MIL-T-6448B
5 November 1980
SUPERSEDING
MIL-T-6448A (USAF)
12 November 1959

MILITARY SPECIFICATION

# TESTER, STARTER TORQUE, TYPE B-1
## (TEST STAND, STARTER, AIRCRAFT PRONY BRAKE, TYPE B-1)

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

## 1. SCOPE

1.1 Scope. This specification covers one type of aircraft prony brake starter tester, designated Type B-1.

## 2. APPLICABLE DOCUMENTS

* 2.1 Issue 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.

SPECIFICATIONS

Federal

| | |
|---|---|
| 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 |

Military

| | |
|---|---|
| MIL-P-116 | Preservation - Packing, Methods of |
| MIL-A-13881 | Anti Seize Compound, Mica-Base (For Threaded Fittings) |
| MIL-M-3171 | Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion on |
| MIL-S-7742 | Screw Threads, Standard, Optimum Selected Series: General Specification for |
| MIL-A-8625 | Anodic Coatings, for Aluminum and Aluminum Alloys |
| MIL-D-1000 | Drawings, Engineering and Associated Lists |
| MIL-C-83488 | Coating, Aluminum, Ion Vapor Deposited |
| MIL-C-87115 | Coating, Immersion Zinc/Chromate Dispersion |

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: WP AFLC CASO/LODS, Federal Center, Battle Creek MI 49016 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

STANDARDS

Air Force-Navy Aeronautical

| | |
|---|---|
| AND20002 | Drive - Type XII Engine Accessory |
| AND20004 | Drive - Type XIV Engine Accessory |
| AND20009 | Drive - Type XIX Engine Accessory |

Military

| | |
|---|---|
| MIL-STD-129 | Marking for Shipment and Storage |
| MIL-STD-130 | Identification Marking of U.S. Military Property |
| MIL-STD-810 | Environmental Test Methods |
| MIL-STD-838 | Lubrication of Military Equipment |
| MIL-STD-1186 | Cushioning, Anchoring, Bracing, Blocking, and Waterproofing; with Appropriate Test Method |

(Copies of specifications, standards, drawings, and publications required by contractors 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 effect on date of invitation for bids or request for proposal shall apply.

Air Force-Navy Aeronautical Bulletin
143 Specifications and Standards; Use of

3. REQUIREMENTS

3.1 Preproduction. This specification makes provision for preproduction testing.

3.2 Components parts. The tester shall consist of an adjustable friction device, a means of indicating torque in pounds-feet, a tachometer to indicate starter-jaw cranking revolutions per minute, and a device to provide for starter mounting and removal without the use of tools or additional equipment.

3.3 Selection of specifications and standards. Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with Bulletin 143 except as provided in 3.3.1 and 3.3.2.

3.3.1 Commercial parts. Commercial parts having suitable properties may be used where, on the date of invitation for bids, there are no suitable standard parts. In any case, commercial utility parts, such as screws, bolts, nuts, and cotter pins, having suitable properties may be used provided:

a. They can be replaced by the standard parts (MS or AN) without alteration.

b. The corresponding standard part numbers are referenced in the parts list and, if practical, on the contractor's drawings.

3.3.2 Standard parts. With the exceptions in 3.3.1, AN or MS standard parts shall be used where they suit the purpose. They shall be identified on the drawings by their part numbers.

3.4 Materials

3.4.1 Fungus-proof materials. Materials that are nutrients for fungi shall not be used where it is practical to avoid them. Where used and not hermetically sealed, they shall be treated with a fungicidal agent acceptable to the procuring activity. However, if they will be used in a hermetically sealed inclosure, fungicidal treatment will not be necessary.

3.4.2 Metals. Metals shall be of the corrosion-resistant type or shall be suitably treated to resist corrosion during normal service life.

3.4.3 Lubrication. Components requiring lubrication shall be lubricated in accordance with MIL-STD-838.

3.5 Design and construction. The tester shall be so designed and constructed that no parts will work loose in service. It shall be built to withstand the strains, jars, vibrations, and other conditions incident to shipping, storage, installation, and service.

3.5.1 Maintenance. The tester shall be so constructed that adjustments and repairs can be easily made by personnel.

3.5.2 The tester shall be designed for testing the performance and the clutch-holding torque of aircraft engine starters.

3.5.3 Access shall be provided to study the engaging action of the starter jaw and to adjust the clutch on starters that are designed with a clutch-adjusting nut in back of the jaw. Sufficient opening shall be provided for the starter-clutch adjustment wrench to swing at least 120°.

3.6 Performance. The tester shall be capable of operating satisfactorily under the following environmental conditions:

a. Temperatures ranging from -62° to +51.7° C.

b. Relative humidity up to 100 percent including conditions wherein condensation takes place in the form of both water and frost.

c. Exposure to salt-sea atmosphere.

3.6.1 Continuous operation. The tester shall be capable of absorbing the loads for the time periods specified in Table I without damage.

TABLE I

| Torque Lb-Ft | RPM | Time Minutes |
|---|---|---|
| 50 | 1,000 | 1 |
| 400 | 40 | 9 |
| 800 | 40 | 3 |
| 1,500 | 0 | 0.5 |

3.6.2 Endurance. The tester shall be capable of withstanding 3,225 cycles of operation at the loads and conditions specified in Table II. Each cycle shall be of 30 seconds duration with a rest period of 2 to 5 minutes between cycles.

TABLE II

| RPM Minimum | Torque Lb-Ft | No of Cycles | Ambient Temperature - °C |
|---|---|---|---|
| 25 | 800 | 10 | 0° ± 2° |
| 25 | 700 | 990 | 20° to 35° |
| 25 | 600 | 1,000 | 20° to 35° |
| 25 | 400 | 600 | 20° to 35° |
| 75 | 200 | 600 | 20° to 35° |
| 0 | 1,500 | 25 | 20° to 35° |

3.6.3 Rotation. The tester shall be capable of indicating torque in either direction of rotation without the use of special tools or additional equipment, excluding jaws.

3.7 Adjustable friction device. A handcrank or handwheel-actuated, adjustable friction device, preferably of the aircraft brakeshoe expanding type, shall be provided. When actuated and engaged with the starter, this device shall be capable of imposing the torque loads and meeting the requirements specified herein.

3.8 Torque indicators. Torque indicators shall be provided for the following ranges:

0 - 150 lb-ft in increments of 2 lb-ft
0 - 500 lb-ft in increments of 10 lb-ft
0 - 1,500 lb-ft in increments of 20 lb-ft

3.8.1 Indicator accuracy. Accuracy of each torque indicator shall be within ± 3 percent of each respective scale reading under a stabilized temperature condition of 20° to 30° C. Each torque indicator shall be furnished with a calibration chart for determining true torque for each 10° change in temperature over the range of 0° to 43° C.

3.9 Tachometer indicator. The tachometer shall have ranges to indicate the following values in clockwise and counterclockwise rotation:

0 - 150 rpm full scale
0 - 1,500 rpm full scale

3.9.1 Tachometer accuracy. Accuracy of the tachometer shall be within ± 2 percent of full scale. A correction chart shall be provided with or attached to each tachometer.

3.10 Drives and mounting pads. Removable mounting pads and drive adapters shall be furnished for drives conforming to AND20002, Type XII, AND20004, Types XIV-A and XIV-C, and AND20009, Type XIX. In addition, a pad and drives shall be provided for retraction-type motors as specified by the procuring activity (see 6.2). Wherever possible, the removable pads shall be designed to utilize both surfaces.

3.11 Interchangeability. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The drawing number requirements of MIL-D-1000 shall govern changes in the manufacturer's part numbers.

3.12 Threaded parts. Screw threads shall conform to MIL-S-7742. All threaded parts shall have a thin coating of compound conforming to MIL-A-13881 applied to the threads. Only enough compound to cover the surface of the threads shall be applied.

3.12.1 Safetying. All screws and screw parts shall be safety wired or fitted with self-locking nuts, where applicable, to prevent loosening due to vibration.

3.13 Dimensions. The maximum size of the tester shall not exceed the overall dimensions specified on figure 1.

3.14 Weight. The total weight of the tester shall not exceed 250 pounds.

3.15 Finishes and protective coatings

3.15.1 Aluminum alloy parts. All exposed, aluminum alloy parts shall be anodically treated in accordance with MIL-A-8625. To insure an adequate bonding connection, the aluminum oxide film deposited by the treatment shall be removed from the actual contact area of all surfaces required to act as a path for electrical current, and from the local areas under screws, nuts, or the like, that are used for assembly or mounting purposes.

3.15.2 Magnesium alloy parts. All exposed, magnesium alloy parts shall be surface treated in accordance with MIL-M-3171, type III.

3.15.3 Steel parts. All exposed non-corrosion resistant steel parts shall be plated or coated in accordance with the following specifications:

a. Zinc plating - QQ-Z-325

b. Aluminum coating - MIL-C-83488

c. Zinc/Chromate coating - MIL-C-87115"

3.16 Identification of product. Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130.

3.17 Workmanship. The tester, including all parts and accessories, shall be constructed and finished in a thoroughly workmanlike manner. Particular attention shall be given to freedom from blemishes, defects, burrs, and sharp edges; accuracy of dimensions, radii of fillets, and marking of parts and assemblies; thoroughness of soldering, welding, brazing, painting, wiring, and riveting; alignment of parts and tightness of assembly screws and bolts; etc.

3.17.1 Dimensions and tolerances. Dimensions and tolerances not specified shall be as closed as is consistent with the best shop practices. Where dimensions and tolerances may affect the interchangeability, operation, or performance of the tester, they shall be held or limited accordingly.

3.17.2 Screw assemblies. Assembly screws and bolts shall be tight. The word tight shall mean that the screw or bolt cannot be appreciably tightened further without damage or injury to the screw, bolt, or threads.

3.17.3 Riveting. Riveting operations shall be carefully performed to insure that the rivets are tight and satisfactorily headed.

3.17.4 Gears. Gear assemblies shall be properly aligned and meshed and shall be operable without interference, tight spots, loose spots, or other irregularities. Where required for accurate adjustments, gear assemblies shall be free from backlash.

3.17.5 Cleaning. The tester shall be thoroughly cleaned and loose, spattered, or excess solder, metal chips, and other foreign material removed during and after final assembly. Burrs and sharp edges, as well as resin flash that may crumble, shall be removed.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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.

4.2 Classification of tests. The inspection and testing of testers shall be classified as follows:

| | | |
|---|---|---|
| a. | Acceptance tests | See 4.3 |
| b. | Preproduction testing | See 4.5 |

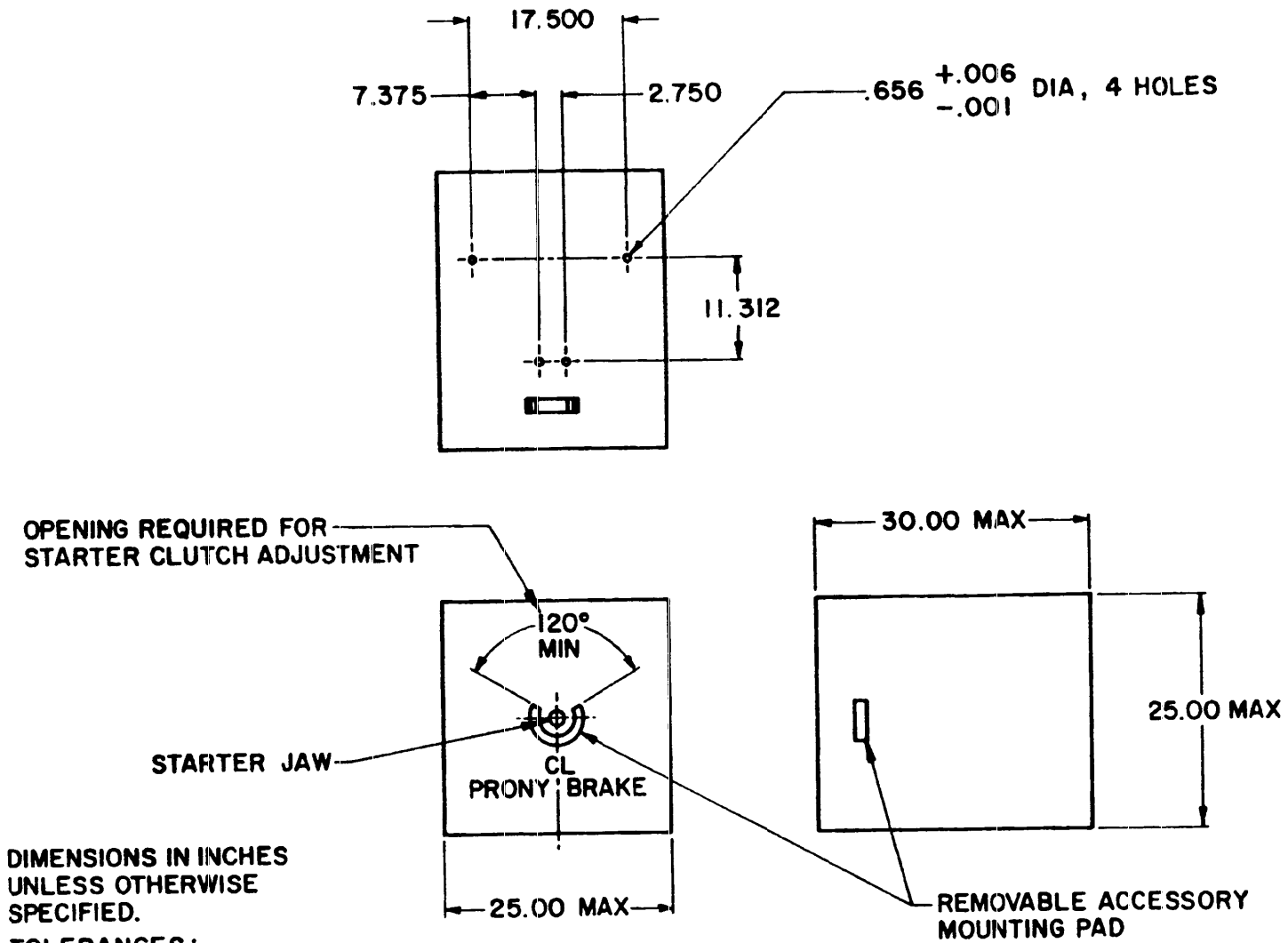


FIGURE 1. Overall Dimensions

4.3 Acceptance tests. Acceptance tests shall consist of the individual tests.

4.3.1 Individual tests. Each tester shall be subjected to the following tests as described under 4.4:

a. Examination of product

b. Continuous operation

4.4 Test Methods

4.4.1 Examination of product. The tester shall be inspected to determine compliance with the requirements specified herein with respect to materials, workmanship, and finish.

4.4.2 Continuous operation. The tester shall be operated throughout the torque range of 50 to 1,500 lb-ft and tested to determine compliance with 3.6.1. During this test, the torque indicator shall be checked for accuracy within the limits specified in 3.8.1. Oscillation of the torque-indicator pointer shall not exceed 1 percent. There shall be no evidence of failure or damage during or at the completion of this test.

4.4.3 Endurance. The tester shall be subjected to a 3,225-cycle operational test to determine compliance with 3.6.2. To prevent excessive temperatures, cooling air at a temperature within the range of 18° to 35° C may be supplied at a rate of not more than 200 CPM. This test shall be completed without replacement of or damage to any part. Prior to and after this test, the tachometer shall be checked for accuracy within the limits specified in 3.9.1.

4.4.3.1 At the completion of this test, the tester shall be disassembled and subjected to complete inspection. No parts, bearings in particular, shall show signs of excessive wear or failure. Signs of structural failure or excessive wear shall be cause for rejection.

4.4.4 Environmental. The tester shall be subjected to the following environmental tests in accordance with the specified procedures of MIL-STD-810.

4.4.4.1 Low Temperature. The tester shall be subjected to low temperature in accordance with procedure I, Method 502.

Summary Data

(a) Pretest data - Data obtained in para 4.4.1 and 4.4.2 of MIL-T-6448B.

(b) -65°F, 24 hours.

(c) -25°F.

(d) N/A

(e) Length of time is dependent on how long it takes to gather comparison data in step 5.

4.4.4.2 High Temperature. The tester shall be subjected to high temperature in accordance with procedure II, Method 501.

Summary Data

(a) Procedure II.

(c) (1) Pretest data - Data obtained in para 4.4.1 and 4.4.2 of MIL-T-6448B.

(c) (2) 120°F.

(c) (3) Length of time is dependent on how long it takes to gather comparison data in step 5.

4.4.4.3 Humidity. The tester shall be subjected to humidity in accordance with procedure I, Method 507.

Summary Data

(a) Procedure I.

(b) Pretest data - Data obtained in para 4.4.1 and 4.4.2 of MIL-T-6448B.

(c) Step 7 only.

(d) N/A.

(e) No.

(f) N/A.

4.4.4.4 Salt Spray. The tester shall be subjected to the salt spray test in accordance with procedure I, Method 509.

Summary Data

(a) Pretest data - Data obtained on para 4.4.1 and 4.4.2 of MIL-T-6448B.

(b) 5± 1 percent.

(c) N/A.

(d) N/A.

(e) N/A.

(f) N/A.

4.5 Preproduction testing

4.5.1 Preproduction test sample. The preproduction test sample shall consist of one tester representative of the production equipment. It shall be tested at a commercial laboratory acceptable to the procuring activity or, when so stated in the contract, at the contractor's plant under the supervision of the procuring activity.

4.5.2 Preproduction tests. Preproduction tests shall consist of all the tests described under 4.4.

4.6 Inspection of preservation, packaging, and packing. The inspection of preservation, packaging, and packing shall be in accordance with the instructions in section 5 or the specifications referenced therein.

5. PACKAGING

5.1 Preservation - packaging.

5.1.1 Level A. The tester shall be preserved and packaged in accordance with MIL-P-116, Method IIa.

5.1.2 Level C. The tester shall be preserved and packaged in such a manner as to provide adequate protection from deterioration or damage during transit to the initial receiving activity. Materials and methods shall be the minimum required.

5.2 Packing

5.2.1 Level A. Testers preserved and packaged as specified in 5.1.1 shall be packed in export-type shipping containers conforming to PPP-B-585, PPP-B-601, PPP-B-621. Containers shall be closed and strapped in accordance with the applicable container specification or appendix thereto.

5.5.2 Level B. Testers preserved and packaged as specified in 5.1.1 shall be packed in accordance with 5.2.1 except the shipping container shall be of the domestic type or class, as applicable.

5.2.3 Level C. Packages that require overpacking for acceptance by the carrier shall be packed in exterior shipping containers in a manner that will insure safe transportation at the lowest rate to the point of delivery. Containers shall meet Consolidated Freight Classification Rules or regulations of other common carriers as applicable to the mode of transportation.

5.3 Physical protection. Cushioning, blocking, bracing, and bolting as required shall be in accordance with MIL-STD-1186 except that waterproofing requirements for containers shall be waived. The drop tests of MIL-STD-1186 shall be waived when preservation, packaging, and packing of the item are for immediate use or when the drop tests of MIL-P-116 are applicable.

5.4 Marking. Interior and exterior containers shall be marked in accordance with MIL-STD-129. The shipment marking nomenclature shall be

Tester, Starter Torque, Type B-1
(Test Stand, Starter, Aircraft Prony Brake, Type B-1).

6. NOTES

6.1 Intended use. The type B-1 tester covered by this specification is intended for use in testing the performance and clutch setting (holding torque) of aircraft engine starters.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number, and date of this specification.

b. When a pad and drives for retraction-type motors will be provided (see 3.10).

c. Point of inspection for preproduction testing (see 4.5.1).

d. Selection of applicable levels of preservation, packaging, and packing (see section 5).

NOTE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may be in any way be related thereto.

6.3 Reclaimed materials. The use of reclaimed materials shall be encouraged to the maximum extent possible.

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