptacle assembly and no loosening of shields or contacts when items are subjected to impact tests after exposure to -55 °C in accordance with 4.6.4.
- 3.5.2 Terminal torque strength: Receptacle assemblies shall be capable of withstanding torque in accordance with 4.6.5. As a result of the application of torque there shall be no cracking, delamination or chipping of the base. The contacts shall not shear, crack or rotate.
- 3.5.3 Flexural strength, receptacle base: Receptacle bases, less center contacts, shields, and other accessories, shall not break when subjected to a minimum force of 1300 pounds for three-pin receptacles, and a minimum 3500 pounds for six-pin receptacles when tested in accordance with 4.6.6.
- 3.5.4 Pin static bending strength: Receptacle assemblies shall be capable of withstanding forces applied to the pins in accordance with 4.6.7. The pins shall not take a permanent set of more than .01 inch at the mating end. There shall be no cracking, delamination or chipping of the base and the contacts shall not come loose in the base.
- 3.5.5 Shield and attachment static strength: Shields shall be capable of withstanding forces applied to the shield in accordance with 4.6.8. The sides of the shield shall not be displaced greater than the amount specified while the forces are applied. After the forces are removed, the shield shall conform to the dimensions shown on the applicable standard. There shall be no cracking, delamination or chipping of the base and the shield shall not come loose from the base.

3.6 Environmental

- 3.6.1 Thermal shock: Receptacle assemblies and covers shall not crack, fracture, or delaminate when subjected to temperature extremes in accordance with 4.6.12.
- 3.6.2 Salt spray: The receptacle assemblies, shields and covers shall show no evidence of corrosion when tested in accordance with 4.6.14.

- 3.6.3 Humidity: Receptacle assembly and cover as appropriate shall withstand the humidity exposure as described in 4.6.13 followed by a dielectric withstanding voltage test defined in 4.6.15.
- 3.6.4 Dielectric withstanding: The voltage shall be 60 Hz 2500 $\pm$ 100 volt rms with a current leakage of less than 1.0 milliamperes when tested in accordance with 4.6.15.

3.7 Identification of Product

Each item shall be marked as follows for identification in accordance with MIL-STD-130:

Specification Part Number

Manufacturer's Part Number

Manufacturer's Name or Trademark

Date Indicator which defines manufacturing dates for periods 3 months or less

3.7.1 Location of markings: Identification markings shall be located as follows:

- a. Three-pin receptacles. Identification markings shall be located on the shield.
- b. Six-pin receptacles. Identification markings shall be located on the pin side of the base a minimum of 5/8" from the perimeter.
- c. Shield, six-pin receptacles. Identification markings shall be located on the shield.
- d. Cover, six-pin receptacles. Identification markings shall be located on the raised center portion of the cover.

3.8 Workmanship

Items shall be fabricated, constructed and assembled to produce an item free from all defects which would affect proper functioning in service. Particular attention shall be given to freedom from chips, dirt, grit and other foreign material; also to freedom from defects, burrs, sharp edges, corners and points. The cleaning methods used shall not be injurious to any of the parts nor shall any of the parts be contaminated by the cleaning agents employed.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examination and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor 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 ensure supplies and services conform to prescribed requirements.

- 4.1.1 Responsibility for compliance: All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements; however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.