

INCH-POUND

MIL-PRF-44408C

31 October 1996

SUPERSEDING

MIL-S-44408B

28 January 1994

PERFORMANCE SPECIFICATION

SHELTER, ELECTRICAL EQUIPMENT, LIGHTWEIGHT

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

1. SCOPE

1.1 Scope. This document covers three types of lightweight electrical equipment shelters designed for transport on both the M1037 and M1097 High Mobility Multipurpose Wheeled Vehicle (HMMWV). These shelters are transported by rail, air, marine and highway when mounted or dismounted from their vehicles.

1.2 Classification. The shelters will be of the following types, as specified (see 6.2).

- Type I - Shelter, Electrical Equipment, Lightweight (w/o Tunnel, 17-2-0035-1)
- Type II - Shelter, Electrical Equipment, Lightweight, Modified, SICPS (w/ Tunnel, Drain holes in tunnel, Secondary Exit, and Ventilation Port, 17-2-0035-2)
- Type III - Shelter, Electrical Equipment, Lightweight, Modified, General Purpose (w/ Tunnel, 17-2-0035-3)

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. The 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, 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).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, U.S. Army Natick Research and Development Center, ATTN: SSCNC-WST, Natick, MA 01760-5018 by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5411

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SPECIFICATIONS

DEPARTMENT OF DEFENSE

- MIL-T-704 - Treatment and Painting of Material
- MIL-M-8090 - Mobility, Towed Aerospace Ground Equipment, General Requirements for

STANDARDS

DEPARTMENT OF DEFENSE

- MIL-STD-209 - Slinging and Tiedown Provisions for Lifting and Tying Down Military Equipment
- MIL-STD-810 - Environmental Test Methods and Engineering Guidelines
- MIL-STD-1366 - Transportability Criteria
- MIL-STD-1791 - Designing for Internal Aerial Delivery in Fixed Winged Aircraft

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available 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 are those cited in the solicitation.

U.S. ARMY NATICK RESEARCH, DEVELOPMENT AND ENGINEERING CENTER

- 17-1-8565 - Extension Kit, Pintle
- 17-1-8584 - Mounting Kit Shelter To HMMWV
- 17-2-0035 - Interface Control Drawing for, Shelter, Electrical Equipment, Lightweight, Types I, II and III
- 13228E1639 - Standard Camouflage Pattern For Shelter, Lightweight, Multipurpose

(Copies of drawings are available from the U.S. Army Natick Research, Development, and Engineering Center, ATTN: SSCNC-WST, Natick, MA 10760-5018.)

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 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 the 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)

- PS 27 - 95 - Provisional Standard Specification for Engineering and Design Criteria for Rigid Wall Relocatable Structures

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

INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)

- IEEE 299-1991 - IEEE Standard Method for Measuring the Effectiveness of Electromagnetic Shielding Enclosures

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(Application for copies should be addressed to the IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08855-1331.)

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 First article. When specified (see 6.3), a sample shall be subjected to first article inspection in accordance with 4.1a. A first article is defined as a preproduction or an initial production sample consisting of one or more of each type of completed shelters.

3.2 Physical Performance Requirements.

3.2.1 Weight and payload. The shelter weight and payload capacity of each shelter type shall be as listed in table I. The maximum shelter weight listed does not include the weight of the Mounting Kit and Pintle Extension and their attaching hardware. The shelter shall be capable of accepting the payload distribution specified in the contract or purchase order (see 6.2).

TABLE I. Weight and Payload Capacity

Type	Maximum Shelter Weight	Minimum Payload Capacity	Mounting Kit Incl. Hardware	Pintle Extension Incl. Hardware
I	608 lbs	3300 lbs	88 lbs	50 lbs
II	650 lbs	3300 lbs	88 lbs	50 lbs
III	643 lbs	3300 lbs	88 lbs	50 lbs

3.2.2 Parts interchangeability.

3.2.2.1 Spare parts. The spare parts are listed in table II and are depicted on interface drawing number 17-2-0035. All spare parts and related assemblies shall be functionally and dimensionally interchangeable without modification or rework of the part, assembly, or shelter.

TABLE II. Spare Parts

PART
HMMWV Mounting Kit
Pintle Extension Kit
Door Assembly
Hatch Assembly (Type II)
Rear Ladder
Steps
T-bar Door Holder

3.2.2.2 Interface parts. The interface parts are listed in table III. All interface parts and related assemblies shall be functionally and dimensionally interchangeable, without modification or rework of the part, assembly, shelter, or vehicle, with the reference parts listed in table III.

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TABLE III. Interface Parts

PART	REFERENCE PART NO.
Mounting Kit, Shelter To HMMWV	17-1-8584-1
Extension Kit, Pintle	17-1-8565-1

3.2.3 Shelter configuration. The shelter shall meet the configuration constraints specified on interface drawing 17-2-0035 for the shelter type specified.

3.2.3.1 Shelter flatness and squareness. Shelter surfaces shall be flat and square. Each surface of the shelter shall be flat within 1/8 inch per each 48 inch length. Adjacent surfaces shall be perpendicular within 0.10 degrees.

3.2.3.2 Shelter dimensions. The shelter shall meet the dimensional constraints within the specified tolerances required by interface drawing 17-2-0035 for those dimensions which are not provided for reference only.

3.2.3.3 Integration. The shelter shall be capable of accepting all integration configurations of the systems listed in table IV (see 6.2) without modification or rework to the system integration designs listed in table IV. The shelter shall be capable of accepting integration configuration cutouts at various locations. Shelter surfaces shall be capable of accepting the installation of individual pieces of equipment installed by system integrators at various locations. For installations where threaded mechanical fasteners are the preferred fasteners, the attaching surfaces shall be capable of resisting the loads listed in table V for the listed sizes of threaded mechanical fasteners, without damage or degradation to the shelter or fastener.

TABLE IV. System Integration Configurations

SYSTEM INTEGRATION CONFIGURATIONS
All Source Analysis System
Chemical Biological Protected Shelter
Common Ground Station
Firefinder
Light Ground Station Module
Meteorological Measuring Set
Standardized Integrated Command Post System
Trojan
Unmanned Aerial Vehicle-Short Range

TABLE V. Attaching Surface Resistance Load

Threaded Fastener Size(inches)	Torque (ft-lb)	Pull-out (lb)
10-32	8	800
1/4-20 through 1/2-20	10	1000

3.2.4 Chemical and biological (CB) resistance. All shelter surfaces, except weather seals and gaskets, shall be resistant to, and shall not absorb, chemical and biological agent contamination, decontamination fluids, and petroleum

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products. Weather seals and EMI gaskets shall either meet the requirements above or be easily replaceable.

3.2.5 Pressurization. The shelter shall be capable of being pressurized to withstand overpressurization of 1.2 inches water gauge (iwg) with an air leakage not to exceed 10 standard cubic feet per minute (scfm) for Types I and III, and 15 scfm for Type II with the ventilation port covered and sealed. Additionally the Type II shelter with the ventilation port opened shall have an air leakage of 40 to 50 scfm, at an overpressurization of .75 iwg.

3.2.5.1 Ventilation port. The Type II shelter shall be equipped with an air flow passage that functions in conjunction with the Chemical Avoidance Protective Entrance CAPE (see interface drawing 17-2-0035) and Gas Particulate Filter Unit GPFU (NSN 4240-01-231-6515). Based on two people in the shelter, 40 cfm of ventilation air flow is required and the GPFU will nominally provide an overpressure of 0.75 iwg. The airflow passage shall be in the shelter door to allow ventilation of the space between the CAPE and the shelter door. The passage shall prevent dust and contaminants from entering the shelter when no ventilation air flow is being provided. An exterior cover may be used to meet this requirement. The cover shall not be a separate item. In routine conditions the air flow passage will be open. While open, the passage shall maintain the weather tightness and EMI integrity of the shelter.

3.2.6 Roof loads. The shelter roof shall be capable of supporting, without damage or degradation; (1) a uniformly distributed load of 40 lbs/ft² over the entire surface and (2) a concentrated load of 660 lbs over a 1 ft x 2 ft area, applied anywhere on the roof.

3.2.7 Floor loads. The shelter floor shall be capable of supporting, without damage or degradation; (1) a uniformly distributed load of 65 lbs/ft² over the entire floor, (2) a concentrated load of 1000 lbs applied over a 1 ft x 2 ft area, and (3) a point load of 125 lbs, over one square inch.

3.2.8 Door.

3.2.8.1 Door handle. From either side, the shelter door shall be capable of being opened and closed with a maximum force of 48 lbs applied to the door handle. From inside the shelter, the shelter door shall be capable of being opened and closed with a maximum force of 48 lbs applied to the door handle with the outside handle locked. The door shall be capable of being padlocked from the outside.

3.2.8.2 Door structure and hinge assembly. The door and hinge assembly shall be capable of supporting a 200 lb static load applied parallel to the hinge line, along the door edge opposite the hinge, with the door open to 90 degrees, without degradation or damage to the door or door hardware and the door shall operate freely after such a load is applied.

3.2.8.3 Door stop. The door shall include a door stop capable of automatically latching the door, when opened, at 90 degrees. The stop shall automatically prevent the door from swinging beyond 90 degrees when engaged and allow the door to open 180 degrees when disengaged. The door stop shall be capable of being disengaged by personnel, while they are standing on the ground, when the shelter is mounted on the HMMWV and shall not obstruct entry/exit through the door. The door stop shall be capable of withstanding a static load equal to 10 lb/ft² times the largest surface area of the door. The load shall be applied normal to the door's largest surface and on the edge opposite the hinge, with the door latched at 90 degrees. The door and its hardware shall be capable of withstanding these loads without degradation, damage, or improper door operation.

3.2.8.4 Door maintainability. The door shall not be removable from the exterior when locked and shall be easily removable with hand tools when unlocked.

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Hand tools are defined as those found in Tool Kit, General Mechanics, Automotive and Shop Equipment, Automotive Maintenance and Repair (NSN: 5180-00-177-7033 and 4910-00-754-0654, respectively).

3.2.8.5 Door drip edge. There shall be a drip edge over the entire width of the door. The drip edge shall prevent water rolling down the side of the shelter from entering the shelter.

3.2.9 Ladder. A ladder shall be provided to allow personnel carrying equipment, with a combined weight of up to 400 lbs, to enter and exit the shelter safely while the shelter is mounted on the vehicle without damage or degradation to the shelter or ladder. The ladder shall have a stowage location on the door as described on interface drawing 17-2-0035. The ladder must stow securely in all transportation modes (see 3.4).

3.2.10 Roof Hatch. The Type II shelter shall have a roof hatch which shall provide for safe and quick evacuation of personnel from the shelter. The roof hatch shall not be removable from the exterior when locked and shall be easily removable with hand tools when unlocked. Hand tools are defined as those found in Tool Kit, General Mechanics, Automotive and Shop Equipment, Automotive Maintenance and Repair (NSN: 5180-00-177-7033 and 4910-00-754-0654, respectively).

3.2.11 Impact resistance. The shelter shall be capable of withstanding, without damage, the impact of any of the hand tools as defined in 3.2.10 dropped onto the top of the floor surface from a height of 30 inches.

3.2.12 Roof access steps/handholds. Roof access steps and handholds shall be provided for safe access to the roof. These steps/handholds shall be either built into the shelter or attached to the exterior. The steps/handholds shall be designed such that the vehicle/shelter combination does not (1) exceed the legal highway size limitations imposed by states and foreign countries, and (2) limit any other modes of transportation (i.e., rail, air, ship). The roof access steps/handholds shall be designed for the 5th percentile female through the 95th percentile male military personnel and each step shall be capable of supporting 400 lbs without deformation of the step or shelter.

3.2.13 Interface requirements. The shelter shall conform to the interface requirements noted on interface drawing 17-2-0035.

3.3 Environmental Performance Requirements.

3.3.1 Marine atmosphere. The shelter, in operational and storage mode, except for the mounting kit's shock isolator assembly, shall be fully operational when exposed to a marine environment equivalent to 25 lb/acre/yr (2.0 g/m²/yr). The shelter shall not corrode or degrade.

3.3.2 Electromagnetic interference (EMI). The shelter shall be capable of an attenuation level of 60 dB in any location of the shelter, at the following frequencies: H-field (150 kHz and 14 MHz) and Plane Wave (400 MHz, 1 GHz, and 10 GHz).

3.3.3 Climatic range.

3.3.3.1 Temperature range. In storage, the shelter shall be capable of withstanding exposure to temperatures of -70° to 160° Fahrenheit with no evidence of corrosion or degradation of the fasteners, seals, or other hardware. In transit, the shelter shall be capable of withstanding exposure to temperatures of -65° to 160° Fahrenheit. The operational temperature of the shelter shall be -65° to 125° Fahrenheit plus solar load.

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3.3.3.2 Temperature shock. The shelter shall withstand a temperature shock from an equilibrium state at 160° to -70° Fahrenheit and from an equilibrium state at -70° to 160° Fahrenheit without evidence of structural damage, degradation, or permanent deformation.

3.3.3.3 Solar load. The shelter shall withstand a solar induced outer roof surface temperature of 205° Fahrenheit, while maintaining an internal temperature of 85° Fahrenheit, without evidence of structural damage, degradation, or permanent deformation.

3.3.3.4 Sunshine (ultraviolet effects). The shelter shall show no evidence of structural damage, degradation, or permanent deformation as a result of exposure to ultraviolet effects.

3.3.3.5 Humidity. The shelter shall be capable of withstanding daily exposure of up to 97% relative humidity, and exposure of 100% relative humidity (with condensation) for short periods of time, without evidence of structural damage, degradation, or permanent deformation.

3.3.4 Heat transfer. The shelter shall have an overall heat transfer coefficient of no more than 0.50 BTU/hr/ft²/°F.

3.3.5 Blowing dust/sand. The external moving parts of the shelter shall be designed to resist the effects of blowing dust and sand without degradation. Blowing sand is defined as 150 - 1000 micron particles in concentrations of 1.32 x 10⁻⁴ pounds per cubic feet (lbs/ft³) with a wind velocity of 1750 ± 250 ft/min.

3.3.6 Watertightness. The completed shelter, without the aide of supplementary sealing, caulking, taping, etc., shall be capable of withstanding a 40 psig spray from nozzles located 19 inches from and normal to each external shelter surface. The shelter shall not allow water leakage into the shelter and shall not gain weight (see 4.2.1.1).

3.3.7 Detectability.

3.3.7.1 Color and camouflage. Unless otherwise specified (see 6.2), the shelter shall be the standard color and pattern specified on drawing 13228E1639. The interior surface of the personnel door shall match the primary exterior color of the shelter.

3.3.7.2 Blackout. The shelter, with the door closed, shall not permit a light source from within to emit detectable amounts of light.

3.4 Transportability performance requirements. The shelter and shelter/vehicle combinations shall not exceed the legal highway size limitations imposed by states and foreign countries be and shall be capable of obtaining transportability approval from Military Traffic Management Command Transportability Engineering Agency (MTMCTEA) based on requirements for transport in the following modes.

3.4.1 Rail transport. The dismantled shelter and shelter/vehicle combinations, with a simulated payload (see 3.2.1), shall: (1) meet the Gabarit International de Chargement (GIC) equipment gauge envelope as defined in interface standard MIL-STD-1366, and (2) shall be capable of withstanding multiple rail impacts without damage or degradation to the shelter or shelter/vehicle combination, and without damage to the tiedown cables, or blocking or bracing. (see 4.4.1)

3.4.2 Fixed-wing air transport. The dismantled shelter and shelter/vehicle combinations, with payload (see 3.2.1) shall be transportable in C-130 and larger Air Mobility Command (AMC) aircraft. The dismantled shelter shall be capable of being aircraft loaded while attached to a 463L pallet. The shelter mounted on the M1097 HMMWV, shall be capable of roll-on/roll-off loading at ramp angles of 15

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degrees on C-130 and larger AMC aircraft without special handling procedures or equipment.

3.4.3 Rotary-wing external air transport. The dismantled shelter and shelter/vehicle combination, with payload (see 3.2.1) shall be capable of being externally transported by DoD rotary wing aircraft, CH-47 and larger. At maximum loaded weight, the dismantled shelter and shelter/vehicle combination shall be capable of meeting the external air transport requirements specified in appendix A. The dismantled shelter with or without mission equipment shall also be capable of being flown under the UH-60 helicopter. The shelter, shelter/vehicle, and shelter/vehicle/trailer shall be structurally capable of meeting the requirements of interface standard MIL-STD-209 and withstanding the loads when flown in; single point, dual point, and tandem load configurations and shall show no signs of damage or degradation as a result of being flown.

3.4.4 Ground mobility. The shelter/vehicle combination, with payload (see 3.2.1), mounted on an M1097 HMMWV, shall be capable of being driven over road courses as defined by the Perryman, Churchville, and Munson courses found at Aberdeen Proving Ground, Maryland, without damage or degradation to the shelter, or damage or degradation to the vehicle, caused by the shelter. The shelter/vehicle combination shall meet U.S. and NATO countries highway legal limits.

3.4.5 Fording. The dismantled Type I shelter shall be capable of being forded to a depth of 30 inches of water, measured from the lowest part of the shelter, without structural damage, water penetration into the shelter, weight gain, or signs of seal failure.

3.4.6 Material Handling. The dismantled shelter, with payload (see 3.2.1), shall be capable of withstanding flat and rotational drops from 6 inches without structural damage, permanent deformation, or degradation. The shelter shall also be capable of being placed on an unimproved surface without structural damage, permanent deformation, or degradation.

3.4.7 Lifting and tiedown provisions. The shelter shall be provided with lifting and tiedown provisions that meet the requirements of interface standard MIL-STD-209.

3.5 Identification. The exterior of the shelter shall be permanently marked to allow the user to identify the manufacturer, Contract Number, and production unit. The dimensions which locate the center-of-gravity of the shelter in the three planes; the gross weight and mission equipment payload of the shelter; and the bearing pressure on the bottom shock elements. This information shall be visible with the shelter either mounted or dismantled from the vehicle. The location of the center-of-gravity shall be determined by the contractor using the first article unit of production with simulated mission payload.

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

4. VERIFICATION

4.1 Classification of inspections. Alternative test methods, techniques, or equipment, such as the application of statistical process control, tool control, or cost effective sampling procedures may be proposed by the contractor. Acceptable alternative verification approaches, including the use of sample testing, shall be identified in the contract. The inspection requirements specified herein are classified as follows:

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a. First article inspection. When a first article inspection is required, it shall be applied to the first article submitted in accordance with 3.1. Specific verifications to be performed shall be defined by the contract (see 6.2) and shall include any verification contained herein.

b. Conformance inspection. When a conformance inspection is required (see 6.2), specific inspections to be performed shall be defined by the contract (see 6.2) and shall include any verification contained herein.

4.2 Physical Performance Verification.

4.2.1 Weight and payload.

4.2.1.1 Weight. Compliance with 3.2.1 shall be determined by weighing the shelter, the mounting kit, and the pintle extension including their associated hardware. The scale used shall have one (1) pound or less graduation and shall have an accuracy of at least plus or minus one (1) pound. The scale shall have a current calibration, traceable to the National Institute for Standards and Technology. Any item exceeding maximum weight listed in table I shall be considered a failure.

4.2.1.2 Payload. Racks, shelves, attaching hardware, and individual weights shall be installed in the shelter to simulate a payload of 3300 lb (see 3.2.1). The simulated payload shall be distributed throughout the shelter (see 6.2). This simulated payload shall be used for all verifications which require a payload, and any failure of this payload (racks, shelves, or attaching hardware) attributable to the shelter during the course of the test shall constitute failure of the test being performed.

4.2.2 Parts interchangeability.

4.2.2.1 Spare parts. Compliance with 3.2.2.1 shall be determined by selecting two shelters from the production lot of completed shelters. The parts listed in table II shall be interchanged between the shelters. The interchange shall be accomplished by removing the fasteners, interchanging the parts and reinstalling the fasteners. Inability to interchange the parts or loss of functionality in accordance with 3.2.2.1 shall constitute failure of this test.

4.2.2.2 Interface parts. Compliance with 3.2.2.2 shall be determined by selecting one of each of the parts listed in table III from the production lot of completed shelters. The interchange shall be accomplished by removing the fasteners, interchanging the parts and reinstalling the fasteners with a government furnished shelter/vehicle combination. Inability to interchange the parts in accordance with 3.2.2.2 shall constitute failure of this test.

4.2.3 Shelter configuration. The shelter shall be inspected to determine compliance with 3.2.3. Failure to meet the requirements of 3.2.3 shall constitute failure of this test.

4.2.3.1 Shelter flatness and squareness. The following flatness and squareness tests shall be performed to determine compliance with the requirements with 3.2.3.1. Failure to meet the requirements of 3.2.3.1 shall constitute failure of this test.

4.2.3.1.1 Flatness. The flatness of the shelter panels shall be determined using a straight edge, that is at least 48 inches long, which is flat within 0.005 inches total. Two 1/8-inch shims shall be placed under the straight edge, one at each end. A series of measurements shall be taken along the length of the straight edge, in both the horizontal and vertical directions, across the shelter's interior/exterior surfaces to identify the largest cup or bow.

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4.2.3.1.2 Squareness. The shelter shall be tested in accordance with ASTM PS 27-95. For the purpose of this test, any horizontal surface shall be considered a roof/floor and any vertical surface shall be considered a wall. In those regions where a 36 inch square is impractical, a square of the appropriate size shall be used and the allowed gap shall be proportional.

4.2.3.2 Shelter dimensions. Each non-reference dimension specified on interface drawing 17-2-0035 shall be measured. Failure to meet the requirements of 3.2.3.2 shall constitute failure of this test.

4.2.3.3 Integration. The shelter shall be examined to determine compliance with 3.2.3.3. In addition, the shelter will be integrated with one or more of the systems listed in Table IV (see 4.1). After the successful integration of the shelter, threaded fasteners shall be tested. Test fixtures shall be fashioned to evaluate the shelter's ability to securely hold threaded fasteners (10-32 through 1/2-20 bolts). The test fixtures shall be fashioned to induce only a twisting load to the shelter attachment point for the torque test and, primarily, only an axial tensile load through the centerline of the shelter attachment point for the pull-out test. Reaction forces applied by the pull-out test fixture onto the shelter surface shall be outside a three inch (3) radius measured from the center line of the fastener being tested. Failure to meet the requirements of 3.2.3.3 shall constitute failure of this test.

4.2.3.3.1 Torque. To determine compliance, a torque load equal to 8 ft-lb for the 10-32 bolt and 10 ft-lb for the other bolts shall be applied to two identical fasteners of each size (1 horizontal, 1 vertical) installed in the shelter, fasteners used to integrate the system (see 4.2.3.3) should be used where possible. Failure to meet the torque requirements of 3.2.3.3 shall constitute failure of this test.

4.2.3.3.2 Pull-out. To determine compliance, a tensile load equal to 800 lbs for the 10-32 bolt and 1000 lbs for the other bolts shall be applied to two identical fasteners of each size (1 horizontal, 1 vertical) installed in the shelter, fasteners used to integrate the system (see 4.2.3.3) should be used where possible. Failure of meet the pullout requirements of 3.2.3.3 shall constitute failure of this test.

4.2.4 Chemical and biological (CB) resistance. To determine compliance with the requirements of 3.2.4, it shall be verified that the shelter is finished in accordance with MIL-T-704 types F or G, or that the finish meets the test methods (or equivalent) in MIL-T-704 types F or G.

4.2.5 Pressurization. Air shall be supplied to the shelter, in operational configuration, with all appropriate openings closed, and an internal pressure of 1.2 inch water gauge shall be obtained and maintained. The air pressure and air flow shall be stabilized. Any additional air supplied to maintain specified internal pressure shall be recorded to determine compliance with 3.2.5. The Type II shelter shall have the ventilation port opened and the internal pressure reduced to .75 iwg and maintained. The air pressure and air flow shall be stabilized. Any additional air supplied to maintain specified internal pressure shall be recorded. Failure to meet the requirements of 3.2.5 shall constitute failure of this test.

4.2.5.1 Ventilation port. The ventilation port shall be inspected. Failure to meet the requirements of 3.2.5.1 shall constitute failure of this test.

4.2.6 Roof loads. The shelter roof shall be subjected to a uniform load of 40 pounds per square foot (lb/ft^2) over the entire surface. After removal of the uniform load, a 660 lb load over a 1 ft x 2 ft area at the weakest area of the roof shall be applied. Each test shall be for a duration of 5 minutes. Failure

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to meet the requirements of 3.2.6 both during the test and subsequent removal of the load shall constitute failure of this test.

4.2.7 Floor loads. The shelter's floor shall be uniformly loaded to 65 lb/ft² for 30 minutes. Prior to removal of the uniform load, all moveable parts shall be operated to ensure no interference exists between components. After completion of the above test, the uniform load shall be removed and a concentrated 1000 lb load shall be applied over a 1 foot (ft) by 2 ft area centered on the floor and left in position for 30 minutes. The 2 ft dimension shall be parallel to the shelter's sidewall. Prior to removal of the concentrated load, all movable parts shall be operated to ensure no interference exists between components. After completing both of the above tests, the concentrated load shall be removed and a load of 125 lb, balanced atop a 1 square inch (in²) block, shall be applied for 5 minutes to the center of the floor. Failure to meet the requirements of 3.2.7 shall constitute failure of this test.

4.2.8 Door.

4.2.8.1 Door handle. The shelter door shall be securely closed. A 48 lb load shall be applied to the door handle in the direction which best facilitates opening the door. After it has been verified that 48 lb is adequate to open the door, the door shall be closed and a 48 lb force applied in the direction which best facilitated the securing of the door. After it has been verified that 48 lb is adequate to secure the door, the outer door handle shall be locked and the above procedure shall be repeated. Failure to meet the requirements of 3.2.8.1, shall constitute failure of this test.

4.2.8.2 Door structure and hinge assembly. The door shall have a 200 lb static load applied parallel to the hinge line, along the door edge opposite the hinge, with the door open to 90 degrees. After 30 minutes the load shall be removed and the door examined. Failure to meet the requirements of 3.2.8.2 shall constitute failure of this test.

4.2.8.3 Door stop. This test shall be performed with the door in the open position, held by the door stop mechanism. A fixture shall be attached to the midpoint of the edge of the door opposite from the hinge which shall permit the application of a load equivalent to 10 lb/ft² times the largest surface area of the door, normal to the door's surface, using free running pulleys and a 1/4 inch diameter steel cable to transmit the load. Failure to meet the requirements of 3.2.8.3 shall constitute failure of this test.

4.2.8.4 Door maintainability. The door shall be inspected to ensure compliance with 3.2.8.4. Failure to meet the requirements of 3.2.8.4 shall constitute failure of this test.

4.2.8.5 Door drip edge. The door shall be inspected to ensure compliance with 3.2.8.5. Failure to meet the requirements of 3.2.8.5 shall constitute failure of this test.

4.2.9 Ladder. The ladder shall be attached to the shelter which is mounted on an M1097 HMMWV or to a mounting surface which simulates the M1097 HMMWV, according to the contractors attaching instructions. A 400 lb load shall be applied for 5 minutes in the location which shall cause the greatest amount of stress to the ladder. The ladder shall not be damaged or deformed. Failure to meet the requirements of 3.2.9 shall constitute failure of this test.

4.2.10 Roof Hatch. The roof hatch shall be inspected to ensure compliance with 3.2.10. Failure to meet the requirements of 3.2.10 shall constitute failure of this test.

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4.2.11 Impact resistance. A hand tool as defined in 3.2.10 shall be selected and shall be allowed to freefall from a height of 30 inches onto the floor surface of the shelter. Failure to meet the requirements of 3.2.11 shall constitute failure of this test.

4.2.12 Roof access steps/handholds. A vertical load of 400 lbs. shall be applied one step at a time to the outer most point of each deployed step and maintained for 30 seconds. The access steps/handholds shall be evaluated for compliance with 3.2.12. Failure to meet the requirements of 3.2.12 shall constitute failure of this test.

4.2.13 Interface requirements. The interfaces shall be evaluated for compliance with the interface drawings listed in 3.2.13. Failure to meet the requirements of 3.2.13 shall constitute failure of this test.

4.3 Environmental Performance Verification.

4.3.1 Marine atmosphere. The shelter, in the operational and storage mode, shall be exposed to a marine atmosphere and tested in accordance with ASTM 27-95, paragraph 10.10. Failure to meet the requirements of 3.3.1 shall constitute failure of this test.

4.3.2 Electromagnetic interference (EMI). The shelter shall be tested in accordance with IEEE STD 299-1991 except that the measurements shall be made at 150 kHz and 14 Mhz in the H-field and 400 MHz, 1 GHz, and 10 GHz in Plane Wave. Failure to meet the requirements of 3.3.2 shall constitute failure of this test.

4.3.3 Climatic range.

4.3.3.1 Temperature range. The shelter shall be tested in accordance with PS 27-95, paragraph 10.11. Failure to meet the requirements of 3.3.3.1 shall constitute failure of this test.

4.3.3.2 Temperature shock. The shelter shall be tested in accordance with test method standard MIL-STD-810, Method 503.3. Failure to meet the requirements of 3.3.3.2 shall constitute failure of this test.

4.3.3.3 Solar load. The shelter shall be tested in accordance with PS 27-95, paragraph 10.12. Failure to meet the requirements of 3.3.3.3 shall constitute failure of this test.

4.3.3.4 Sunshine (ultraviolet effects). The shelter's exterior components subject to solar exposure shall be tested in accordance with test method standard MIL-STD-810, Method 505.3, procedure 1. Failure to meet the requirements of 3.3.3.4 shall constitute failure of this test.

4.3.3.5 Humidity. The shelter shall be tested for daily exposure of up to 97% relative humidity for 20 hours and exposure of 100% relative humidity (with condensation) for 4 hours in accordance with test method standard MIL-STD-810, Moisture Resistance Test, Method 507, procedure II, cycles 4 or 5. After cycling has been completed the shelter shall be inspected. Failure to meet the requirements of 3.3.3.5 shall constitute failure of this test.

4.3.4 Heat transfer. The shelter shall be tested in accordance with PS 27-95, paragraph 10.14. Failure to meet the requirements of 3.3.4 shall constitute failure of this test. The Type II and III shelters may have the tunnel openings closed off for this test.

4.3.5 Blowing dust/sand. The shelter shall be tested in accordance with test method standard MIL-STD-810, Method 510.1, procedure I except the sand particle size shall be as specified in table VI

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TABLE VI. Sand Particle Size

SIZE	PERCENT PASSING MESH SCREEN
1000 microns	100% passing mesh screen
500 microns	98 ± 2% passing through mesh screen
150 microns	90 ± 2% passing through mesh screen

The second 6-hour test (step 3 of Method 510.1) at 145° F (63° C) shall be performed immediately after reaching stabilization in step 2 of procedure I. Subsequent to testing, all exposed hardware shall be operated. Failure to meet the requirements of 3.3.5 shall constitute failure of this test.

4.3.6 Watertightness. The shelter shall be tested in accordance PS 27-95, paragraph 10.37.1. The shelter shall be weighed after the test in accordance with 4.2.1.1. Failure to meet the requirements of 3.3.6 as measured within the tolerance of the scales shall constitute failure of this test.

4.3.7 Detectability.

4.3.7.1 Color and camouflage. The shelter shall be inspected to determine conformance with the color and pattern as specified in 3.3.7.1. Failure to meet the requirements of 3.3.7.1 shall constitute failure of this test.

4.3.7.2 Blackout. The shelter shall be tested in accordance with PS 27-95, paragraph 10.8. Failure to meet the requirements of 3.3.7.2 as determined by an observer detecting rays of light, shall constitute failure of this test..

4.4 Transportability Performance Verification.

4.4.1 Rail transport. The dismantled shelter and shelter/vehicle combinations, with a simulated payload (see 4.2.1.2), shall be tested in accordance with test method standard MIL-STD-810, Method 516.4, Procedure VIII, rail impact test. When secured to the flatcar, the shelter and shelter vehicle combinations shall then be inspected for conformance to Gabarit International de Chargement (GIC) gauge envelope as shown in interface standard MIL-STD-1366. Failure to meet the requirements of 3.4.1 shall constitute failure of this test.

4.4.2 Fixed-wing air transport test. The shelter and shelter/vehicle combinations, with a simulated payload (see 4.2.1.2), shall be tested for compliance with 3.4.2. MIL-STD-1791 shall be used for guidance in conducting this test. Failure to meet the requirements of 3.4.2 shall constitute failure of this test.

4.4.3 Rotary-wing air transport test. The shelter and shelter/vehicle combinations, with a simulated payload (see 4.2.1.2), shall be tested in accordance with interface standard MIL-STD-209 and Appendix A. Failure to meet the requirements of 3.4.3 shall constitute failure of this test.

4.4.4 Ground mobility. The shelter/vehicle combination, with a simulated payload (see 4.2.1.2), shall be tested for compliance with 3.4.4. MIL-M-8090, Type V Mobility, shall be used as guidance for this test. Failure to meet the requirements of 3.4.4 shall constitute failure of this test.

4.4.5 Fording. The dismantled type I shelter shall be immersed in water to a depth of 30 ± 1/2 inches, measured from the lowest part of the shelter, for a period of 30 minutes. Afterwards, the shelter shall be weighed in accordance with 4.2.1.1. Failure to meet the requirements of 3.4.5 as measured within the tolerance of the scales shall constitute failure of this test.

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4.4.6 Material Handling. The dismantled shelter shall be tested in accordance with 4.4.6.1, 4.4.6.2, and 4.4.6.3 to determine compliance with 3.4.6.

4.4.6.1 Flat-drop. The shelter, with a simulated payload (see 4.2.1.2), shall be tested in accordance with PS 27-95, paragraph 10.33, except the drop height shall be 6 inches. Failure to meet the requirements of 3.4.6 shall constitute failure of this test.

4.4.6.2 Rotational drop. The shelter, with a simulated payload (see 4.2.1.2) shall be tested in accordance with PS 27-95, paragraph 10.34, except the drop height shall be 6 inches. Failure to meet the requirements of 3.4.6 shall constitute failure of this test.

4.4.6.3 Shelter placement. A 1.5 inch high cube shall be placed on a flat surface. The shelter with a simulated payload (see 4.2.1.2) shall be lowered onto the surface over the cube. Failure to meet the requirements of 3.4.6 shall constitute failure of this test.

4.4.7 Lifting and tiedown provisions. The shelter's lifting and tiedown provisions shall be inspected and tested for conformance to interface standard MIL-STD-209 and compliance with 3.4.7. Failure to meet the requirements of 3.4.7 shall constitute failure of this test.

4.5 Identification. The shelter shall be inspected to verify the requirements of 3.5. Failure to meet the requirements of 3.5 shall constitute failure of this test.

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's 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'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 which may be helpful, but is not mandatory.)

6.1 Intended Use. These shelters are highly mobile multipurpose shelters. They are suited for housing electronics and communications equipment. They can be mounted on the vehicles listed in 1.1. Type II shelter is intended for use with the Standardized Integrated Command Post System (SICPS) Rigid Wall Shelter (RWS). These shelters are not intended for airdrop.

6.2 Acquisition Requirements. Acquisition documents must specify the following:

- a. Title, number and date of the specification.
- b. Quantities and types of shelters (see 1.2).
- c. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).
- d. Requirements for first article and conformance inspection, including number of shelters, inspection lot size, sample size, specific

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- verification test to be performed and sequence of tests (see 3.1, 4.1, 6.3).
- e. Drawings of the System Integration Configurations (see 3.2.3.3) should be provided. If additional System Integration Configurations are required they should be included in the contract or purchase order.
 - f. If standard color and camouflage are not required, then alternate color and camouflage with verification procedures must be specified (see 3.3.7.1).
 - g. Payload distribution, rack layout/design, and/or center of gravity (see 3.2.1, and 4.2.1.2)
 - h. Packaging requirements (see 5.1).

6.3 First Article When a first article is required (see 6.2), it should be inspected and approved under the appropriate provisions of Federal Acquisition Regulation (FAR). The contracting officer should include specific instructions in all acquisition documents regarding arrangements for inspection and approval of the first article.

6.4 Technical Manuals The requirement for technical manuals should be considered when this specification is applied on a contract. If technical manuals are required, specifications and standards that have been cleared and listed in DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL) must be listed on a separate Contract Data Requirements List (DD Form 1423), which is included as an exhibit to the contract. The technical manuals must be acquired under a separate contract line item in the contract.

6.5 Subject term (key word) listing

Command post
 Electronics
 EMI shield
 HMMWV
 Multipurpose
 SICPS

Custodians:

Army - GL
 Air Force - 99

Preparing activity:

Army - GL

Review Activities:

Army - AT, AV, CR, MT
 Air Force - 80
 DLA - CC
 Navy - MC

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APPENDIX A

REQUIREMENTS FOR THE CERTIFICATION OF
EXTERNALLY TRANSPORTED MILITARY EQUIPMENT BY
DEPARTMENT OF DEFENSE ROTARY WING AIRCRAFT

A.1 SCOPE

A.1.1 Scope. This appendix establishes the general and detailed requirements for the certification of externally transported military equipment by Department of Defense rotary wing aircraft. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

A.2 GENERAL REQUIREMENTS

A.2.1 Slinging provisions.

A.2.1.1 Number. The number of slinging provisions shall conform to the requirements as specified in the current revision of MIL-STD-209.

A.2.1.2 Location of lift provisions. The location of slinging provisions shall conform to the requirements as specified in the current revision of MIL-STD-209.

A.2.1.3 Dimensions. Slinging provisions shall conform to the dimensions as specified in the current revision of MIL-STD-209.

A.2.1.4 Frame attachments. Frame members should not be used as lifting points, unless specifically designed for that purpose. Frame members designated for lifting shall meet the structural requirements of the proof load testing section (see A.3.2) and shall provide a means of restricting movement of the sling legs along the frame member.

A.2.1.5 Spreader bars. Spreader bars must be certified for use in EAT by the U.S. Army Natick Research, Development, and Engineering Center. Spreader bars must meet the requirement:

- a. Spreader bars or other load spreading equipment must be specified in the new equipment specification.
- b. Stowage provisions must be provided on the item by the contractor to ensure such devices remain with the item.
- c. Wooden spreader bars and/or other devices which are to be locally fabricated shall not be permitted under any circumstances.
- d. All devices shall meet the structural requirements of A.3.2.4.

A.2.2 Rigging procedures.

A.2.2.1 Sling sets. The following standard military sling sets and components shall be used for rigging:

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TABLE I. Military Sling Sets

SLING SET IDENTIFICATION			SLING LEG CHARACTERISTICS		
SERVICE	CAPACITY	NSN	LIMIT LOAD	LENGTH	TYPE
ARMY	10,000 LBS	1670-01-027-2902	11,300 LBS	12-16 FT	ROPE
ARMY	25,000 LBS	1670-01-027-2900	22,500 LBS	12-16 FT	ROPE
MARINE CORPS	15,000 LBS	1670-00-902-3080	26,700 LBS	15-18 FT	WEB
MARINE CORPS	40,000 LBS	3940-01-183-2118	39,800 LBS	12-16 FT	ROPE

A.2.2.2 Minimum sling leg clearance. The following clearances are required between sling legs and the item of equipment. If minimum clearances cannot be met, padding of the sling legs and/or proof load testing of potential contact area will be required, in accordance with the proof load testing section (see A.3.2).

A.2.2.2.1 Rope type sling legs. A minimum clearance of 1 inch must be maintained between rope type (round cross section) sling legs and the load.

A.2.2.2.2 Webbing type sling legs. A minimum clearance of 8 inches must be maintained between webbing type (flat cross section) sling legs and the load.

A.2.2.3 Non-standard lifting components. Non-standard (non-type classified) lifting components are not permitted unless approved by U.S. Army Natick Research, Development, and Engineering Center and specified in the new equipment specification.

A.2.2.4 Drag inducing devices. Drag inducing devices such as drogue chutes are not permitted unless approved by U.S. Army Natick Research, Development, and Engineering Center.

A.2.2.5 Tandem sling loads. The following requirements shall apply to all items of equipment rigged as tandem sling loads:

- a. Each individual item of equipment shall meet the requirements of this standard.
- b. All devices required and used for attaching tandem sling loads together must meet the structural requirements of this standard and shall be proof load tested in accordance with the requirements in A.3.2.
- c. All tandem sling loads require flight testing in the tandem rigged configuration.

A.2.3 Static lift testing. Static lift testing is required for each proposed lifting configuration, in accordance with A.3.1. Static lift testing consists of lifting the item in the proposed rigging configuration to verify sling leg clearances and to determine sling leg angles and lift point loading.

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A.2.4 Proof load testing. Proof load testing is required for all slinging provisions, interference points, and load bearing components required for lifting, in accordance with A.3.2. Proof load testing consists of a static pull test or compression test of each slinging provision or component to verify structural adequacy.

A.2.5 Flight testing. Flight testing is required for each item in its proposed lifting configuration by each specified aircraft in accordance with section A.3.3.

Flight maneuvers shall be performed and test results documented in accordance with the Multi-Service Flight Data Collection Sheet (MSFDCS).

A.3 DETAILED REQUIREMENTS

A.3.1 Static lift testing. The following requirements shall apply to all static lift testing:

- a. The item shall maintain stability while suspended in the rigged configuration.
- b. The maximum sling leg tension (static load times the materiel lift point load factor) shall not exceed the sling leg design limit load as specified in table I for the proposed sling set. The static load is determined by the static lift test or by mathematical analysis. All load calculations shall be performed using the sling leg angles of the proposed rigging configuration.
- c. The sling legs shall meet the clearance requirements of A.2.2.2. Structural members which contact a sling leg in the rigged configuration must be proof load tested, in accordance with A.3.2.
- d. For dual point configurations, the weight distribution of the item shall meet the dual point weight balance requirements of the specified lifting aircraft (e.g. no more than 60 percent of the total load on either hook for the CH-53E helicopter).

A.3.2 Proof load testing.

A.3.2.1 Materiel lift point load factor. The materiel lift point load factor is calculated using table II and is a function of the External Air Transport Weight (EATWT) and the EATWT/ Maximum Projected Frontal Area (MPFA) (See Figure 1) ratio. For items of equipment with cargo carrying capability, the materiel lift point load factor shall be calculated for the minimum and maximum possible EATWT (e.g. curbweight and gross vehicle weight).

- a. For an EATWT/MPFA ratio of greater or equal to 60 pounds per square foot, the materiel lift point load factor is a function of EATWT in accordance with table II.
- b. For an EATWT/MPFA ratio between 45 and 60 pounds per square foot, the materiel lift point load factor of table II is increased by $[0.16 \times (60 - (\text{EATWT}/\text{MPFA}))]$.

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- c. For an EATWT/MPFA ratio of less than or equal to 45 pounds per square foot, the materiel lift point load factor of table II is increased by 2.4.

TABLE II. Calculation of materiel lift point load factor.

<u>EATWT,</u> <u>MPFA</u>	<u>LB</u> <u>FT²</u>	<u>EATWT, LB</u>	<u>MATERIEL LIFT POINT LOAD FACTOR</u>
≥ 60		5,000	3.5
≥ 60		5,001 - 15,000	3.2
≥ 60		15,001 - 36,000	3.2-(0.000038 X(EATWT - 15,000))

A.3.2.2 Calculation of the design limit load. The design limit load is the maximum resultant product of the materiel lift point load factor multiplied by the static load for the worst case loading condition.

A.3.2.3 Proof load testing requirements. Proof load testing consists of a static pull test or compression load test, to the design limit load of A.3.2.2, in accordance with the requirements in the current revision of MIL-STD-209. The following requirements shall also apply to all proof load testing for EAT certification:

- a. The application of proof load shall be in the direction of the sling leg when the item is in its' proposed rigged configuration.
- b. All structural members which contact the sling legs must be compression tested to the actual contact load times the Material Lift Point Load Factor.
- c. Load spreading devices or structures, subject to compressive buckling, must be compression tested to 1.5 times Design Limit Load without failure.

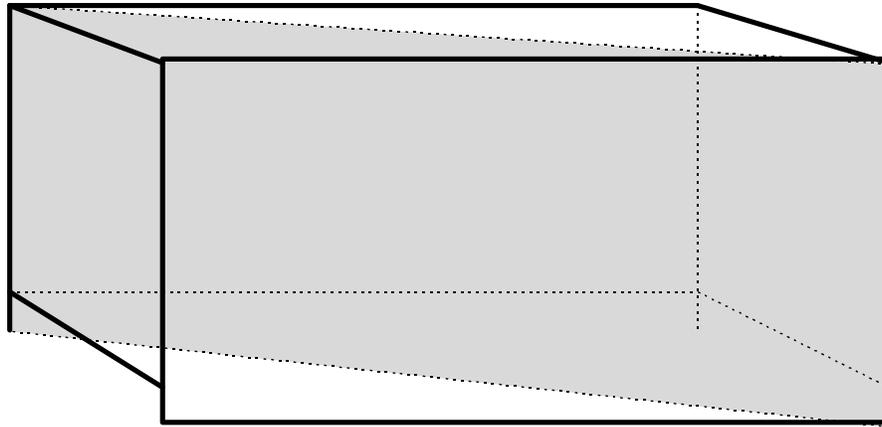
A.3.2.4 Ultimate load verification. Analysis and/or testing must be performed to verify ultimate load capability.

A.3.3 Flight testing. The following requirements shall apply to all flight testing:

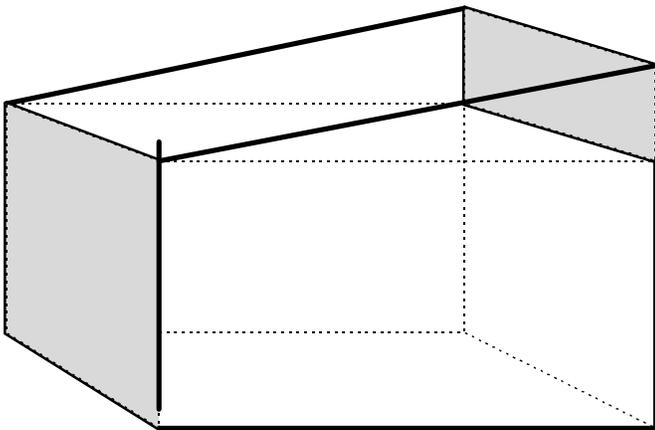
- a. All maneuvers specified by the Multi-Service Flight Data Collection Sheet (MSFDCS) shall be performed.
- b. The item shall demonstrate stability during all maneuvers performed during the flight test.
- c. The item shall not sustain any damage due to flight and shall be fully operational upon completion of the flight test.
- d. The results of the flight test shall be documented on the MSFDCS.

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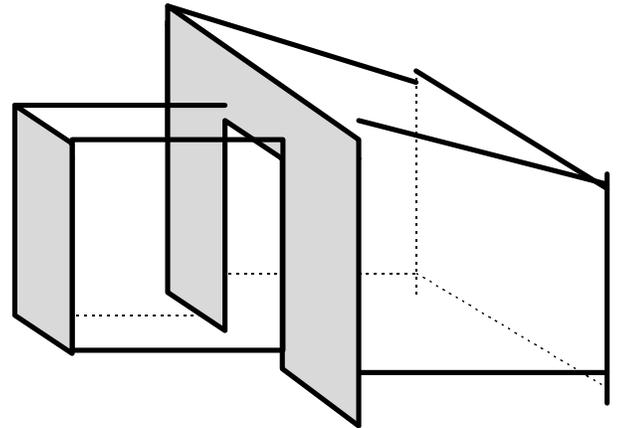
Maximum Projected Frontal Area (MPFA) denoted by shaded areas



Single point lift (all directions of flight)



Dual point lift



Tandem load (dual point lift)

←-----
Direction of flight

FIGURE 1. MAXIMUM PROJECTED FRONTAL AREA (MPFA)

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-44408C

2. DOCUMENT DATE (YYMMDD)
961031

SHELTER, ELECTRICAL EQUIPMENT, LIGHTWEIGHT

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) AUTOVON
(if applicable)

7. DATE SUBMITTED
(YYMMDD)

8. PREPARING ACTIVITY

a. NAME

U.S. ARMY SOLDIERS SYSTEMS COMMAND

b. TELEPHONE (Include Area Code)

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