

SAE Aerospace An SAE International Group	AEROSPACE STANDARD	SAE AS85896	REV. A
		Issued 2002-05 Cancelled 2011-04	Superseding AS85896
Ladder, Aircraft Maintenance, Aluminum, Three-Way Combination (Step, Straight and Extension), General Specification for			

RATIONALE

A review of this document revealed that it has no commercial purpose and therefore needs to be cancelled.

CANCELLATION NOTICE

This document has been declared "CANCELLED" as of April 2011. By this action, this document will remain listed in the Numerical Section of the Aerospace Standards Index.

SAENORM.COM : Click to view the full PDF of as85896a

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2011 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
http://www.sae.org

SAE WEB ADDRESS:

**SAE values your input. To provide feedback
on this Technical Report, please visit**
<http://www.sae.org/technical/standards/AS85896A>

NOTICE

This document has been taken directly from U.S. Military Specification MIL-L-85896, Amendment 2, 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-L-85896, Amendment 2. 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.

SAENORM.COM : Click to view the full PDF of AS85896A

This specification is approved for use within the Naval Air Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE:

1.1 Scope:

This specification establishes the requirements for the manufacture and acceptance of three-way combination (step, straight and extension) aluminum ladders for aircraft maintenance use.

1.2 Classification:

Ladders shall be one of the following classes:

	Class			
	I	II	III	IV
Part Number	M85896-1	M85896-2	M85896-3	M85896-4
Storage height (Approximate) Maximum (ft)	4	5	6	7
Stepladder standing height (Approximate) Maximum (ft)	1 to 3	2 to 5	3 to 7	4 to 9
Extended standing height (Approximate) Maximum (ft)	4 to 8	6 to 12	8 to 16	10 to 20
Weight (lb) (Approximate)	32 ±2	39 ±2	45 ±2	56 ±2

2. APPLICABLE DOCUMENTS:

2.1 Government documents:

- 2.1.1 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

PPP-B-601	Boxes, Wood, Cleated Plywood
PPP-T-97	Tape, Pressure-Sensitive Adhesive, Filament Reinforced
PPP-B-640	Box, Fiberboard, Corrugated, Triple Wall
QQ-S-781	Strapping, Steel and Seals

MILITARY

MIL-T-704	Treatment and Painting of Material
MIL-G-20241	Gasket Material, Wool Felt, Impregnated, Adhesive, Pressure-Sensitive
MIL-P-23377	Primer Coating, Epoxy Polyamide, Chemical and Solvent Resistant
MIL-I-45208	Inspection System Requirements
MIL-C-52950	Crate, Wood, Open and Covered
MIL-S-81733	Sealing and Coating Compound, Corrosion Inhibitive

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-889	Dissimilar Metals

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

2.2 Other publications:

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A14.2 Safety Requirements for Portable Metal Ladders
ANSI/AWS D1.2 Structural Welding Code - Aluminum, Section 5

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D-3951 Standard Practice for Commercial Packaging

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

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence:

In the event of a conflict between the text of this specification and the references cited herein (except for associated 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 First article:

When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.3 and 6.3). The ladder shall conform to all provisions of this specification and ANSI A14.2.

3.2 Materials:

Materials shall be as specified herein. Materials not specified shall be selected by the contractor and shall be subject to all provisions of this specification.

- 3.2.1 Material deterioration and control: The ladders shall be fabricated from compatible materials inherently corrosion resistant or treated to provide protection against the various forms of corrosion and deterioration that may be encountered in any of the applicable storage and/or operating environment (see 6.2) to which the item may be exposed.
- 3.2.1.1 Dissimilar metals: Dissimilar metals as defined in MIL-STD-889 shall be electrically insulated from one another to minimize or prevent galvanic corrosion. Insulation shall be provided by an insulating barrier such as a coat of epoxy primer conforming to MIL-PRF-23377 or corrosion inhibiting sealant conforming to MIL-PRF-81733.
- 3.2.1.2 Identification of materials and finishes: The contractor shall identify the specific material, material finish or treatment for use with components and subcomponents, and shall make information available, upon request, to the contracting officer or his designated representative.
- 3.3 Construction:
- 3.3.1 Ladder sections: The complete ladder shall consist of two outer (wider, flared) and two inner sections as depicted in Figures 1 through 3. The side rails of the same outer sections shall be designed to have a minimum clear width measured at the bottom of the side rail of 12 inches plus 1-1/4 minimum inches per foot of side rail length as required in ANSI A14.2. The two inner sections shall be hinged. These sections shall support the outer sections and allow various height and length adjustments. Each section shall consist of two side rails joined by rungs at 12 inches plus or minus 1/8-inch intervals (see Figure 4). The bottom rung shall be at a distance from the ground of 6 to 12 inches maximum. The side rails shall be heat-treated structural aluminum, with a section flange of 1 inch maximum, and shall be the specified length plus or minus 1/2 inch.
- 3.3.2 Height and length adjustment: The outer sections shall provide the means of leveling when the ladder is used as a stepladder in a stairway or other uneven surfaces. When used as a straight ladder or an extended ladder, the outer two sections shall become an extension of the inner sections by use of a suitable positive self-locking device. Each outer section shall slide over the inner section to obtain different heights or lengths when the sections are adjusted as a leveling device. Both outer sections shall have positive self-locking devices of sufficient strength to assure no slippage between the mating sections when the ladder is in use. The ladder shall lock at 12 inch intervals in ladder length. The rung standing surface on the overlapping inner and outer sections shall be on the same plane.
- 3.3.2.1 Stepladder standing height: The standing height range of the ladder in the stepladder configuration (see figure 5a) shall be those specified in table I.
- 3.3.2.2 Extended ladder standing height: The standing height range of the ladder in the extended configuration (see figure 5b) shall be as specified in table I.

TABLE I. Configuration standing heights

Ladder Configuration	Standing height for part numbers			
	M85896-1	M85896-2	M85896-3	M85896-45
Stepladder configuration	1 to 3 ft ±0.50	2 to 5 ft ±0.50	3 to 7 ft ±0.50	4 to 9 ft ±0.50
Extended configuration	4 to 8 ft ±0.50	6 to 12 ft ±0.50	8 to 16 ft ±0.50	10 to 20 ft ±0.50

- 3.3.3 Rungs: The rungs shall be 12 inches minimum in working length (see Figure 6a). They shall be of suitable strength material either square, trapezoid or D-shaped. The standing surface shall be 1 inch minimum (see Figure 6b). This surface shall be flat and parallel to the horizontal plane plus or minus 2° in all working positions. All rungs shall have a skid resistant working surface. There shall be no permanent deformation (see 4.5.2d) of the rungs when tested in accordance with 4.5.2.1.
- 3.3.4 Side rails: There shall be no permanent deformation of the side rails when tested in accordance with 4.5.2.3 and 4.5.2.4.
- 3.3.5 Extension locking device: The extension locking device shall be permanently attached to the ladder. There shall be no permanent deformation (see 4.5.2d) of the extension locking device when tested in accordance with 4.5.2.6.
- 3.3.6 Hinge: The hinge shall be a self-locking device and shall be permanently attached to the ladder. The hinge shall have a built-in stop to prevent the ladder from jack-knifing when used as an extension ladder. There shall be no permanent deformation (see 4.5.2d) of the hinge after the ladder is subjected to all tests specified herein.
- 3.3.7 End caps: Any exposed end of a side rail or rung shall have a permanently attached end cap. There shall be no visible damage, failure, permanent deformation (see 4.5.2a, 4.5.2b and 4.5.2d), or end cap separation from the ladder after the ladder is subjected to all the tests specified herein.
- 3.3.7.1 Hinge and extension locking device protection: The ladder design shall provide protection for the hinge and extension locking device when the ladder is tipped over from its maximum height in the stepladder configuration and impacts the floor. The protection device shall be permanently attached to the ladder and shall prevent any damage to the hinge and extension locking device when tested in accordance with 4.5.2.9. The protection device shall not interfere with the hinge nor the extension locking device operation, and shall not require adjustment or alignment in order to carry out the expected protective action. There shall be no failure (see 4.5.2b) of the hinge and the extension locking device, and no separation of the protective device after the ladder is subjected to all the tests specified herein.
- 3.3.8 Tie-down: A tie-down shall be permanently attached to each outer section of the side rails to provide maximum ladder stability. The tie-downs shall be rounded or D-shaped with an inner diameter of 2 inches plus or minus 0.125-inch. There shall be no failure or permanent deformation (see 4.5.2b and 4.5.2d) of the ladder or tie-downs when tested in accordance with 4.5.2.8.

- 3.3.9 Skid resistant feet: The side rail ends of all sections which rest on the surface shall be provided with a skid resistant swivel foot. The dimensions of the skid resistant swivel foot shall not be less than the dimensions of the projected area outlined by the cross section of the end of the rail. The swivel foot shall be suitable for all surface conditions (i.e., dry, wet, oily, icy). There shall be no visible damage, failure, permanent deformation (see 4.5.2a, 4.5.2b and 4.5.2d) of skid-resistant feet or component separation from the ladder, after the ladder is subjected to all tests specified herein. The skid resistant feet shall not mar, mark, or deform the aircraft structure when the ladder is extended and placed against the aircraft.
- 3.3.10 Platform: The work platform shall be designed as a work stand and as a utility shelf. The platform shall be removable, support 300 pounds, and shall be heat-treated structural aluminum with a minimum working area of 10 inches by 10 inches. There shall be no permanent deformation (see 4.5.2d) when tested in accordance with 4.5.2.1.1.

3.4 Weight:

The ladder assembly shall not exceed those values shown in table II.

TABLE II. Ladder weights

	Class			
	I	II	III	IV
Part Number	M85896-1	M85896-2	M85896-3	M85896-4
Weight	32 ±2 lb	39 ±2 lb	45 ±2 lb	56 ±2 lb

3.5 Overlap:

The ladder shall have a minimum overlap of 12 inches when opened to its maximum working height in the stepladder and extended configurations.

3.6 Slope:

When the stepladder is erected on a level surface, the slope for both hinged sections shall be 3-1/2 inches, plus or minus 1/4-inch, for a foot length of side rail.

3.7 Performance:

- 3.7.1 Stability of stepladder: When erected on a level surface to its maximum height or on stairs, the stepladder shall remain in a level position with all feet on the surface and shall withstand each pull force without raising the base of the side rails from the surface, and without failure or permanent deformation (see 4.5.2b and 4.5.2d) when tested in accordance with 4.5.2.2.
- 3.7.2 Extension ladder assembly: The ladder in the fully extended position shall not fail or have any permanent set or deformation (see 4.5.2c and 4.5.2d), when tested in accordance with 4.5.2.3. When the ladder is in the straight or extended configuration and placed against the aircraft structure, the ladder design shall not mar, mark or deform the aircraft structure.

- 3.7.3 Side rails: The side rails of the ladder shall not exceed 1/4-inch permanent deformation when tested in accordance with 4.5.2.1, 4.5.2.3.2, 4.5.2.4, 4.5.2.5 and 4.5.2.6.
- 3.7.4 Rungs: Rungs shall not fail or show any permanent set (see 4.5.2c) when tested in accordance with 4.5.2.1 and 4.5.2.3.2.
- 3.7.5 Compression resistance: The ladders shall not fail or show any permanent set (see 4.5.2c) when tested in accordance with 4.5.2.5.

3.8 Identification marking:

The ladders shall be marked in accordance with MIL-STD-130 and shall include the following information:

Part No.
CAGE (Manufacturer's ID)
Contract No.

3.9 Treatment and painting:

The ladders shall not be painted.

3.10 Welders and welding:

- 3.10.1 Welders: Before assigning any welder to manual welding work covered by this specification, the contractor shall provide the contracting officer with certification that the welder has passed qualification tests for the type of welding operations to be performed and that such qualification is effective as defined by ANSI/AWS D1.2.
- 3.10.2 Welding: The surface of parts to be welded shall be free from scale, grease and other foreign matter. Welds shall transmit stress without failure or permanent deformation (see 4.5.2b and 4.5.2d) when the parts connected by the welds are subjected to proof and service loading. All welds shall be free from undercuts, cracks, and closely spaced in-line surface porosity.
- 3.10.3 Aluminum welding: Aluminum welding shall be accomplished by the gas metal arc method or any other method that will provide equivalent mechanical properties of the filler metal-to-base metal combinations, as described in ANSI/AWS D1.2. Complete and uniform penetration and fusion of the metals shall be obtained on all welds. Aluminum welds may be ground, filed, wire brushed or chipped but shall not be hammered.

3.11 Riveted connections:

Rivets shall fill the holes completely. The upset rivet head shall be full, neatly made, and concentric with the rivet holes. Rivets shall make full contact with the surface and go completely through the structural member. Semitubular or non-expandable rivets shall be used on composite or pivotal connections.

3.12 Bolted connections:

There shall be no bolted connections.

3.13 Labeling:

The ladder shall be labeled according to the labeling/markings requirements specified in ANSI A14.2.

3.14 Workmanship:

The ladder shall be clean and free from sand, dirt, pits, scale, grease, and other harmful, extraneous material that could be ingested into aircraft engines. There shall be no exposed sharp edges, burrs or weld splatters that will cause injury to personnel using the ladder.

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. The contractor shall have an inspection system in accordance with MIL-I-45208. 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 Responsibility for compliance: All items must 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 in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Classification of inspections:

The inspection requirements specified herein are classified as follows:

- a. First Article Inspection (see 4.3).
- b. Quality Conformance Inspection (see 4.4).
- c. Inspection of packaging (see 4.6).

4.3 First article inspection:

4.3.1 Examination: The first article ladder shall be examined as specified in 4.5.1. Presence of one defect shall be cause for rejection.

4.3.2 Inspection tests: The first article ladder shall be inspected as specified in table III. Presence of one defect shall be cause for rejection.

4.4 Quality conformance inspection:

4.4.1 Lot: All ladders offered for inspection at one time shall constitute a lot.

4.4.2 Sampling: Sampling for examination and tests shall be in accordance with MIL-STD-105, Level II.

4.4.3 Examination: Samples selected in accordance with 4.4.2 shall be examined as specified in 4.5.1. Acceptable Quality Levels (AQL) shall be less than 1.0 percent defective.

4.4.4 Conformance inspection tests: Samples selected in accordance with 4.4.2 shall be tested as specified in table III.

TABLE III. First article and quality conformance inspections sequence

Sample(s)	Requirement paragraph	Inspection sequence	Test modification
First article	3.1	4.5.2	
	3.7.4	4.5.2.1	
	3.7.4	4.5.2.1.1	
	3.7.4	4.5.2.1.2	
	3.7.4	4.5.2.1.3	
	3.7.1	4.5.2.2	
	3.7.2	4.5.2.3.1	
	3.7.2	4.5.2.3.2	
	3.7.3	4.5.2.4	
	3.7.5	4.5.2.5	
	3.3.5	4.5.2.6	
	3.3.9	4.5.2.7	
	3.3.8	4.5.2.8	
	3.3.7.1	4.5.2.9	
Quality conformance	3.7.2	4.5.2.3.1	Apply a load of 300 pounds
	3.7.2	4.5.2.3.2	Apply a load of 300 pounds
	3.7.5	4.5.2.5	Apply a load of 600 pounds

4.5 Inspection procedures:

4.5.1 Examination: The ladders shall be examined as specified herein for the following defects:

101. Material not as specified (see 3.2).
102. Materials are not corrosion resistant or treated to be made corrosion resistant for the applicable storage and/or operating environment (see 3.2.1 and 3.2.1.1).
103. Dissimilar metals as defined in MIL-STD-889 are not effectively insulated from each other (see 3.2.1.1).
104. Contractor does not have documentation available for identification of material, material finishes or treatments (see 3.2.1.2).
105. Dimensions not as specified (see 3.3).
106. Height and length adjustment not as specified (see 3.3.2).
107. Rungs not as specified (see 3.3.3).
108. Side rails not as specified (see 3.3.4).
109. Extension locking device not as specified (see 3.3.5).
110. Hinge not as specified (see 3.3.6).
111. End caps not as specified (see 3.3.7).
112. Lack of protection for the hinge and extension locking device (see 3.3.7.1).
113. Tiedowns not as specified (see 3.3.8).
114. Skid resistant feet not as specified (see 3.3.9).
115. Working platform not as specified (see 3.3.10).
116. Weight not as specified (see 3.4).
117. Overlap not as specified (see 3.5).
118. Slope of sections not as specified (see 3.6).
119. Not labeled as specified (see 3.13).
120. Identification marking incorrect or missing (see 3.8).
121. Workmanship not as specified (see 3.14).

4.5.2 Tests: The terms visible damage, failure, permanent set, and permanent deformation shall be defined as follows:

- a. Visible damage: Damage clearly evident to the naked eye without recourse to external measuring or magnifying devices.
- b. Failure: Damage in which the structure or component is buckled, twisted, torn, or fractured, or inoperable.
- c. Permanent set: Any set in excess of 1/1000 of the effective span of a ladder side rail, or any set in excess of 1/100 of the effective span of a ladder rung or platform.
- d. Permanent deformation: Permanent set of the ladder structure which is clearly visible in accordance with the definition of visible damage.

4.5.2.1 Rungs: A rung of the inner and outer section shall be subjected to the following tests.

- 4.5.2.1.1 Rung and platform bending: The strength of the rung and platform shall be tested by applying a load of 1000 pounds for a minimum period of 1 minute over a 3-1/2-inch length across the full width of the rung or platform and on the center of the longest or bottom rung, with the ladder in the stepladder open position. The test load shall also be applied to all rungs and platforms of different design or material specifications as well as the longest rung without braces. Inability of the rung or platform to withstand the load without failure or permanent set (see 4.5.2b and 4.5.2) shall constitute failure of this test.
- 4.5.2.1.2 Rung-to-side-rail shear strength: The shear strength of the rung-to-side-rail joint shall be measured by applying a test load of 1200 pounds for a minimum period of 1 minute over a 3-1/2-inch length across the full width of the rung. The test load shall be applied on the longest braced and unbraced rung with the least fastening. The same test load shall be applied to all rungs of different cross-sectional designs or materials. The test load shall be applied as near the side rail as possible, with the ladder in the stepladder open position. When the load is removed, the unit shall show no indication of failure (see 4.5.2b) in the fastening means attaching the rung to the side rail or failure (see 4.5.2b) of any other component.
- 4.5.2.1.3 Rung torque: The test unit shall consist of either a single section of the ladder or a short section comprising at least one rung and two side rails. A torque load of 900 inch-pounds shall be applied to a 3-1/2-inch wide block in the center of the rung, made of such material that the block will not deform the rung locally. The torque load shall be applied in a clockwise and then counterclockwise direction alternately for 10 cycles at each torque test. Torque test loads shall start at 300 inch-pounds and shall increase in 300 inch-pound increments until the maximum load of 900 inch-pounds is met. The torque shall be applied using a test bar whose moment arm may vary as long as the required torque test load in inch-pounds is obtained, but in no case shall the moment arm be less than 18 inches. Both sets of rung joints and the immediate adjacent areas of the rung and side rail shall be coated with a die marking material, and a line shall be scribed along the rung or locations. The rung shall be secured to the side rails so that the alternating torque load shall cause no relative motion between the step and the side rails. Both joints in the assembly shall meet this requirement.
- 4.5.2.2 Stability: The ladder shall be set in the open position to its maximum height on a level floor in its stepladder position. A uniformly distributed load of 200 pounds shall be applied to the highest proper standing level as defined in ANSI A14.2. The ladder shall then be subjected to a horizontal pulling force from the climbing sides, also from the side direction separately. These forces shall be 45 pounds from the climbing side, 20 pounds from the side direction. The pulling force shall be applied as close to the apex as possible. The test surface shall be such as to ensure that the ladder does not slip or slide during the test. The minimum load that causes the ladder to tip over shall not be less than the value specified herein.
- 4.5.2.3 Extension ladder:

- 4.5.2.3.1 Horizontal bending: The ladder shall be open to its fully extended length and placed over two horizontal supports at 6 inches from each end in a flat, horizontal position. The ladder shall be loaded with the preload of 225 pounds which shall be held for a minimum period of 1 minute and then unloaded. After preloading, a deflection test load of 300 pounds shall be applied equally to both side rails. The load shall be applied to the center of the rung nearest to the center of the test span, over a 3-1/2-inch length of the rung. Vertical measurements shall be taken of both rails before and during loading and after the load is removed. The maximum average deflection of both side rails shall not exceed those values in table IV. The ladder shall then be subjected to an ultimate load of 375 pounds for a minimum period of one minute. The ladder shall sustain this load without failure (see 4.5.2b).

TABLE IV. Extended ladder maximum average vertical deflection

	Class			
	I	II	III	IV
Part Number	M85896-1	M85896-2	M85896-3	M85896-4
Average deflection (inches)	4.4	7.6	11.6	14.8

- 4.5.2.3.2 Simulated in-use inclined load test: Set up the ladder in the extension position to its maximum length at the working angle of 75-1/2 degrees. The test load shall be applied equally to both side rails on the rung immediately above the hinge using two 3-1/2-inch straps, each located next to both side rails and centrally loaded through an equalizer bar over the climbing side of the ladder. The ladder shall be tested to a load of 1000 pounds. The full load shall be applied for a period of 1 minute before release. The ladder shall sustain this load without failure (see 4.5.2.b). Permanent deformation (see 4.5.2d) shall be allowed.
- 4.5.2.4 Side rail cantilever bending: The test ladder shall be opened to its stepladder position and placed on its side, with the rungs perpendicular to the ground. The lower side rail shall be clamped to a support and shall be unsupported from the bottom end of the rail to the top of the bottom rung. The top surface of the rung shall be parallel to the edge of the support. The side rail cantilever bending strength of a ladder shall be measured by applying an edgewise load to the bottom end of the side rail. Use appropriate means to ensure that the test load is applied by means of a weight for a minimum period of 1 minute to the extreme bottom end of the upper side rail. The load shall be centrally applied to a 2-inch long block resting on the full width of the rail web and held in place by a C clamp; the load attachment point on the C clamp shall not be more than 2 inches below the underside of the web of the rail being tested. The weight shall be suspended so that it is acting through the vertical neutral axis of the side rail. The permanent deformation of the upper side rail shall not exceed 1/4-inch. The test load shall then be applied to the extreme bottom end of the lower side rail in a like manner. The allowable permanent deformation of the lower side rail shall not exceed 1/4-inch. Provided the ladder continues to support the test load, permanent deformation or failure of any ladder components as a result of the test, except for the limitation on the maximum allowable permanent deformation of the upper and lower side rails shall not constitute test failure.

- 4.5.2.5 Compression test: A load test of the entire ladder shall be made with the ladder in the stepladder position. A uniformly distributed load of 1200 pounds shall be applied for a minimum period of 1 minute to the ladder top rungs. The ladder unit shall withstand the load without failure (see 4.5.2b).
- 4.5.2.6 Single lock load test: The extension locking device shall be tested using a full-size ladder set in the extended ladder configuration, at a 75-1/2-degree working angle with one lock disengaged. A downward distributed load of 1000 pounds shall be applied for a minimum period of 1 minute equally to both side rails on the lowest rung above the overlap using two 3-1/2-inch straps, each located next to a rail and centrally loaded through an equalizer bar over the climbing side of the ladder.
- 4.5.2.7 Foot slip test: The test ladder shall be in its fully extended position at a 75-1/2-degree working angle. The test surface shall be A-C plywood, which shall be presanded using 320 fine wet/dry sandpaper. The "A" side of the plywood shall be placed in contact with the bottom of the ladder. The surface that the top of the upper section of the ladder rests against shall also be A-C plywood, similarly treated. A weight of 300 pounds shall be attached to the third highest rung. A horizontal pulling force of 50 pounds, statically applied to the bottom of the ladder at 1 inch above the test surface, shall not cause movement in excess of 1/4 inch across the test surface. Failure of this test shall be cause for rejection.
- 4.5.2.8 Tie-downs: The ladder shall be set in the open position to its maximum height in its stepladder configuration. A chain shall be connected from each tie-down ring to a pad eye on a test platform. The chain shall be taut on each side so there is no movement of the ladder. A load of 300 pounds shall be applied to the highest rung. The test platform shall be tilted 20 degrees from the vertical to the left for two minutes. This test shall be repeated tilting the ladder 20 degrees from the vertical to the right. The ladder shall remain anchored at all times. The test shall be repeated with the ladder set to its maximum height in the extended configuration. There shall be no failure, permanent deformation (see 4.5.2b and 4.5.2d) or pullout of the tie-down rings.
- 4.5.2.9 Hinge and extension locking device protection test: The ladder shall be set on a level floor to its maximum height in the stepladder position. The ladder shall be tipped over sideways (toward the side rails) five times from each side. The ladder shall be set in all the operable configurations (straight, extended, stepladder, etc.) and there shall be no indications of failure (see 4.5.2b), safety hazards or any condition which avoids the use of the ladder in any configurations.
- 4.6 Inspection of packaging:
- 4.6.1 Quality conformance inspection of packaging:
- 4.6.1.1 Unit of product: For the purpose of inspection, a completed pack prepared for shipment shall be considered a unit of product.
- 4.6.1.2 Sampling: Sampling for examination shall be in accordance with MIL-STD-105, Level II.

4.6.1.3 Examination: Samples selected in accordance with 4.6.1.2 shall be examined for the following defects. AQL shall be less than 1.0 percent defective.

- 120. Material, methods and containers not as specified. Each incorrect material, method, or container shall constitute one defect.
- 121. Blocking, bracing, cushioning, and tie-down not provided as specified.
- 122. Packing not as specified.
- 123. Strapping not as specified in MIL-STD-129, Level A.
- 124. Marking illegible, incorrect, incomplete, or missing.

5. PACKING:

5.1 Packing:

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

- 5.1.1 Level A: Each ladder shall be collapsed and movable parts secured with tape conforming to PPP-T-97, Type II, or soft annealed steel wire. Ladders of like size and description shall be packed in wood cleated plywood boxes conforming to PPP-B-601, overseas type, in quantities not to exceed the weight limitations of the box specification. Blocking, bracing, cushioning, and tiedowns shall be provided to prevent movement and damage to the contents. The boxes shall be closed and strapped in accordance with the appendix to the box specification. Strapping shall conform to QQ-S-781, class 1, type I or IV, finish B unless finish A strapping is specified (see 6.2).
- 5.1.2 Level B: Each ladder shall be collapsed and movable parts secured with tape conforming to PPP-T-97, type II or soft annealed steel wire. Ladders shall be packed in fiberboard boxes conforming to PPP-B-640, Class 2, or wood crates conforming to MIL-C-52950, Style A, Type II, in quantities not to exceed the weight limitations of the box or crate specification. Closure and strapping shall be in accordance with the appendix of the box or crate specification, as applicable.
- 5.1.3 Commercial: The ladder shall be packed in accordance with ASTM D3951.

5.2 Marking:

Marking shall be in accordance with MIL-STD-129..

6. NOTES:

6.1 Intended use:

Ladders covered under this specification are intended to be used for aircraft maintenance operations. However, they may be used for commercial and industrial applications as well.

6.2 Ordering data:

6.2.1 Acquisition requirements: Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Military specification part number required (see 1.2).
- c. when a first article is required for inspection and approval and the number of units required (see 3.1).
- d. When ladders require treatment (see 3.2.1).
- e. Level of packing required (see 5.1 and 6.4).
- f. When finish A strapping is required (see 5.1.1).

6.3 First Article:

When a first article inspection is required, the item shall be examined and should be a preproduction model. The first article should consist of one or more units. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. Invitation for bids should provide that the government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior government approval is presently appropriate for the pending contract.

6.4 Marking:

Preservation requirements have not been included in this document. For the purpose of shipping, marking shall be designated as A/A, B/B or Commercial/Commercial.

6.5 Recycled material:

It is encouraged that recycled material be used when practical as long as it meets the requirements of this specification (see 3.2).

6.6 Subject term (keyword) listing:

Aluminum
Aircraft
Extension
Ladder
Maintenance
Step
Step ladder
Straight
Three-way, combination

Preparing Activity: Navy - AS (Project 5440-0002)

SAENORM.COM : Click to view the full PDF of as85896a

PREPARED UNDER THE JURISDICTION OF
SAE SUBCOMMITTEE AGE-2C, VEHICLE MAINTENANCE & AIRCRAFT SERVICING OF
COMMITTEE AGE-2, AIR CARGO & AIRCRAFT GROUND EQUIPMENT & SYSTEMS

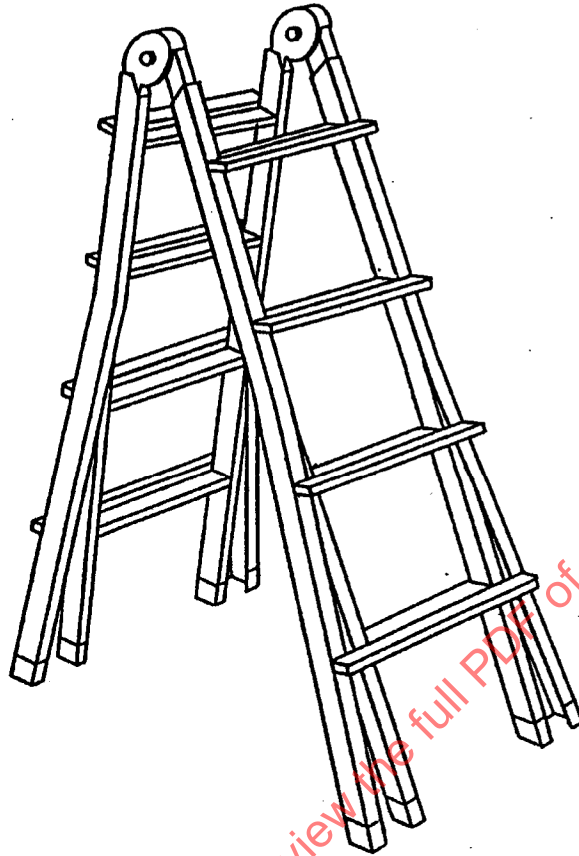


FIGURE 1 Stepladder configuration

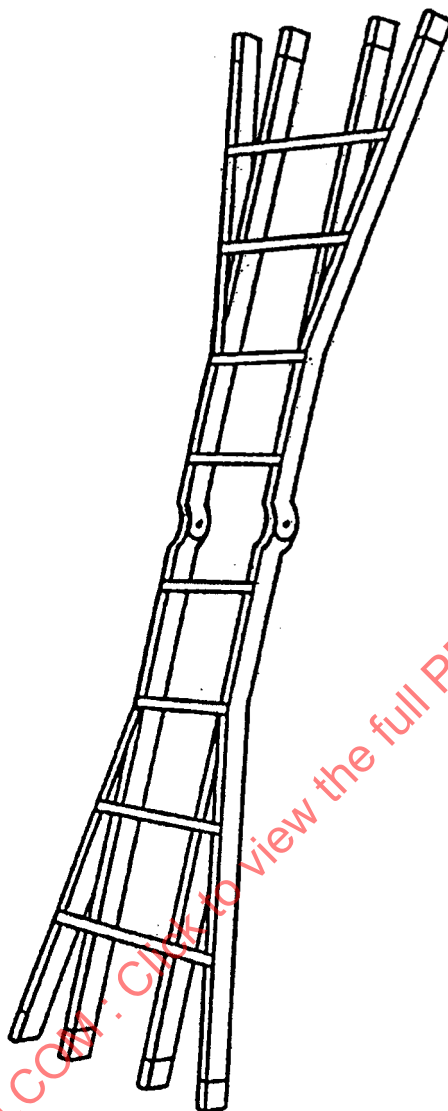


FIGURE 2. Straight ladder configuration