



AEROSPACE STANDARD	AS5944™	
	Issued Reaffirmed	1999-04 2017-11
Slings, Aircraft, General Specification For		
FSC 1730		

RATIONALE

AS5944 has been reaffirmed to comply with the SAE Five-Year Review policy.

NOTICE

This document has been taken directly from U.S. Military Specification MIL-S-5944C 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-S-5944C. Any part numbers established by the original specification remain unchanged.

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Documents
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1. SCOPE:

1.1 Scope:

This specification covers the general requirements for aircraft slings used to lift and transport aircraft or aircraft components which may be bulky or fragile.

1.2 Classification:

The aircraft slings shall be classified in Table I as follows;

TABLE I. Classification of aircraft slings

Class	Type	Purpose
1	Aircraft Handling	Hoisting
2	Aircraft Maintenance	Hoisting and Installation of Major Components
3	Engine Handling	Hoisting and Installation
4	Engine Maintenance	Hoisting and Component Replacement

2. APPLICABLE DOCUMENTS:

2.1 Government documents:

- 2.1.1 Specifications, standards, and handbooks: The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

V-T-295	Thread, Nylon
RR-C-271	Chains and Attachments, Welded and Weldless
RR-W-410	Wire Rope and Strand
CCC-C-419	Cloth Duck, Cotton, Unbleached, Plied-Yarns, Army and Numbered
PPP-B-636	Box, Shipping, Fiberboard

2.1.1 (Continued):

MILITARY

MIL-P-116	Preservation, Methods of
MIL-W-4088	Webbing, Textile, Woven Nylon
MIL-W-5665	Webbing, Textile, Cotton Warp
MIL-H-6875	Heat Treatment of Steels, Process for
MIL-T-8879	Screw Threads, Controlled Radius Root with increased minor Diameter, General Specification for
MIL-C-18375	Wire Rope, Flexible, Corrosion-resisting Nonmagnetic for Aircraft Control
MIL-W-27265	Webbing, Textile, Woven Nylon Impregnated
MIL-M-46032	Fungus Resistant Treatment for Sandbags; Copper Processes
MIL-W-83420	Wire Rope, Flexible For Aircraft Control

STANDARDS

FEDERAL

FED-STD-H28	Screw-Thread Standards for Federal Services
FED-STD-595	Color
FED-STD-751	Stitches, Seams and Stitchings

MILITARY

DOD-STD-100	Engineering Drawing Practices
MIL-STD-109	Quality Assurance Terms and Definitions
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-209	Slings and Tie Down Provisions for Lifting and Tying Down Military Equipment
MIL-STD-808	Finish, Protective and Codes for Finishing Schemes for Ground and Ground Support Equipment
MIL-STD-810	Environmental Test Methods and Engineering Guidelines
MIL-STD-831	Test Reports, Preparation of
MIL-STD-970	Standards and Specifications, Order of Preference for, the selection of
MIL-STD-1189	Standard Department of Defense Bar Code Symbology
MIL-STD-1190	Minimum Guidelines for Level C Preservation, Packing, and Marking
MIL-STD-1367	Packaging, Handling, Storage and Transportability Program Requirements for Systems and Equipments
MIL-STD-2073-2	Packaging Requirements Codes
DOD-STD-2101	Classification of Characteristics
MIL-STD-2175	Castings, Classification and Inspection of
MIL-STD-2219	Fusion welding for aerospace applications

2.1.1 (Continued):

MILITARY HANDBOOKS

MIL-HDBK-300 Technical Information File of Support Equipment

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094)

2.1.2 Other government drawings: The following other Government drawings form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

Air Force Drawings

7545352 Requirements for Finishes, Protective, and Codes for San Antonio ALC
Ground and Ground Support Equipment

Naval Air Systems Command Drawings

4SE000726 Test/Inspection Certification Tag

(Copies of drawings 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 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).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 8 Tension testing of metallic material

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1137)

(Non government 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 document and the references cited herein the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS:

3.1 First article:

When specified (see 6.4), a sample shall be subjected to first article inspection in accordance with 4.4.

3.2 Standardization of slings:

Before a new sling is designed it shall be mandatory that MIL-HDBK-300 be reviewed to verify that an existing sling cannot be used.

3.3 Selection of specification and standards:

Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-970.

3.4 Protective treatment for sling materials:

Materials used in the construction of the slings shall be protected against deterioration when exposed to climatic and environmental conditions likely to occur during service. This protection against deterioration shall be accomplished in a manner which will not prevent compliance with the performance requirements of this specification. Protective coatings that will crack, chip, or scale with age or extremes of climatic and environmental conditions shall not be used. All fabric and webbing used in the slings shall be treated in accordance with MIL-M-46032. Finishes and protective coatings on all metal surfaces of the slings shall be in accordance with MIL-STD-808 and for USAF slings Drawing 7545352.

3.5 Standard steels:

Steels complying with ASTM, AMS, Military, Federal or AISI standards shall be utilized in the design and fabrication of the slings and shall be corrosion resistant or treated to resist corrosion due to fuels, salt spray, or atmospheric conditions likely to be encountered during storage or normal service.

3.5.1 Heat treatment: Heat treatment of steel materials shall be in accordance with MIL-H-6875.

- 3.5.2 Welding: Welding shall be accomplished and inspected in accordance with MIL-STD-2219 and shall only be accomplished by operators who are presently qualified.
- 3.5.3 Castings: When used, castings shall be designed and classified in accordance with the requirements of MIL-STD-2175.
- 3.5.4 Screw threads: Screw threads and threaded fasteners shall meet applicable requirements of FED-STD-H28 except those threads that are designed for a critical application. These threads and “safety” critical threads shall be in accordance with MIL-T-8879.
- 3.5.5 Standard parts: Standard parts (MS, AN, or NAS) shall be used wherever they are suitable for the purpose, and shall be identified on the drawing by their part numbers. Commercial utility parts such as screws, bolts, nuts, cotter pins, et cetera, may be used provided they possess suitable properties and are replaceable by the standard parts (MS, AN, or NAS) without alteration, and provided the corresponding standard part numbers are referenced in the parts list as acceptable alternates and, if practicable, on the contractor’s drawings. In the event there is no suitable corresponding standard part in effect on date of invitation for bids, commercial parts may be used provided they conform to all requirements of this specification.

3.6 Fabric webbing:

All fabric type materials used in the slings structure shall conform to CCC-C-419. All webbing straps used shall conform to MIL-W-5665 or MIL-W-4088. The fabric or webbing shall be constructed to prevent undue fraying of the edges and at attachment points. All ends or termination of nylon thread or webbing shall be secured by heat-searing.

- 3.6.1 Fabric threads: The threads used in the termination or assembly of the webbing shall be nylon thread in accordance with V-T-295 which is the preferred material. The thread size and class shall be determined by the design requirements.

3.7 Part numbering of interchangeable parts:

All parts having the same manufacturer’s part number shall be functionally and dimensionally interchangeable. The item identification and part number requirements of DOD-STD-100 shall govern the manufacturer’s part numbers and changes thereto.

3.8 Design and construction:

The slings shall be designed to support the specified aircraft or component part being hoisted and shall not interfere with or contact the part being hoisted at areas other than points of attachment. Unless otherwise specified, the design shall include a provision of adjustment for varying center of gravity locations of the hoisted items for improved stability during hoisting and limited transportation. The dimensions of slings shall be kept to a minimum consistent with design requirements. For aircraft hoisting slings, the maximum vertical height of the sling hoist attachment shall not exceed 24 feet or as otherwise specified when the aircraft is hoisted just clear of the ground with gears down.

- 3.8.1 Rated load: The rated load shall be the maximum load for which the slings are designed to handle. The term rated load or capacity is the same as the Safe Working Load (SWL). Those terms or loads shall not include the factor of safety and are the loads or forces applied under actual working conditions. The rated load is the maximum permissible applied load.
- 3.8.2 Design requirements: The design of the slings shall eliminate all unnecessary weight and shall reflect a constant effort toward weight-strength optimization. The stress level, under load condition, at any point in the structure shall be limited to a level that provides a safety factor of 3 against permanent deformation. When dynamic factors induce loads that exceed 1.5 times the rated load, the stress level at any point in the structure shall be limited to a level that provides a safety factor of 2 against permanent deformation induced by dynamic loads. Bolts, rivets, pins and all other attachment devices shall be designed to include a safety factor of 5 based on ultimate strength. The design of steel cables and fabric straps shall include a safety factor of 5 based on the breaking strength of the cable or strap. The sling assembly shall be capable of withstanding a static proof load of 200 percent of the rated load. In addition, fabric straps or webbing designed for use as bellyband slings shall be of sufficient width and softness to provide an even distribution of the load to the straps to prevent the straps from damaging the thin skinned surfaces. For those slings used for transporting cargo below a helicopter the frontal area of this cargo shall be calculated in accordance with Appendix A of MIL-STD-209. The maximum shipping weight and sling length shall also be calculated in accordance with MIL-STD-209.
- 3.8.3 Safety: The slings shall be so constructed and assembled as to withstand all conditions of service use without loss or loosening of parts, permanent deformation or loss of serviceability. The slings shall be designed to provide for servicing and use by personnel wearing heavy gloves, mittens, bulky clothing and chemical defense ensembles. Hazards that cannot be eliminated or controlled through design selection shall be controlled to an acceptable level through use of fixed, automatic, or other protective safety design features or devices. A proof load test shall be required for each sling assembly.
- 3.8.4 Interface capability: The slings shall provide an interface capability with the following items:
- Hoisting unit as specified in 3.12 herein.
 - Aircraft or component part as specified in Table I.
- 3.9 Reliability:

The slings shall have a minimum Mean-Time-Between Failures (MTBF) of not less than 120 cycles with a reliability of not less than 0.990 for a one-cycle mission at 0.9 confidence.

3.10 Maintainability:

The slings shall be designed and constructed as specified herein to provide the following:

- a. Minimum number of parts consistent with reliability and performance specified herein.
- b. Minimum amount of training and time necessary for assembly, disassembly, location of trouble sources, and maintenance including servicing. Where practical, parts and components shall be located or positioned for rapid and simple inspection and recognition of excessive wear or potential failure.
- c. Permit adjustments, servicing, replacement of parts and components and other maintenance with minimum disturbance to other equipment parts or or components. Parts and components shall be located for ample and rapid access unless performance or reliability will be appreciably degraded by the accessible location. In performing maintenance, if engineering reasoning or data determines that physical or visual interference between items cannot be avoided, the item predicted to require the most maintenance shall be located for best accessibility.
- d. Permit maintenance with general purpose tools and equipment normally available commercially. Use of special purpose tools and equipment shall be subject to approval of the procuring activity.
- e. Minimum number of tools required for maintenance by design practices such as reducing the variety of bolt head sizes to the practicable minimum.
- f. Foolproofness - Where improper installation of an item could cause a malfunction of the item or the equipment in which it is installed, an unsymmetrical mounting means shall be provided where practical. That mounting shall allow the item to be installed only in its proper operating position. If an unsymmetrical mounting means is not practical, the item shall be so mounted that its proper operating position can be readily and visibly determined by service maintenance personnel.

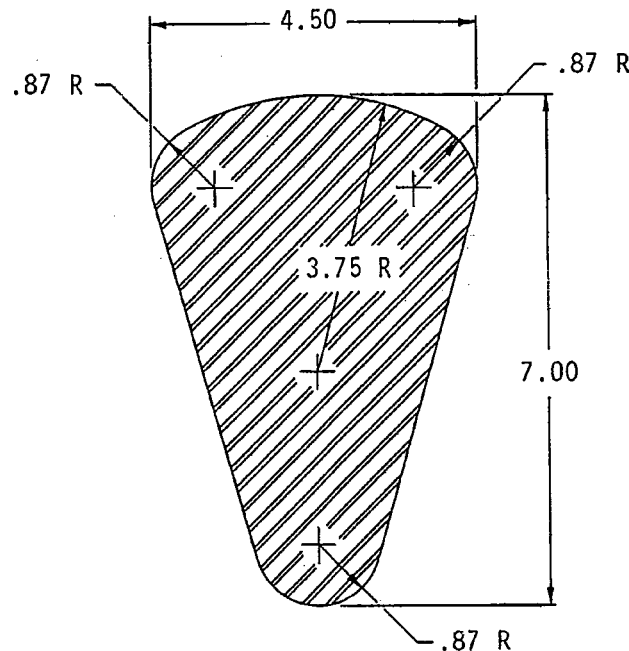
3.11 Components:

The slings shall consist of the following major components:

Component Name	Requirement Para
Hoist attachment	3.12
Lifting attachment	3.13
Main body	3.14
Cable or strap clamps	3.15
Cable or strap terminals	3.16

3.12 Hoist attachment:

The slings shall be provided with a hoist attachment capable of supporting the required load and compatible to interface with the hoisting unit. The hoist attachment shall be designed to be detachable for repair or replacement. When assembled into a complete sling, the hoist attachment or terminal ring of slings designed to support the complete aircraft shall have an unobstructed aperture of sufficient size to accommodate a crane hook of trapezoidal section with major dimensions and configuration as shown on Figure 1. (See 6.8) The maximum cross-sectional dimension of the ring shall not exceed 2-5/8 inches. The hoist attachment used on aircraft component slings shall have a 3-inch minimum inside clear opening for accepting the hoist. The hoist attachments shall conform to the following:



NOTES:

1. Dimensions in inches with tolerance $\pm .02$
2. Material - Steel

FIGURE 1. Trapezoidal section of crane hook

3.12.1 Ring-type attachments: Ring-type hoist attachments for all types of slings may be circular, pear, or oblong in shape and shall be forged or welded steel. The welded-type rings shall be accomplished under a closely controlled process which will consistently produce welds of such quality as to provide strength equivalent to at least 95 percent of that of the parent metal of the ring.