SAE Aerospace
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AEROSPACE STANDARD

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Fastener, Positive Locking, Electronic Equipment, General Specification For

FSC 5340

NOTICE

This document has been taken directly from U.S. Military specification MIL-F-85731, 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-F-85731, 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 technical report.

TO PLACE A DOCUMENT ORDER:
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1. SCOPE:

1.1 Scope:

This specification covers positive locking fasteners intended for use in aircraft to secure electronic line replaceable units (LRUs).

2. APPLICABLE DOCUMENTS:

2.1 Government documents:

2.1.1 Specifications, standards and handbooks:

Unless otherwise specified, the following specifications, standards and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

QQ-P-35	Passivation Treatments for Corrosion Resistant Steel
QQ-P-416	Plating, Cadmium (Electrodeposited)
PPP-B-566	Box, Folding, Paperboard
PPP-B-576	Box, Wood, Cleated, Veneer, Paper Overlaid
PPP-B-585	Box, Wood, Wirebound
PPP-B-591	Boxes, Shipping, Fiberboard, Wood-Cleated
PPP-B-601	Boxes, Wood, Cleated Plywood
PPP-B-621	Box, Wood, Nailed and Lock Corner
PPP-B-636	Box, Shipping, Fiberboard
PPP-B-665	Boxes, Paperboard, Metal Edge and Components
PPP-B-676	Boxes, Setup
PPP-H-1581	Hardware (Fasteners and Related Items), Packaging of
PPP-T-60	Tape, Packaging, Waterproof

2.1.1 (Continued):

MILITARY

MIL-P-116	Preservation, Methods of
MIL-H-6088	Heat Treatment of Aluminum Alloys
MIL-H-6875	Heat Treatment of Steels (Aircraft Practices), Process For
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-L-8937	Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting, NATO Code S-1738
MIL-L-10547	Liner, Case and Sheet, Overwrap, Water Vaporproof Or Waterproof, Flexible

STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U. S. Military Property
MIL-STD-810	Environmental Test Methods and Engineering Guidelines
DOD-STD-1788	Avionics Interface Design Standard

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

2.2 Other publications:

The following document(s) form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B117	Method of Salt Spray (Fog) Testing

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

2.3 Order of precedence:

In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS:

3.1 Specification sheet:

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

3.2 First article inspection:

When specified (see 6.2.1), a sample shall be subjected to first article inspection in accordance with 4.3.

3.2.1 Requalification:

Requalification will be required in the event any change is made in the product design, material, heat treatment, finish or lubrication.

3.2.2 Retention of qualification:

To maintain status on the Qualified Product List, certification shall be submitted at two year intervals to indicate continued compliance with the requirements of this specification (see 4.3.1).

3.3 Material:

The material shall be as specified herein in the applicable specification sheet.

3.3.1 Heat treatment:

3.3.1.1 Aluminum alloy:

Heat treatment of aluminum alloy components shall be in accordance with MIL-H-6088.

3.3.1.2 Corrosion resistant steel (CRES) and alloy steel:

Heat treatment of CRES and alloy steel components shall be in accordance with MIL-H-6875.

3.3.2 Protective treatment:

Fastener components shall be plated or treated as specified herein or in the applicable specification sheet or standard.

3.3.2.1 Passivation:

Fastener components fabricated from corrosion resistant steel shall be passivated in accordance with QQ-P-35.

3.3.2.2 Surface oxide:

After heat treatment of corrosion-resistant steel fastener components, all surface oxide shall be removed by a means that will produce no intergranular or surface corrosion.

3.3.2.3 Alloy steel:

Fastener components fabricated from alloy steel shall be cadmium plated in accordance with QQ-P-416, Type II, Class 2.

3.3.2.4 Aluminum alloy:

Fastener components fabricated from aluminum alloy shall be anodized in accordance with MIL-A-8625.

3.4 Design:

The fastener is designed to secure line replaceable units (LRUs) in military aircraft. When used in conjunction with a mating holddown device, it will secure the LRU in a stable position in the aircraft (see 6.1).

3.5 Lubricant:

When specified in the applicable specification sheet or standard, the lubricant used on the fastener shall be in accordance with MIL-L-8937.

3.6 Environmental requirements:

The fasteners shall be capable of functioning without damage when subjected to the environmental conditions in 3.6.1 through 3.6.3.

3.6.1 Endurance:

The fastener shall be capable of withstanding 2000 cycles (as described in 3.6.1.1) of locking and unlocking without degradation of performance (see 4.5.2).

3.6.1.1 Cycle:

One complete performance of the fastener from zero pound to the preload poundage and then back to the initial zero poundage.

3.6.2 Corrosion:

The fastener shall be capable of five (5) lock and unlock endurance cycles described in 3.6.1.1 after being subjected to the corrosion test (see 4.5.3).

3.6.3 Sand and dust:

The fastener shall be capable of five (5) lock and unlock endurance cycles described in 4.5.2 after being subjected to the sand and dust test (see 4.5.4).

3.6.4 Vibration and shock:

The fastener shall not become loose or unlocked when subjected to the vibration and shock test (see 4.5.5).

3.6.5 Static load:

The fastener shall meet the loads specified in the applicable specification sheet when subjected to the static load test (see 4.5.6).

3.6.6 Equipment interface:

The unattached extractor front holddown assembly will not hang in a position that will interface with the installation or removal of other equipment.

3.6.7 Thermal shock:

The extractor front holddown shall maintain its functional characteristics during alternate exposure to extremities of high and low temperatures according to MIL-STD-202, Test Condition “B”.

3.6.8 Fungus:

The extractor shall demonstrate a resistance to fungus development according to MIL-STD-810, Method 508.1, Procedure I.

3.6.9 Fluid immersion:

Clutch function, parts and spindle travel will not deteriorate after being immersed in MIL-N-5606 hydraulic fluid and MIL-L-7808 oil for eight hours.

3.6.10 Box lift during extraction:

The fastener front holddown shall not allow more than 0.917 in. (5mm) of lift at the front end of the box.

3.7 Identification marking:

The fasteners shall be marked for identification in accordance with the applicable specification sheet or standard and MIL-STD-130.

3.8 Workmanship:

Workmanship shall be consistent with the type of product, finish and the class of thread fit specified. Sharp edges shall be broken; hanging burrs and slivers that might become dislodged during usage shall be removed.

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 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 assure supplies and services conform to prescribed requirements.

4.1.1 Test equipment and inspection facilities:

The manufacturer shall insure that test and inspection facilities of sufficient accuracy, quality and quantity are established and maintained to permit performance of required inspections.

4.2 Classification of inspections:

The inspection requirements specified herein are classified as follows:

a. First article inspection (4.3)

b. Quality conformance inspection (4.4)

4.3 First article inspection:

First article inspection shall be performed at a laboratory acceptable to the Government (see 6.3) on sample units produced with equipment and procedures normally used in production.

4.3.1 Sample:

The qualification test samples shall consist of twenty units.

4.3.2 Inspection routine:

Sample units shall be subjected to the first article inspection specified in table I in the order shown.

TABLE I. First article inspection.

Inspection	Number of samples	Requirement paragraph	Test method paragraph
Visual and dimensional examination	3	--	4.5.1
Endurance	3	3.6.1	4.5.2
Corrosion	3	3.6.2	4.5.3
Sand and dust	3	3.6.3	4.5.4
Vibration and shock	4	3.6.4	4.5.5
Static load	4	3.6.5	4.5.6

4.3.3 This paragraph was deleted per Amendment 1.

4.3.4 Certified test report:

The manufacturer shall furnish a certified test report showing that the manufacturer's product satisfactorily conforms to this specification. The test report shall include as a minimum actual results of the tests specified herein. When this report is submitted, it shall be accompanied by a dated drawing which describes the manufacturer's product by specifying all dimensions and tolerances, composition of materials selected, coating or plating applied, and the hardness. The manufacturer's part number for each size shall be included on the drawing.

4.4 Quality conformance inspections:

Quality conformance inspections shall consist of the tests specified in table II.

TABLE II. Quality conformance inspections

Inspection	Requirement paragraph	Test method paragraph
Visual and dimensional examination	--	4.5.1
Endurance (5 cycles)	3.6.1	4.5.2
Corrosion (2 hours)	3.6.2	4.5.3

4.4.1 Inspection lot:

The inspection lot shall be as defined in MIL-STD-105.

4.4.2 Sampling:

4.4.2.1 Sampling for quality conformance inspections:

A random sample of each item shall be selected in accordance with MIL-STD-105, inspection level S-1, Acceptable Quality Level (AQL) of 1.5 percent defective. For visual examination, fasteners shall be selected in accordance with MIL-STD-105, inspection level 1, AQL of 2.5 percent defective.

4.4.3 Resubmitted inspection lots:

Resubmitted inspection lots shall be in accordance with MIL-STD-105. A resubmitted inspection lot shall be inspected using a tightened inspection. Where the original acceptance number was zero, a sample size represented by the next higher sample size code letter shall be selected.

4.4.4 Manufacturer's inspection report:

Each production lot of fasteners shall be accompanied by two copies of the manufacturer's inspection report signed by an authorized representative of the manufacturer. This report shall state that the fasteners are from a production lot(s) which was manufactured, inspected and accepted in accordance with requirements of this specification. The report shall identify the part number and the production lot number(s) and shall include all actual test results or certifications of conformance.

4.5 Test methods:

4.5.1 Visual and dimensional examination:

The fasteners shall be examined for conformance to the requirements of this specification and the applicable specification sheet.

4.5.2 Endurance:

The fasteners shall be mounted in a suitable tray fixture, as defined in 3.6.1. During lock operation, a preload of 103 lbs to 126 lbs (460N to 560N) shall be exerted on each hook and maintain the reading as specified in DOD-STD-1788. During this test there shall be a check reading of the forces every 50 cycles. The force reading must be within the force tolerance range.

4.5.3 Corrosion:

The fasteners shall be subjected to the salt spray (fog) test of ASTM B117 for 168 hours. Upon completion of this test, the samples shall be subjected to the endurance test of 4.5.2 for Five (5) cycles only.

4.5.4 Sand and dust:

The fasteners shall be subjected to the sand and dust test of MIL-STD-810, Method 510.1. Upon completion of this test the samples shall then be subjected to the endurance test of 4.5.2 for five (5) cycles only.

4.5.5 Vibration and shock:

The fasteners shall be subjected to the vibration and shock test of MIL-STD-810. For vibration, use Method 514.2, Procedure I, Curve E. For shock, use Method 516.2, Procedure I, Figure 516.2-2.

4.5.5.1 The test specimens shall be mounted in a fixture conforming to figure 1 using a 60 pound weight simulated “black box” (15.29 inches wide x 12.52 inches long x 7.64 inches high). Hooks shall be mounted as shown in figure 2.

4.5.6 Static load:

The fastener shall be mounted to the tray containing the simulated black box as shown in figure 1. The fastener shall be subjected to the test specified in 4.5.5.1. Upon completion of the static load test the fastener shall be capable of one complete lock and unlock cycle as defined in 3.6.1.1.

4.6 Inspection and packaging:

The sampling and inspection of the preservation, packing and container marking shall be in accordance with PPP-H-1581.

5. PACKAGING:

5.1 Packaging:

5.1.1 Level A:

The fasteners in a unit quantity of 1 each, of the same part number, shall be packaged in accordance with MIL-P-116, Method III.

5.1.2 Level C:

The fasteners shall be packaged in accordance with commercial practice. When the quantity permits, twenty-five unit packages, or a multiple thereof, shall be packaged in intermediate containers conforming to PPP-B-566, PPP-B-676, or PPP-B-665. The gross weight of the intermediate containers conforming to PPP-B-665 shall not be greater than 20 pounds.

5.2 Packing:

Fasteners shall be packed level A or C, as specified (see 6.2).

5.2.1 Level A:

Fasteners shall be packed in overseas wether resistant type boxes conforming to any of the following: PPP-B-585, Class 3; PPP-B-591; PPP-B-621; PPP-B-636. Gross weight of wood and wood-cleated boxes shall not be greater than 200 pounds; fiberboard boxes shall not be greater than the weight limitations of the box specification. Box closures shall be in accordance with the box specification and the appendix thereto. Boxes shall be provided with case liners conforming to MIL-L-10547, sealed in accordance with the appendix thereto. Case liners may be omitted when weather resistant fiberboard boxes conforming to PPP-B-636 are used, provided that all joints and seams are sealed with tape conforming to PPP-T-60, Type III, Class 1.

5.2.2 Level C:

Fasteners shall be packed to ensure adequate protection against damage during direct shipment from the source to the first receiving activity for immediate use. This level shall conform to applicable carrier rules and regulations and may be the supplier's commercial practice, if this practice meets the requirements of this level.

5.3 Marking:

In addition to any special markings required by the contract, interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129.