INCH-POUND

MIL-PRF-27260C
27 November 1998
SUPERSEDING
MIL-T-27260B
28 December 1970

PERFORMANCE SPECIFICATION

TIE DOWN, CARGO, AIRCRAFT, CGU-1/B

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 5,000-pound capacity aircraft cargo tie down. The tie down is designated CGU-1/B and is furnished in a minimum length of 240 inches.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, and standards. The following specifications and standards 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).

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-130 - Identification Marking of US Military Property

(Unless otherwise indicated, copies of the above standard are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this document should be addressed to: Technology & Industrial Services Division, SA-ALC/TILDD, 485 Quentin Roosevelt Rd., Kelly AFB, Texas 78241-6425, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 1670

2.3 Non-Government publication. The following document forms 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 QUALITY CONTROL (ASQC)

ANSI/ASQC Z1.4 - Sampling Procedures and Tables for Inspection by Attributes (DoD-adopted)

(Application for copies should be addressed to American Society for Quality Control, 611 East Wisconsin Avenue, P.O. Box 3005, Milwaukee, WI 53201-3005, or to the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.)

RADIO TECHNICAL COMMISSION FOR AERONAUTICS (RTCA)

RTCA/DO-160 - Environmental Conditions and Test Procedures for Airborne Equipment

(Application for copies should be addressed to RTCA, Inc., 1140 Connecticut Ave. NW, Washington, DC 20036.)

2.4 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 Qualification. The tie downs furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.3).

3.2 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle cost.

3.3 Materials. All materials shall be treated to resist corrosion due to electrolytic decomposition, fungus, salt spray, and any other atmospheric conditions that may be encountered during operational use or storage (see 4.6).

3.4 Design. The tie down assembly shall be designed as an integral unit and shall not require attachment or assembly of separate parts for operation. The tie down assembly shall be operable without the use of tools. The tie down shall be designed so that no parts will work loose in service. Portions of the tie down which bear on the strap when the tie down is in the operating position shall not incorporate knurled, serrated, or other types of surfaces that could degrade the strap strength. The tie down shall be designed to be easily operable while wearing standard aircrew work gloves (see 4.6).

3.5 Components. The tie down major components shall consist of a strap, a fixed hook assembly, and an adjustable hook assembly that has an integrated adjusting, tensioning and release mechanism (see 4.6).

3.5.1 Strap. The strap shall incorporate a stop to prevent it from threading loose through the adjustable hook assembly (see figure 1). The strap shall not have frayed ends. The strap shall not interfere with the operation and locking of the tensioning lever (see 4.6).

3.5.2 Fixed hook assembly. The fixed hook assembly shall have a non-swiveling hook with a mechanism on the hook to prevent inadvertent disengagement (see 4.6 and 4.7.1.3).

3.5.3 Adjustable hook assembly. The adjustable hook assembly shall have a non-swiveling hook, without an inadvertent disengagement mechanism (see 4.6).

3.6 Interface.

3.6.1 Tie down dimensions. The overall dimensions of the tie down are shown in figure 1.

3.6.2 Hook dimensions. The hooks shall permit securing of the tie down to a ring having a minimum clear opening of 0.75 inch diameter and a maximum cross section diameter of 0.875 inch (see 4.6).

3.6.3 Weight. The overall weight of the tie down assembly shall not exceed 3.75 pounds (see 4.6).

3.6.4 Strap color. The color of the strap shall be white (see 4.6).

3.7 Operation. The fixed hook assembly and the adjustable hook assembly shall attach to the aircraft tie down rings (see 3.6.2) without the use of tools or other supplementary devices. The adjusting, tensioning, and release mechanism requirements (see 3.8.3, 3.8.4, and 3.8.6) shall be accomplishable by personnel wearing standard aircrew work gloves. The work gloves shall not cause interference (see 4.7.1.1).

3.8 Performance.

3.8.1 Proof load. The tie down shall be capable of withstanding a proof load of 5,000 pounds for 30 seconds without slippage of the strap through the adjustment device. Damages such as broken sewing, broken or frayed strap, and deformation or rupture of hardware shall not be permitted. The tie down shall be fully operational (see 4.7.4).

3.8.2 Ultimate load. The tie down shall be subjected to an ultimate load of 6,000 pounds for 30 seconds. Damage such as broken sewing without complete separation, broken or frayed strap without complete separation of the strap, and deformation but not rupture of hardware shall be permitted. The release mechanism shall be operable (see 4.7.4.1).

3.8.3 Adjusting mechanism. The adjusting mechanism shall be capable of adjusting the tie down to any length within the limits shown in figure 1. Adjustments in fixed increments of length shall not be acceptable. It shall be possible to accomplish preliminary adjustments of the webbing to the approximate length required in a maximum of 15 seconds. There shall be no inadvertent disengagement of the fixed hook assembly during tie down operations (see 4.7.1.2).

3.8.4 Tensioning mechanism. The tensioning mechanism shall be of the progressive-take-up-ratchet type or similar mechanism and shall be capable of taking up a minimum of one foot of strap. The tensioning mechanism shall be capable of applying a tension of not less than 150 pounds using an applied force not to exceed 50 pounds. No more than 7 progressive take-ups shall be required to obtain 150 pounds of tension with 18 feet of strap between the hooks. The mechanical advantage of the mechanism shall not exceed 5. In the tightened position, the operating lever shall not protrude. A lock shall be incorporated in the tensioning mechanism and shall automatically engage upon completion of the tensioning operation. The force required to disengage the lock shall not exceed 5 pounds (see 4.7.1.2).

3.8.5 Tensioning mechanism strength. The tensioning mechanism shall be capable of withstanding a minimum applied force of 300 pounds without permanent deformation or malfunctioning of the mechanism. The tensioning mechanism shall be operable (see 4.7.1.3).

3.8.6 Release mechanism. The release mechanism shall, when actuated, release the tensioning mechanism and shall produce sufficient slack in the strap to permit removal of the attachment hooks. It shall be possible to manually release a tension load of 750 pounds, with the applied force not exceeding 60 pounds (see 4.7.1.4).

3.8.7 Strap strength. The strap shall have a minimum tensile strength of 9,500 pounds (see 4.7.3).

3.9 Environmental conditions. The tie down shall be capable of satisfactory operation in worldwide environmental conditions expected to be encountered during aircraft loading operations and long term storage to include the following conditions:

a. Exposure to fungi (see 4.7.2.1).

b. Exposure to salt sea atmosphere (see 4.7.2.2).

c. Sand and dust particles as encountered in desert areas (see 4.7.2.3).

d. Vibration incident to service use (see 4.7.2.4).

e. A minimum temperature of -65° F (see 4.7.2.5).

f. A maximum temperature of 160°F (see 4.7.2.6).

3.10 Durability. The tie down shall be designed to perform in its intended environment (see 3.9) for at least 30 years of continuous use with no loss of function or safety (see 4.7.5).

3.11 Interchangeability. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable (see 4.6).

3.12 Item identification. The tie down major components (strap, fixed hook, and adjustable hook assemblies) shall be permanently marked for identification in accordance with MIL-STD-130. The identification shall include the contract number, vendor, and CAGE number (see 4.6). The following special marking shall be included:

5000 Lb. CAP (see 4.6)

3.13 Safety. The tie downs shall be functional without sharp edges, burrs, or protrusions that might injure operational personnel or prevent the operation of the tie downs in restricted locations. Operation of the tie down equipment shall not present undue hazards to personnel, wearing standard aircrew work gloves, during tie down of cargo, while the cargo is secured, during the release of cargo restraint, or during removal or stowage of the tie downs. Normal operation shall not present cutting, pinching, stabbing, nor abrupt impact hazards to personnel. Tie down straps shall not contain defects such as holes, cuts, tears, splices, or abrasions which may cause strap failure and result in injury to personnel. The strap shall also be free of grease, oil, dirt, or any other foreign matter that is not removable without damaging the strap and degrading it's strength (see 4.6).

3.14 Toxic chemicals, hazardous substances, and ozone depleting chemicals (ODCs). The use of toxic chemicals, hazardous substances, or ODCs shall be avoided (see 4.6).

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.2).

b. Conformance inspection (see 4.3).

4.1.1 Sampling for inspection. Unless otherwise specified, sampling shall be in accordance with ANSI/ASQC Z1.4.

4.2 Qualification inspection. Qualification inspection shall be performed on three complete tie down assemblies (A, B, and C). The three tie down assemblies will be examined in accordance with 4.6. The assemblies will then be subjected to the tests specified in 4.7 using the sequence specified in table I.

4.3 Conformance inspection. Conformance inspection shall include the examinations and inspections under 4.6, and the tests specified (see 4.7.1.3 and 4.7.1.5).

4.4 Test conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in RTCA/DO-160 for the applicable test.

4.5 Requirements cross-reference matrix. Table II provides a cross-reference matrix of the section 3 requirements and section 4 verifications.

4.6 Visual examination. Each tie down assembly shall be examined for compliance with the requirements specified (see 3.3, 3.4, 3.5, 3.5.1, 3.5.2, 3.5.3, 3.6.1, 3.6.2, 3.6.3, 3.6.4, 3.11, 3.12, 3.13, and 3.14).

4.7 Methods of inspection.

4.7.1 Sample configuration. Unless otherwise specified, tests shall be made with the tie down working length adjusted to 4 feet ± 3 inches.

4.7.1.1 Operations. The test shall be performed in conjunction with the tensioning (see 4.7.1.2) and the release (see 4.7.1.4) tests as specified (see 3.7).

4.7.1.2 Adjusting and tensioning mechanism. With the tie down connected between two fixed points 18 feet apart, the adjusting mechanism and tensioning mechanism shall be operated and checked for compliance (see 3.8.3 and 3.8.4).

4.7.1.3 Tensioning mechanism strength. The tensioning mechanism shall be subjected to a minimum applied force of 300 pounds through the operating lever. The tensioning mechanism shall be operated and checked for compliance (see 3.8.5).

4.7.1.4 Release mechanism. The tie down shall be assembled in a testing machine and the release mechanism locked. A minimum load of 750 pounds shall be applied and the release mechanism shall operate by the application of not more than 60 pounds of force, while the tie down is sustaining the applied load. The release mechanism shall operate as specified (see 3.8.6).

4.7.2 Environmental. Environmental testing shall be planned and conducted using the guidance in RTCA/DO-160.

4.7.2.1 Fungus resistance. The tie downs shall be subject to a fungus resistance test in accordance with RTCA/DO-160, Section 13, Category F.

4.7.2.2 Salt fog. The tie down shall be subjected to a salt fog test in accordance with RTCA/DO-160, Section 14, Category S, 5% Salt Spray. At the conclusion of this test, the tie down shall be subjected to the tests specified (see 4.7.1.2, 4.7.1.3, and 4.7.1.4).

4.7.2.3 Sand and dust. The tie down shall be subjected to a dust test in accordance with RTCA/DO-160, Section 12, Category D. Note: if 140 mesh silica flour is used, local environmental laws and criteria must be observed. At the conclusion of this test, the tie down shall be subjected to the tests specified (see 4.7.1.2 and 4.7.1.4).

4.7.2.4 Vibration. The tie down shall be kept under a tension of 200 pounds for a 24-hour period. The tie down assembly, while under tension, shall then be subjected to a vibration test in accordance with RTCA/DO-160, Section 8, Standard Sinusoidal Vibration Test Procedure, Figure 8-4, Curve Y.

4.7.2.5 Low temperature. The tie down shall be subjected to a low temperature test in accordance with RTCA/DO-160 Section 4, Category A3, Ground Survival Low Temperature Curve, and temperature of -65°F. During this test, the tie down shall be subjected to the tests specified (see 4.7.1.2, 4.7.1.3, and 4.7.1.4).

4.7.2.6 High temperature. The tie down shall be subjected to a high temperature test in accordance with RTCA/DO-160 Section 4, Category A3, Ground Survival High Temperature Curve, except the maximum temperature shall be 160°F. During this test, the tie down shall be subjected to the tests specified (see 4.7.1.2, 4.7.1.3, and 4.7.1.4).

4.7.3 Strap strength. The strap material shall be tested to failure in a tensile test machine at a constant crosshead rate of 3.0 ± 1.0 inches per minute in order to verify compliance (see 3.8.7).

4.7.4 Proof-load. The tie down shall be subjected to a proof load of 5,000 pounds for 30 seconds as specified (see 3.8.1).

4.7.4.1 Ultimate-load. The tie down shall be subjected to an ultimate load of 6,000 pounds for 30 seconds as specified (see 3.8.2).

4.7.5 Durability. One tie down shall be rotated for one hour in a tumbler type test fixture. The tie down will then be subjected to the tests specified (see 4.7.1.2 and 4.7.1.4).

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department or Defense Agency automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. The CGU-1/B tie down covered by this specification is intended for use in securing cargo being transported in military aircraft.

6.2 Acquisition requirements. Acquisition documents must specify the following:

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

b. Issue of the DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.3).

c. Packaging requirements (see 5.1).

d. Item identification (see 3.12).

6.3 Qualification. The attention of the contractors is called to the requirements with respect to products requiring qualification. Awards will be made only for products which are, at the time of award of contract, qualified for inclusion in the Qualified Products List (QPL-27260) whether or not such products have actually been listed by that date. In order that the manufacturers may be eligible to be awarded contracts or purchase orders for the products covered by this specification, they are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification. Information pertaining to qualification of products may be obtained from (Resources & Logistics Services Division, SA-ALC/TILDD, 485 Quentin Roosevelt Rd., Kelly AFB, Texas 78241-6425).

6.4 Subject term (key word) listing.

140 mesh silica flour
adjusting assembly
hook
ratchet
strap
tensioning assembly

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

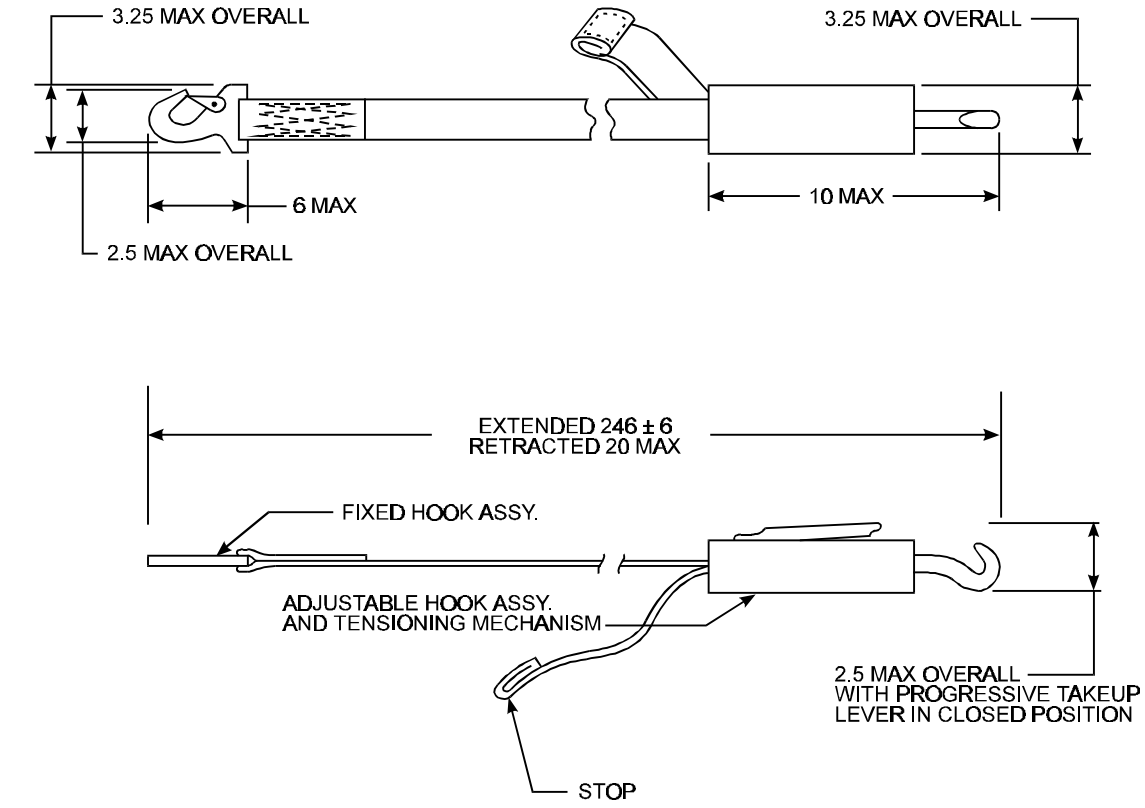
TABLE I. Testing sequence

Test Paragraph	Test Article A	Test Article B	Test Article C
4.7 & subparagraphs	1		
4.7.1.2		6	3
4.7.1.4		7	4
4.7.2.1		2	
4.7.2.2		5	
4.7.2.3		3	
4.7.2.4		4	
4.7.2.5			1
4.7.2.6			2
4.7.3 (strap only)			5
4.7.4	2		
4.7.4.1	3		
4.7.5		1	

TABLE II. Requirements cross-reference matrix.

Requirement	Verification
3.3	4.6, 4.7.2.1, 4.7.2.2
3.4	4.6
3.5	4.6
3.5.1	4.6
3.5.2	4.6, 4.7.1.3
3.5.3	4.6
3.6 & subpara.	4.6
3.7	4.7.1.1
3.8.2	4.7.1.2
3.8.3	4.7.1.2

Requirement	Verification
3.8.4	4.7.1.3
3.8.5	4.7.1.4
3.8.1	4.7.4, 4.7.4.1
3.8.6	4.7.3
3.9	4.7.2 & subpara.
3.10	4.7.5
3.11	4.6
3.12	4.6
3.13	4.6
3.14	4.6



THIS ILLUSTRATION IS FOR REFERENCE ONLY

FIGURE 1. Tie down dimensions.

Custodians:
Air Force - 99
Army - GL

Preparing Activity:
Air Force - 82

(Project No. 1670-0888)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	**1. DOCUMENT NUMBER** MIL-PRF-27260C	**2. DOCUMENT DATE (YYMMDD)** 27 Nov 98
3. DOCUMENT TITLE Tie Down, Cargo, Aircraft, CGU-1/B		
4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME *(Last, First, Middle Initial)*	b. Organization	
c. ADDRESS *(Include zip code)*	**d. TELEPHONE** *(Include Area Code)* (1) Commercial (2) DSN *(if applicable)*	**7. DATE SUBMITTED (YYMMDD)**
8. PREPARING ACTIVITY		
a. NAME SA-ALC/TILDD	**b. TELEPHONE** *(Include Area Code)* (1) Commercial 210-925-6314 (2) DSN 945-6314	
c. ADDRESS *(Include Zip Code)* 485 Quentin Roosevelt Rd. Kelly AFB, Texas 78241-6425	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** **Defense Quality and Standardization Office** **5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466** **Telephone (703) 756-2340 DSN 289-2340**	