INCH-POUND
MIL-DTL-27444E (USAF)
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DETAIL SPECIFICATION

NET, CARGO TIE-DOWN, AIRCRAFT PALLET
HCU-7/E, HCU-7A/E, HCU-15/C

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

1. SCOPE

1.1 Scope. This specification covers NET, CARGO TIE-DOWN, AIRCRAFT PALLET, designated HCU-7/E, HCU-7A/E and HCU-15/C. The HCU-7/E and HCU-7A/E can be considered completely interchangeable with one another, with the exception of HCU-7A/E nets usable for low profile loads.

1.2 Classification. Tie-down nets are of the following types, as specified (see 6.2).

1.2.1 Types. The types of tie-down nets are as follows:

Type I – Net, Cargo Tie-down, Pallet HCU-7/E

Type II – Net, Cargo Tie-down, Pallet HCU-15/C

Type III – Net, Cargo Tie-down, Pallet HCU-11/C - DELETED

Type IV – Net, Cargo Tie-down, Pallet HCU-16/C - DELETED

Type V – Net, Cargo Tie-down, Pallet HCU-7A/E

2. APPLICABLE DOCUMENTS

Comments, suggestions, or questions on this document should be addressed to: AFLCMC/WNZEB, Robins AFB, GA 31098-1813. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil.

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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 of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 cited in the solicitation or contract.

FEDERAL STANDARDS

FED-STD-595/13538	Yellow, Gloss
FED-STD-595/14084	Green, Gloss
FED-STD-595/23538	Yellow, Semi-gloss
FED-STD-595/24084	Green, Semi-gloss
FED-STD-595/30277	Brown
FED-STD-595/33538	Yellow, Flat or Lusterless
FED-STD-595/34088	Green, Flat or Lusterless

COMMERCIAL ITEM DESCRIPTIONS

A-A-59291	Ink, Marking (For Parachutes and other Textile Items)

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-W-4088	Webbing, Textile, Woven Nylon
MIL-W-27265	Webbing, Textile, Woven Nylon Impregnated

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-129	Military Marking for Shipment and Storage
MIL-STD-810	Environmental Engineering Considerations and Laboratory Tests

(Copies of these documents are available online at https://assist.dla.mil/quicksearch/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent

specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DRAWINGS (CAGE 98752)

67F46303	TYPE I – Net -HCU-7/E, SIDE
67E46290	TYPE II – Net-HCU-15/C, TOP
201124564	TYPE V – Net-HCU-7A/E SIDE
67B46274	SLIDE, ADJUSTMENT-WEB
67B46275	RING CARGO NET-PALLET
67C46272	HOOK ASSEMBLY TENSIONING 2,800 POUND CAPACITY
64C43921	HOOK ASSEMBLY PALLET NET
67B46270	HOOK ASSEMBLY, 7/8" EYE
67B46276	SLIDE ASSEMBLY TENSIONING, 3,500 POUND CAPACITY

(Copies of these drawings required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERCIAN SOCIETY FOR QUALITY (ASQ)

ANSI/ASQ Z1.4	Sampling Procedures and Tables for Inspection by Attributes

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B633	Standard Specification for Electroposited Coatings of Zinc on Iron and Steel

(Copies of these documents are available online at http://www.ansi.org or American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036.

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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 6.2), a sample shall be subjected to first article inspection in accordance with 4.3.

3.2 General requirements. The requirements of the applicable drawings for the required net type and those details referenced therein apply as requirements of the specification, with the exceptions and additions specified herein. Unless otherwise noted herein or in the contract, in the event of a conflict between the specification and drawings, the specification shall take precedence.

3.2.1 Materials. The nets shall be constructed of those materials specified in the applicable detail drawing and sub-level drawings.

3.3 Construction. The nets shall be constructed so that no part will work loose in service. They shall be built to withstand the strains, jars, vibrations, and conditions incident to shipping, storage, and service.

3.4 Reliability. The nets shall be constructed as specified herein to assure the optimum service life under all service conditions specified herein, and shall be acceptably demonstrated during the testing specified herein.

3.5 Net configuration. The nets shall be constructed in accordance with the applicable detail drawing.

3.5.1 Strength. The following factors and load configuration shall be used in the construction of the nets:

3.5.1.1 Maximum stock height and load. The cargo stock height shall be 96 inches maximum and the total maximum load shall be 10,000 pounds for Types I, II, and V nets.

3.5.1.2 Load configuration. The load shall be considered to be rectangular boxes approximately 20” x 20” x 12” for Type I (Type V) and Type II nets. All boxes are free to move relative to adjacent boxes.

3.5.1.3 Maximum range of adjustment. The Type I (Type V) net set shall enclose on an 84” x 108” x 96” load. The Type II net shall enclose a load 84” x 108” and have a max range of adjustment of 190” and 167” along the length and width, respectively, of the net.

3.6 Net assembly. A net assembly shall consist of two side nets and one top net. A combination of two of the TYPE I or TYPE V nets with a TYPE II net shall make one set.

3.7 Webbing. The webbing shall conform to MIL-W-4088 and the resin impregnated requirements of MIL-W-27265; except for the testing portion, the minimum breaking strengths of the webbings shall be in accordance with TABLE I.

TABLE I. Minimum breaking strengths.

TYPE	MINIMUM BREAKING STRENGTHS (lbs)
VII	5500
VIII	3600
XIII	6500

3.7.1 Webbing colors. The webbing colors shall be in accordance with FED-STD-595 as shown in TABLE II.

TABLE II. Webbing colors.

NET TYPE CLASSIFICATION	COLOR	COLOR CHIP NUMBER
TYPE I	Green	14084, 24084 or 34088
TYPE II	Brown	30277
TYPE V	Green	14084, 24084 or 34088

3.8 Hardware. All hardware shall be installed in accordance with the applicable detail drawing. All hardware shall be securely sewn to the webbing or otherwise attached to the net.

3.9 Stitching. Stitching design and thread shall be selected by the contractor. The contractor shall meet the requirements of this specification and those tests cited in section 4.5.2.

3.10 Salt fog. The nets shall be capable of storage and operation in high temperature, high humidity, salt laden, sea coast environments without damage or deterioration of performance.

3.11 Vibration. The nets shall be capable of withstanding vibration observed inside cargo carrying aircraft.

3.12 Special marking. The nets shall be marked with 1-inch block letters to indicate outside, top or side as applicable in accordance with the net type required and the 463L (see 6.4.2). Nets shall be stenciled with ink in accordance with A-A-59291. The colors shall be in accordance with FED-STD-595 as shown in TABLE III.

TABLE III. Marking colors.

NET TYPE CLASSIFICATION	COLOR	COLOR CHIP NUMBER
TYPE I	Yellow	13538, 23538 or 33538
TYPE II	Yellow	13538, 23538 or 33538
TYPE V	Yellow	13538, 23538 or 33538

3.13 Dimensional tolerances. Dimensions and tolerances not specified shall be consistent with best commercial practices. When dimensions and tolerances affect the interchangeability, operation, or performance of the net, they shall be held or limited accordingly.

3.14 Workmanship. Workmanship shall be of the highest quality to insure proper operation under conditions to which the nets may be subjected. Unsatisfactory workmanship such as loose, cocked, or inadequately headed rivets; distorted or loose bushing and pins; loose, broken, or incomplete stitching and rough malformed, misaligned, or improperly fabricated fittings shall be deemed defects. Corners shall be rounded, and sharp edges, burrs, or other protrusions that could damage the webbing shall not be permitted.

4. VERIFICATION

4.1 Classification of tests. The inspection and testing of the nets shall be classified as follows:

a. First article testing (see 4.3)

b. Acceptance testing (see 4.4)

4.2 Verification requirements. The verification of requirements shall be in accordance with the matrix in TABLE IV.

TABLE IV. Requirement verification matrix

REQUIREMENT	VERIFICATION METHOD	VERIFICATION
3.3 Construction.	Examination	4.5.1 Examination of product.
3.4 Reliability.	Analysis	4.5.3 Reliability analysis.
3.5 Net configuration.	Examination	4.5.1 Examination of product.
3.6 Net assembly.	Examination	4.5.1 Examination of product.
3.7 Webbing.	Test	4.5.2 Load test.
3.7.1 Webbing colors.	Examination	4.5.1 Examination of product.
3.8 Hardware.	Examination	4.5.1 Examination of product.
3.9 Stitching.	Test	4.5.2 Load test.
3.10 Salt fog.	Test	4.5.4.2 Salt fog test.
3.11Vibration.	Test	4.5.4.1 Vibration test.
3.12 Special marking.	Examination	4.5.1 Examination of product.

TABLE IV. Requirement verification matrix - Continued

REQUIREMENT	VERIFICATION METHOD	VERIFICATION
3.13 Dimensional tolerances.	Examination	4.5.1 Examination of product.
3.14 Workmanship.	Examination	4.5.1 Examination of product.

4.3 First article testing.

4.3.1 First article test sample. The first article test sample of each type net shall consist of the following:

a. Two complete nets of each type shall be produced and examined in accordance with 4.5.1. One net shall be used for test specimens and one net shall be retained for comparison with production nets. The retained net shall be shipped as one of the last shipments of the contract.

b. Test specimens shall be selected from one of the nets and shall be assembled in the net. A specimen shall be selected for each type of hardware, except the loop stop, combined with each type of attached webbing. In places where two or more types of webbing are attached to one piece of hardware (an example of this is the ring), a specimen shall be selected for each type of webbing, thread and, sewing pattern used. In places where two pieces of hardware are assembled together, the test specimen shall include the assembly. Each test specimen shall be tested in accordance with 4.5.2.

c. In addition to the specimens selected in 4.3.1b, a test specimen shall be selected for each type of stitch pattern not included in the specimen in 4.3.1b. An example is the grid area (where webbing is sewn to webbing) stitching. Each test specimen shall be tested in accordance with 4.5.2.

d. A tensioning mechanism test specimen shall be fabricated and tested in accordance with the requirements of 4.5.4.1.

4.3.2 Test rejection criteria. Throughout all tests specified herein, the net shall be closely observed for the following conditions, which shall be cause for rejection:

a. Failure to conform to design or performance requirements specified herein or in the contractor's technical proposal.

b. Structural failure of any component, including permanent deformation, or evidence of impending failure (unless otherwise specified).

c. Evidence of excessive wear. If excessive wear is suspected, the original equipment manufacturer's (OEM's) specifications or tolerances shall be utilized for making a determination.

d. Evidence of corrosion or deterioration.

e. Misalignment of components.

f. Conditions that present a safety hazard to personnel during operation, servicing, or maintenance.

4.4 Acceptance tests. The acceptance tests shall consist of the following:

a. Individual test (see 4.4.1)

b. Lot test (see 4.4.2)

4.4.1 Individual test. Each net shall be subject to the test specified in 4.5.1.

4.4.2 Lot test sampling plan. A lot shall consist of one week's production of one type of net. The Government shall randomly select, for contractor testing, nets from the lot in accordance with ANSI/ASQ Z1.4, Inspection Level S-2. The AQL (Acceptance Quality Limit) shall be 6.5. The test specimen shall, as a group, cover all combinations of hardware, webbing and stitching used in the nets. Loop stops shall be excluded. The specimens shall be tested according to 4.5.2. Failure of any specimen shall constitute failure of the net from which it was extracted.

4.4.2.1. Rejection and test. When a lot is rejected, a retest may be allowed after the contractor has explained to the Government representative the cause of failure and the action taken to preclude recurrence, the cause of failure has been corrected, all nets on hand have been purged and 4.4.2 successfully repeated at the contractor's expense.

4.4.2.2 Defects in nets already accepted. The investigation of a test failure could indicate the defects may exist in nets already accepted. If so, the contractor shall fully advise the procuring activity of all the defects likely to be found and the method of correcting them.

4.5 Test methods.

4.5.1 Examination of product. The net shall be examined to determine compliance with the requirements specified herein with respect to materials, workmanship, dimensions and marking.

4.5.2 Load test. Each specimen shall be subjected to a load equal to 85% of the minimum breaking strength of the webbing (see 3.7) except as noted on the component drawing and herein. The load shall be applied for 30 seconds minimum in accordance with TABLES V & VI below.

TABLE V. Loads for the HCU-7/E and HCU-7A/E Nets.

NAME	AF DRAWING #	LOAD (LBS)
Slide assembly	67B46274-01 & VII webbing	3500
Ring assembly	67B46275-01 & -03 & XVI webbing	3825
Hook assembly	67C46272-10, 67B46275-03 & VII webbing	2800
Hook assembly	64C43921, 67B46275-01 & -03 & XIII webbing	5100
Grid area stitching (Detail C)	Type XIII webbing	400

TABLE VI. Loads for the HCU-15/C Nets

NAME	AF DRAWING #	LOAD (LBS)
Hook assembly	67B46270-10 & XVI webbing	2800
Tensioning hook assembly	67C46272-10 & XVI webbing	2800
Slide assembly	67B46276-10 & XVI webbing	2800
Grid area stitching (Detail A)	Type VIII webbing	400
Ring attachment tab (Detail B)	67B46275-01 & XVI webbing	2800
Grid area stitching (Detail C)	Type XVI webbing	400
Grid area stitching (Detail E)	67B46276-10 & XVI webbing	400

4.5.3 Reliability analysis. An engineering analysis shall be performed to demonstrate compliance with the reliability requirement of 3.4.

4.5.4 Environmental test. The hardware of the net shall be subjected to the following environmental tests conducted in accordance with the specified procedure of MIL-STD-810.

4.5.4.1 Vibration test. A tensioning mechanism shall be subjected to vibration in accordance with Method 514.6, Procedure I - General Vibration. The vibration profiles shall encompass the profiles for jet and propeller aircraft and shall be tested in accordance with MIL-STD-810, Method 514.6, Annex C, Categories 8 and 9. The tensioning mechanism shall be vibrated while under a tension of 200 pounds. No loss of tension shall result due to slippage of the webbing through the tensioning mechanism.

4.5.4.2 Salt fog test. A first article net (see 4.3.1) shall be tested in accordance with ASTM B633-11, Table 2, Type II, for 96 hours to demonstrate compliance with 3.10.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's

system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's 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 that may be helpful, but is not mandatory.)

6.1 Intended use. The nets are intended for use in securing cargo to pallets conforming to MIL-DTL-27443 as applicable. The cargo pallets are designed for use on military aircraft and support equipment rail systems, thus the nets are unique to the military.

6.2 Acquisition Requirements. Acquisition documents should specify the following:

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

b. Type required (see 1.2).

c. When first article is required (see 3.1).

d. Packaging requirements (see 5.1).

6.3. Classification deletions. Types III and IV nets are obsolete and are no longer available for procurement. These nets were previously used in conjunction with the HCU-12/E half pallets, but the requirement no longer exists for these items.

6.4 Definitions. For the purpose of this specification, the following definitions will apply.

6.4.1 Breaking Strengths. The minimum breaking strength for any webbing specimen type can be found in tables II and III of MIL-W-4088.

6.4.2 463L. Cargo Handling System to transport cargo in aircraft, within air terminals, and on motorized and non-motorized vehicles.

6.5 Subject term (key word) listing.

Assembly
Load test
Specimen
Webbing

6.6 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.

Custodians:
Air Force – 84

Preparing Activity:
Air Force – 84

Reviewers:
Air Force – 11

Agent:
Air Force – 99

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