

INCH-POUND

MIL-PRF-32504

30 September, 2014

PERFORMANCE SPECIFICATION

MODULAR LARGE AREA MAINTENANCE SHELTER (MLAMS)

TYPES:

AVIATION (A), VEHICLE (V), STORAGE (S)

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

1.1 **SCOPE:** This performance specification identifies the minimum functional capabilities required for the overall system and the key subsystems. The Modular Large Area Maintenance Shelter (MLAMS) types Aviation (A), Vehicle (V) and Storage (S), are intended for military use as tactical field maintenance facilities for field repair and maintenance of Army helicopters (Type A), some fixed wing aircraft (Type A), ground vehicles (Type V) and general storage (Type S) respectively.

1.2 **CLASSIFICATION:** MLAMS will be of the following types:

Type A: Aviation

Type V: Vehicle

Type S: Storage

Comments, suggestions, or questions on this document should be addressed to: Force Provider Sustainment Programs, TACOM-Integrated Logistics Support Center (ILSC), Soldier-Product Support Integration Directorate (PSID), U.S. Army Natick Soldier Systems Center Natick MA 01760 or email Joseph.m.kleinfeldt.civ@mail.mil. 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>.

AMSC N/A

FSC: 5410

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MIL-PRF-32504

2. APPLICABLE DOCUMENTS

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

2.2 GOVERNMENT DOCUMENTS: None

2.2.1 SPECIFICATIONS, STANDARDS AND HANDBOOKS: The following specifications, standards and handbooks form a part of this document to the extent specified herein.

FEDERAL STANDARDS:

FED-STD-4	-	Federal Standard: Glossary of Fabric Imperfections
FED-STD-191	-	Federal Standard: Textile Test Methods
FED-STD-595/33466	-	Tan, Camo
FED-STD-595/17925	-	White, Untinted
MIL-PRF 44103	-	Performance Specification, Cloth, Fire, Water and Weather Resistant
MIL-DTL-22992	-	Connectors, Plugs and Receptacles, Electrical, Waterproof, Quick Disconnect, Heavy Duty Type, General Specification For
MIL-STD 810	-	Environmental Engineering Considerations And Laboratory Tests Part 3 Table 1

(Copies of these documents are available online at <http://quicksearch.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 1911-5094).

DEPARTMENT OF DEFENSE STANDARDS:

DoD 4140.65	-	Issue, Use, and Disposal of Wood Packaging Material
DoD 4140.01	-	Supply Chain Materiel Management Policy

(Copies of these documents are available online at <http://www.dtic.mil>)

2.2.2 OTHER GOVERNMENT DOCUMENTS, DRAWINGS AND PUBLICATIONS: None

2.3 NON-GOVERNMENT: 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.

American Society for Testing and Materials (ASTM)

ASTM D751	-	Standard Test Methods for Coated Fabrics
ASTM D2136	-	Low Temperature Bend Test

MIL-PRF-32504

- ASTM D6413 - Standard Test Method for Flame Resistance of Textiles (Vertical Test)
 - ASTM D7478/D7478M - Standard Specification for Heavy Duty Sheathed Wood Crates
 - ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
 - ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
 - ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
- (Copies of these documents are available online at www.astm.org)

American Association of Textile Chemists and Colorists (AATCC) 169
(Copies of this document are available online at www.aatcc.org)

International Protection Codes (IP) – International Electrotechnical Commission
(Copies of this document are available online at www.iec.ch)

National Electric Code (NEC) – Article 210, Branch Circuits
(Copies of this document are available online at www.nfpa.org)

National Fire Protection Association (NFPA) 701
(Copies of this document are available online at www.nfpa.org)

Unified Facilities Criteria (UFC) 3-600-01 Section 2-5 “Means of Egress”
(Copies of this document are available online at www.wbdg.org)

2.4 ORDER OF PRECEDENCE PUBLICATIONS: 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 supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Operating requirements: The Modular Large Area Maintenance Shelter – Aviation (Type A), the Modular Large Area Maintenance Shelter – Vehicle (Type V) and the Modular Large Area Maintenance Shelter – Storage (Type S) shall be portable, temporary facilities of modular construction to support Army rotary and fixed wing (Type A), vehicle maintenance (Type V) and general storage (Type S) in forward operational areas without fixed facilities. The structure shall be a pre-engineered unit requiring no on-site fabrication or welding to install, strike, or relocate. This applies to structural frame components,

MIL-PRF-32504

fabric and accessories. The structure shall be fully re-locatable, allowing for disassembly and reuse of all components (except anchors) without any additional fabrication, welding of structural components or replacement of fabric. Shelter shall not require the use of Material Handling Equipment (MHE) for installation or disassembly. The MLAMS Type A, Type V and Type S shall provide an unobstructed and weatherproof covered area with no internal posts or supports. The Type A interior dimensions shall allow adequate vertical clearance for removing CH-47 rotor blades, hubs and shafts and mast mounted sights, allowing enough lateral clearance to rotate rotor systems 360 degrees under blackout conditions. The basic MLAMS components are considered to be as a minimum; the structural members; weather barrier fabric; insulation kit (if applicable); shelter erection kit; lighting and electrical system; ventilators; shelter anchoring system; operators manual; and shipping containers. The shelter shall allow for all fabric shell panels and optional inner liner fabric panels to be replaced or removed individually with the structure erected without the need to deconstruct the shelter or completely unrestrain the arch base plates. The fabric panels for the main bays of the structure shall be designed so the installation and removal can be accomplished with all personnel on the ground. No fabric welding or heat-sealing may be used to complete shelter fabric installation. The MLAMS is required to meet human factors and environmental considerations as described in this document.

3.1.1 Physical Characteristics: The shelter arch structural members to be fabricated from lightweight corrosion resistant materials. The shelter frames for the Type A, V and S shall be capable of converting from one type to another through the addition or subtraction of components. The shelter shall be modular in design, allowing for extended lengths via addition or matching arch structures. Shelter to include external engineered system designed to resist water intrusion at the arch assembly joints and the arch/fabric interface. All shelter support cabling shall be designed, fitted and provided with preassembled or easily assembled terminal fittings equal to or greater than 80% of the catalog breaking strength of the cable. All exterior hardware components and fittings, both metal and plastic, visible from the exterior of the shelter, shall have no color requirements other than absence of polished or bright reflective surfaces.

3.1.1.1 Recycled, recovered, environmentally preferable, or biobased materials: Recycled, recovered, environmentally preferable, or biobased 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.

3.1.1.2 Dimensions: Each of the Modular Large Area Maintenance Shelters shall have the following center line dimensions:

TABLE I. Centerline dimensions for MLAMS

Type	Width (ft)	Length (ft)	Eave Height (ft)	Peak Height (ft)
Aviation (Type A)	75 ^{+5, -2ft}	192 ^{+4, -5ft}	15 ^{+3.5, -1.5ft}	31 ^{+5, -0ft}
Vehicle (Type V)	75 ^{+5, -2ft}	128 ^{+7, -3ft}	15 ^{+3.5, -1.5ft}	31 ^{+5, -0ft}
Storage (Type S)	45 ^{+5, -2ft}	62 ^{± 4ft}	14 ^{± 1ft}	23 ^{± 2.5ft}

MIL-PRF-32504

3.1.2 Shelter Erection: The MLAMS shall be capable of being set up by a maximum of ten (10) soldiers in 60 working hours exclusive of site preparation under ideal conditions. The shelter shall be capable of being erected, operated or taken down from -25°F to +120°F (Basic Cold C1 to Hot A1) conditions. Operators shall be able to erect, strike, pack, adjust the shelter, enter, exit, open and close shelter doors and flaps while wearing cold weather garments.

3.1.2.1 Shelter Erection Kit: The shelter shall include all tools, manuals and technical drawings required for assembly. The erection kit must be of such size and configuration to fit into an ISO shipping container.

3.1.2.2 Shelter Assembly: The shelter shall have individual fabric panels which are installed between the structural arches. Any shelter which utilizes a single fabric panel which spans between multiple arches or across the entire structure will not be considered. The shelter's fabric shall be tensioned without the need to completely unrestrain the base plates from an anchoring point. For safety purposes, all fabric panels shall become integral with the frame during installation so that unexpected winds during installation cannot lift the fabric away from the frame. The shelter's Main Bay and End Wall or End Door System exterior fabric panels shall be capable of being installed or removed with the arches erected and anchored to the ground without removing or loosening purlins and roof cables.

3.1.2.3 Anchoring system: The structure shall be designed and provide for installation on concrete, dirt, grass or asphalt with an anchoring system suitable for all the required loads. The number, size and strength of the anchors shall be adequate to meet the wind and roof load requirements. All anchors shall be self-locking with no glue or adhesives necessary to develop full load capacity. The anchoring system shall include a powered anchor driving machine with all accessories necessary for driving anchors included. Note: Often times the only fuel available in a field environment will be JP-8 Aviation fuel. If any fuel is necessary for the operation of the anchor driving device, the device must be capable of operation using JP-8 fuel.

3.1.2.4 Strike, Pack and Package: The basic MLAMS shall be capable of being struck using the operator manual and the shelter erection kit and packed into ISO shipping containers by a maximum of ten (10) average soldiers in 480 man hours or less. Each shelter shall be packed into shipping container(s) 20'L x 8'W x 8.5'H for shipment. The containers shall be in "like new" condition and International Convention for Safe Containers (CSC) certified. All wood certification markings shall be in compliance with Wood Preservation Marking (WPM) in accordance with DOD 4140.65. With the exception of the frame members, large components, or groups of small components separately packaged, shall be packed in crates conforming to ASTM D7478/D7478M, "Standard Specification for Heavy Duty Sheathed Wood Crates" Type II, Class 1, Style A, unless otherwise stated in the solicitation.

MIL-PRF-32504

3.1.3 Entry and exit:

3.1.3.1 Personnel Doors: There shall be a minimum of two (2) Personnel doors, each with dimensions of 6'-6" high x 3'-0" width. These doors shall have a security entry lock, with internal Safety Bar operation and equipped with exit signage in accordance with the Unified Facilities Criteria (UFC) 3-600-01 Section 2-5, "Means of Egress". They shall be outward opening, with a closer or incorporated door stop. The door and assemblies shall be engineered to withstand 90 mph wind load. Personnel doors shall be located on opposing walls of the shelter.

3.1.3.2 End Doors, M-LAMS Type A specific: There shall be one each Full Width Door (FWD) installed on each end of the shelter. The FWD fabric shall be installed between the end door arches. Any shelter which utilizes a single end door fabric panel which spans between multiple arches or across the entire end door will not be considered. Each FWD shall be operated by one (1) electric winch. Each electric winch shall be operated using 110/208V AC power. Each electric winch shall be independently powered from the shelter's electrical system. Each winch shall be capable of being installed a minimum of 30 inches above grade. The full width opening doors shall have the capability to be manually opened and closed should the electrical system fail to deliver power to the winches. Each electric winch shall have one (1) weather proof motor controlled with a minimum 12 foot cord. Each electric winch shall incorporate an automatic stop mechanism to limit FWD travel or over-tensioning of FWD lifting cables.

3.1.3.3 End Walls, MLAMS Type V and S specific:3.1.3.3.1 MLAMS Type V Specific

3.1.3.3.2 The MLAMS end walls shall be flat walls. The shelter shall include One (1) Metal Roll-up door or one (1) Fabric Sliding door with dimensions of 16 ft ^{+/- 1ft} width x 16 ft ^{+/- 1ft} height located on each end wall of the shelter.

3.1.3.4 MLAMS Type S Specific

3.1.3.4.1 The MLAMS-S end walls shall be flat walls. The shelter shall include One (1) Metal Roll-Up door or one (1) Fabric Sliding door with dimensions of 12 ft ^{+/- 1ft} width x 12 ft ^{+/- 1ft} height located on each end wall of the shelter.

3.1.3.5 Metal Roll-Up Doors (RUD) or Fabric Sliding Doors: Each RUD or Fabric Sliding Door shall be manually operated from the ground. Each RUD or Fabric Sliding Door shall withstand 90 mph sustained wind load.

3.1.4 Blackout Protection: The shelter shall prevent detectable light leakage through the shelter outer fabric cover, vents, door openings and shall provide blackout protection on level and varying terrain at 1,000 feet to the naked eye when using the general illumination lighting system supplied with the shelter.

MIL-PRF-32504

The shelter shall also provide additional blackout capability when viewed by night vision devices at a distance of 1,650 feet while using the general illumination lighting system supplied with the shelter.

3.1.5 Shelter weather barrier: The shelter fabric shall meet the requirements in Table II – Fabric Requirements. The shelter shall be constructed of tear resistant PVC coated synthetic scrim material weighing 24 (+/- 2) oz/yd and strong enough to meet the structural requirements of the shelter. See Section 3.1.5.1 All of the shelter’s fabric materials shall meet Berry Amendment requirements. The shelter’s fabric exterior color shall match Tan # 33446 and the interior shall match White, Untinted #17925 - both as per FED-STD 595C.

3.1.5.1 Shelter Fabric Specifications:**Table II. Fabric requirements**

Item	Standard
Base Fabric Type	Polyester
Base Fabric Weight (nominal)	5.0 oz/yd ²
Finished Coated Weight ASTM D751	24 oz/yd ² +/- 2oz/yd ²
Tongue Tear ASTM D751	8” x 10” sample @ 12 in/min 160/160 lb _f
Trapezoid Tear ASTM D751	50/60 lb _f
Grab Tensile ASTM D751	375/350 lb _f
Strip Tensile ASTM D751 Procedure B	300/275 lb _f /in
Adhesion ASTM D751 Dielectric Weld	10 lb _f /in
Hydrostatic Resistance ASTM D751 Procedure A	500 psi
Dead Load ASTM D751	2 inch seam, 4 hour, 1 inch strip 106 lb _f @ room temperature 53 lb _f @ 160 ⁰ F
Low Temperature ASTM D2136 LTC 1/8” mandrel, 4 hr LTC	Pass -40 ⁰ F

MIL-PRF-32504

Table II. Fabric Requirements – continued

Item	Standard
Flame Resistance ASTM 6413, ASTM E84 flame spread index < 25, smoke development rating < 450	Char: Max 50% After Flame: Max 2 seconds After Glow: Max 2 seconds
Opacity MIL-PRF-44103	Shall not transmit more than 0.020 foot-lamberts of visible light
Color Federal Standard 595C	Exterior: # 33446, Tan Interior # 17925 White, Untinted
Berry Amendment	Fabric must comply with Berry Amendment
Top Coat Composition, Dry Film Thickness	PVDF or Acrylic High Performance Film, 0.00001” min
Face Coat Mildew Resistance ASTM G21	“0” Rating
Weathering Resistance ASTM G155	10,000 hour rating, no delamination, crazing or cracking of fabric
Back Coat Composition ASTM D751	Polymeric Film, 0.004” minimum
Back Coat Mildew Resistance ASTM G21	“0” Rating

3.1.5.2 Flammability: The shelter weather barrier fabric cover (interior and exterior) shall be flame resistant, self-extinguishing and shall not have flaming melt pieces when exposed to flame or high heat. The weather barrier fabric cover shall not generate toxic gases when exposed to fire and high heat.

3.1.6 Interior Shelter Environment

3.1.6.1 Ventilation: The shelter shall incorporate a ventilation system. The ventilation system shall be easily connected to the shelter electrical system. The system shall provide a minimum of 9 cfm (0.25 m³) to ensure adequate personnel air and circulation to minimize humidity built up inside the closed shelter. Ventilators shall be provided with a cleanable air filter which will prevent the entry of fine, blowing sand. The use of ventilators shall not affect the shelter’s ability to maintain blackout capability during operation.

3.1.6.2 Passive Ventilation: Passive Ventilation at the roof peak is acceptable for heat dissipation however it is not a substitute for powered Active Ventilation used for air exchange purposes. Passive ventilation must comply with Black-out condition requirements.

MIL-PRF-32504

3.1.6.3 Odors: The shelter shall not harbor or emit noxious or toxic odors under all environmental conditions. The shelter shall not irritate skin or cause other human reactions.

3.1.6.4 Safety: The shelter shall minimize flammability and personnel hazards. The shelter system shall be physically safe to operate, store, transport and maintain throughout the life cycle of the system.

3.1.6.5 Toxicity: The MLAMS shall not be constructed of materials that shall expose installation team or operators to any chemicals or chemical compounds deemed hazardous via long-term exposure by OSHA or NIOSH.

3.1.7 Electrical System: The MLAMS shall be equipped with an electrical system consisting of a main power panel, junction boxes, lighting, power cables, duplex receptacles, switches, wiring and other items necessary to supply electrical power and lighting. All components shall conform to the National Electric Code and meet Underwriter Laboratory approval. The electrical system shall be designed to accommodate all required circuits and vendor supplied ancillary equipment such as Environmental Control Units and Powered Heaters. The electrical system shall not require on-site cutting, splicing or similar methods of assembly. The electrical system shall not require an electrician to install the system. All connectors shall be weatherproof, rated IP 55 or NEC Type III with either a) twist lock, b) locking, or c) screw type connectors.

3.1.7.1 Power distribution panel: The electrical system shall accommodate 120/208 Volt, 3-Phase, 200 Amp, 50/60Hz power with built-in main circuit breaker. To ensure compatibility with Military Power Distribution Systems, the utilization of MIL-DTL-22992 Class L connectors for input power to the power distribution system is required. The panel shall be capable of accepting and distributing standard electrical power of five-wire three-phase power as supplied by standard military generators. All circuits shall be protected by separate, 50/60 Hz circuit breakers. The electrical panel shall be grounded.

3.1.7.2 Electric duplex outlets: The shelter shall provide a minimum of eight (8) each, dual duplex outlet boxes with 120V, 20 Amp, 50/60 Hz circuit breakers. All terminal outlets shall be ground fault interrupter (GFI) protected and controlled by circuit breakers within the main electrical panel. The duplex outlets shall be evenly spaced on each side of the shelter and mounted to the support structure. All electrical boxes and devices shall be capable of orientation such that water will not have a direct path to the electrical devices. The outlet shall be re-locatable along the sidewall 30" to 48" above finished grade.

3.1.7.3 Power connecting cables: All supply and distribution electrical cabling shall be SOOW (Service, Oil Resistant Insulation and Jacketing, Other Substance, Weather) rated, or equivalent. The cables shall provide quick disconnect attachment to the main power distribution panel. The electrical cabling system shall provide sufficient material to allow the inclusion of drip loops to prevent the intrusion of water into electrical devices. The shelter shall provide provisions to facilitate cable management at a maximum of 6 foot intervals.

MIL-PRF-32504

3.1.7.4 Emergency exit signage: Shall be in accordance with UFC 3-600-01 Section 2-5 “Means of Egress Marking”.

3.1.7.5 Electric ventilation fan: The shelter shall have electrically powered rainproof ventilation fans and each fan shall be controlled by GFI circuit breakers located in the main electrical panel. Each ventilator shall be electrically controlled by an On-Off switch located at a convenient height above the floor of the shelters.

3.1.7.6 Lighting: The shelter shall incorporate sufficient lighting to provide between 540 lux (50 foot candles) to 810 lux (75 foot candles) as measured 76 cm (30 inches) above the floor. Each fixture shall have a means to protect the lighting elements. Each fixture shall incorporate a hanging hook and safety retention device. Each fixture shall have a power cord with IP 55 or NEC Type III weatherproof twist lock or screw type connectors. Each light fixture shall be operated from switches located along the side wall of the shelter 30 inches to 48 inches above finish grade. Lighting shall be provided with a pre-wired harness system for ease of installation.

3.1.7.7 Environmental Control Units: The shelter exterior fabric panels shall have ventilation/heating duct access panels to accommodate and secure a minimum of two sets of 16” diameter fabric ducts. This interface shall allow intake and exhaust from an external ECU, without loss of environmental or blackout protection.

3.2 Operating Environment Requirements: The following conditions define the environmental limits for the MLAMS. The erected shelter system shall provide all the following environmental conditions without degradation in performance.

3.2.1 Wind: The erected shelter shall withstand sustained winds of 90 MPH, from any direction, in all soil/surface conditions - including the fabric, framing, all access doors and support cabling.

3.2.2 Rain: The MLAMS shall resist intrusion of water during rainstorms though the shelter structural members, fabric, flaps, seams, tabs, material interfaces or vents. Dripping water will not be allowed.

3.2.3 Water resistance: The shelter shall incorporate water management features designed to mitigate rain water intrusion along the length of the shelter. The shelter is to include an external system engineered to resist water intrusion at the arch assembly joints and the arch/fabric interface. The design of the MLAMS shall be such that no water collects or pools on the exterior surface. Methods used to join shelter fabric sections together shall not compromise the structural integrity of the shelter system or result in leakage of liquids.

3.2.4 Snow and sleet: The shelter shall support a minimum threshold of 8 pounds per square foot (PSF) balanced snow load. A 20 psf roof load with complete unimpeded interior access is the objective. The shelter will support the designated load for a minimum of 12 hours without sustaining damage that would render the shelter unusable or unserviceable.

MIL-PRF-32504

3.2.5 Temperature: The MLAMS shall be capable of operating in the temperature range -20°F to +120°F, and in conditions comparable to MIL-STD 810G Part Three Table 1, “Hot Dry A1” through “Basic Cold C1” without structural damage, degradation or permanent deformation.

3.2.6 Humidity: The MLAMS 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 of structural components, end door fittings, personnel access doors, electrical devices, supply panels, power transmission cabling, outer shell fabric or interior insulating fabric if supplied.

3.2.7 Sunlight (Ultraviolet Effects): The MLAMS weather barrier fabric, the insulation liner fabric and associated fabric panel construction materials shall be selected so as to resist damage under normal sunlight usage and degradation due to UV light for a period of seven years continuous duty under normal conditions. The shelter materials shall show no evidence of structural damage, degradation or permanent deformation. After performance of accelerated weathering or UV effects, the weather barrier fabric shall show no signs of performance degradation in Breaking Strength, Coating Adhesion, Tongue Tear, Grab or Strip Tensile, Flame Resistance or Dead Load Capacity.

3.2.8 Sand and dust: The MLAMS shall protect occupants from dust and sand storms.

3.2.9 Mildew and Fungus: The MLAMS shall resist dry rot, fungus and mildew encountered in all climates.

3.2.10 Environmental acids: The MLAMS shall resist damage from acids, including acid rain and bird droppings.

3.2.11 Varying terrain: The MLAMS shall be designed such that it can be installed over grade which may vary 1.5% in length and width.

3.2.12 Petroleum, oils and lubricants: The shelter fabric, electric cables and other components shall be resistant to petroleum, oils and lubricants.

3.2.13 Transportation environment: When placed in ISO shipping containers the basic MLAMS components shall be compatible with typical shock, bounce and vibration environment encountered during shipping by ground vehicle, train, aircraft and material handling equipment.

3.3 INTERFACE REQUIREMENTS:

3.3.1 Interoperability and interchangeability: The shelter frames for MLAMS-S and MLAMS-A/V shall be capable of converting from one type to another through the addition or subtraction of components.

MIL-PRF-32504

3.3.2 Environmental conditioning unit duct interface: MLAMS fabric shell panels shall incorporate a means to interface with Army Standard ECU ducts of 16" diameter intake and exhaust.

3.4 OWNERSHIP AND SUPPORT REQUIREMENTS:

3.4.1 Shelf life: The shelter depot storage life shall be a minimum of 10 years.

3.4.2 Durability: The shelter continuous use service life shall be a minimum of 7 years under normal conditions.

3.4.3 Reliability: The shelter system and all component parts, except ground anchors, shall withstand four (4) erection and strike cycles in its expected field life. New ground anchors will be required to meet the intended four cycles.

3.4.4 Transportability:

3.4.4.1 Shipping containers: All components of the MLAMS required to erect and maintain the shelter shall be transported on the battlefield in 8 ft wide x 8.5ft high x 20 ft long standard International Standard Organization (ISO) shipping containers (minus Associated Support Items of Equipment i.e. Generators, ECU's etc). The containerized MLAMS shall have as-shipped configurations where the centers of gravity shall be at or below the container geometric centers.

3.4.5 Maintainability: The MLAMS fabric system shall be field repairable. A dedicated field repair kit shall be provided with each shelter intended for operator level maintenance. The shelter shall require no special tools for assembly/disassembly that are not part of the shelter erection kit. The requirement for scheduled/periodic maintenance and inspections at the field level shall be kept to an absolute minimum.

3.4.6 Product Markings: The shelter or appropriate durable component shall be permanently marked with date of manufacture, contract number and manufacturer's contact information at a minimum.

3.4.7 Operator's Manual: Instructions for erecting, striking, disassembling, repairing and storing the shelter and requirements for preparing the site will be provided on a CD-ROM electronic technical manual and in a hard copy manual. These items will be in the shipping container. An erect/strike checklist and structural diagram will be permanently affixed to the inside doors of the shipping container. An operator's manual shall be supplied with each shelter. Documentation shall be provided with a parts inventory list with parts descriptions and part numbers for all shelter parts and equipment including those of the installation tool kit.

3.5 First Article Testing: All aspects of the shelter listed within shall undergo First Article Testing for the purposes of compliance and performance verification in accordance with these specifications and requirements. All testing shall be the responsibility of the Vendor unless stipulated by the Government. The Government reserves the right to all test data.

MIL-PRF-32504

3.6 Weight: The maximum allowable weight of a containerized LAMS-A shall be 48,000 lbs total, including installation kit, with each single container unit having an absolute maximum allowable containerized weight of 25,500 lbs.

4.0 VERIFICATION

4.1 Verification Methods: This section describes the procedures that shall be used to verify Section 3 performance requirements are met. Unless otherwise specified in the contract, the vendor is responsible for the performance of all testing, certifications and analyses required by this specification. The Government reserves the right to witness or perform any of the tests required for certification where such tests are deemed necessary to assure that the MLAMS conforms to the specified requirements. Acceptable verification methods include visual inspection, measurement, sample tests, full-scale demonstration tests, videotaped demonstration, simulation, modeling, engineering evaluation, component properties analysis, independent analysis or professional organization certification and similarity to previously-approved or previously-qualified design.

Inspection: Verification shall be accomplished by a visual examination of the item, reviewing descriptive documentaries and comparing the appropriate characteristics with predetermined standards to determine conformance.

Analysis: Shall be accomplished by technical or mathematical evaluation, mathematical models or simulation and algorithms using data supplied by the vendor. The government reserves the right to perform independent analysis to verify the vendor results or to investigate issues which may arise during field testing.

Demonstration: The illustration of performance of a unit by observation of its practical application.

Certification: A written certification that the part, component or assembly meets the requirements of this specification, a government or commercial standard, or an approved design document. The basis of certification must be stated, i.e. testing, inspection or analysis.

4.1.1 Verification alternatives: The manufacturer may propose alternative test methods, techniques, or equipment, including the application of statistical process control, tool control, or cost-effective sampling procedures to verify performance. Test data shall include detailed results of the tests for evaluation by the government as well as a visual record of the test.

4.1.2 Verification using standard samples: Use standard samples to verify colors with visual inspections. Compare with the naked eye in simulated or actual daylight.

4.2 End item examination: The contractor shall be responsible for verifying that each MLAMS meets all of the requirements in Section 3. This element of inspection shall encompass all visual examinations and dimensional measurements.

MIL-PRF-32504

4.3 Classification of inspection: The inspection requirements specified herein are classified as follows:
First Article Inspection (4.3.1)

4.3.1 First article inspection: First article inspection shall be performed on one complete MLAMS-A being purchased. This element of inspection shall encompass all visual examinations, shall include setup/strike, weights and dimensional measurements. First article inspection shall verify that the MLAMS meets the minimum performance requirements in Section 3. Conformance Inspection includes those examinations and tests from Table III - Verification Methods.

4.3.2 First article definition: First Article is defined for these purposes as an initial production sample, modified to consist of one five bay MLAMS-Aviation, with one full-width opening door and one flat end wall assembly with metal Roll-up Door or Fabric sliding door - including textile samples from the same production runs as finished textile products included in the construction of the First Article Shelter. Fabric samples will include all features necessary to fulfill fabric testing requirements as listed in Section 3.1.5.1, Table 2 in conjunction with ASTM test sample lot sizes. First article test sample will include all electrical components necessary for full product testing. First article test sample will include necessary components to assemble a full sized MLAMS-Vehicle Flat End Wall unit, to include fabric or metal Roll-Up Door installation for the purposes of testing and evaluation of form, fit, finish and field construction. First article sample will include all necessary and optional support cabling, stiffeners, personnel doors and ECU ducting interfaces. First article will include a full insulating fabric liner set for the purposes of testing form, fit and functionality. First article test shelter will include all components necessary to install shelter on earth and concrete. First article test shelter will include all tools necessary for shelter installation and installation instruction manual, complete with parts and spare parts listing.

TABLE III. Verification methods

Title	Requirement	Verification
Operating Requirements	3.1	4.1
Physical Characteristics	3.1.1	4.5.1
Dimensions	3.1.1.2	4.5.1.1
Weight	3.6	4.5.1.2
Shelter Erection	3.1.2	4.5.2
Erection Kit	3.1.2.1	4.5.2.1
Anchoring System	3.1.2.3	4.5.2.2
Strike, Pack and Package	3.1.2.4	4.5.2.3
Entry and Exit	3.1.3	4.5.3
Blackout Protection	3.1.4	4.5.4
Weather Barrier Fabric	3.1.5	4.5.5
Weather Resistance	3.2.7	4.4.1
Flammability	3.1.5.2	4.5.5.1
Hardware Color	3.1.1	4.5.5.2
Interior Shelter Environment	3.1.6	4.5.6

MIL-PRF-32504

TABLE III. Verification methods - Continued

Title	Requirement	Verification
Ventilation	3.1.6.1	4.5.7.6
Odors	3.1.6.3	4.5.6.2
Toxicity	3.1.6.5	4.5.6.2.3
Safety	3.1.6.4	4.5.6.3
Electrical System	3.1.7	4.5.7
Power Distribution Panel	3.1.7.1	4.5.7.1
Electrical Power Distribution Cords	3.1.7.3	4.5.7.4
Electric Winches	3.1.3.2	4.5.7.3
Emergency Exit Signage	3.1.7.4	4.5.7.5
Lighting	3.1.7.6	4.5.7.7
ECU's	3.1.7.7	4.5.7.8
Temperature	3.2.5	4.6.5
Humidity	3.2.6	4.6.6
Snow Load	3.2.4	4.6.4.1
Sunlight	3.2.7	4.6.8
Sand and Dust	3.2.8	4.6.9
Mildew and Fungus	3.2.9	4.6.10
Environmental Acids	3.2.10	4.6.11
Varying Terrain	3.2.11	4.6.12
Petroleum, Oil, Lubricants	3.2.12	4.6.13
Transportation	3.4.4	4.6.14
Interface Requirements	3.3	4.7.1
Interoperability and Interchangeability	3.1.1	4.7.1.1
Duct Interface	3.3.2	4.7.2
Electrical Supply Interface	3.1.7.1	4.7.3
Ownership and Support		
Shelf Life	3.4.1	4.8.1
Durability	3.4.2	4.8.2
Reliability	3.4.3	4.8.3
Transportability	3.4.4	4.8.4
Shipping Containers	3.4.4.1	4.8.6
Maintainability	3.4.5	4.8.7
Product Markings	3.4.6	4.8.2.1
Operators Manual	3.4.7	4.8.9

MIL-PRF-32504

4.4 Methods of Inspection: Weather barrier fabric and Insulating Liner fabric samples, associated fabric panel construction materials:

4.4.1 Accelerated weathering-xenon lamp: Accelerated weathering procedure (xenon exposure). AATCC Method 169 except that the following deviations shall apply:

a. The test apparatus shall be either test chamber type 1A or IB. Type 1B shall be equipped with a three-tiered inclined specimen rack. The apparatus shall be equipped with an automatic light monitor and shall be capable of automatically controlling irradiance, temperature, and humidity. The apparatus shall be maintained in accordance with the manufacturer's recommendations.

b. The weathering test cycle shall be 40 minutes of light, 20 minutes of light with water spray on the fabric face, 60 minutes of light, 60 minutes of darkness. The test cycle shall be repeated until the total energy exposure is equal to 100 kilojoules per square meter.

c. The irradiance level shall be $0.55 + 0.01$ watt/square meter/nanometer ($w/m^2/nm$) band pass at 340 nanometers.

d. The glass filter combination shall be a quartz inner filter and a borosilicate type "S" outer filter.

e. The relative humidity shall be $50 + 5$ percent during the light cycle and not lower than 95 percent during the dark cycle.

f. The control set points shall be as follows:

Dark cycle Light cycle

Black panel 38°C 77°C

Conditioning water 40°C 53°C

Wet bulb depression 1/ 0°C 10°C

1/ As a guide only; adjust to achieve required relative humidity (see e. above).

g. The test specimens shall fit the specimen rack of the apparatus with no wrinkles or gaps. The test specimen shall be mounted on the outside of the rack with the use of appropriate stainless steel spring clips. After the required exposure period, the specimens shall be removed from the apparatus and allowed to dry and condition at Standard Conditions. Then test specimens for each required test shall be cut and tested appropriately.

NOTE: Monitoring of dry bulb temperature, wet bulb depression, irradiance, and black panel temperature is recommended through the use of chart recorders.

4.5 Operating requirements verification: Complete each verification in Section 4.6

4.5.1 Physical characteristics: Complete each verification in Section 4.5

MIL-PRF-32504

4.5.1.1 Dimensions: Visually inspect the shelter. Measure minimum interior dimensions at the base and at the 14 foot 6 inch height. Measure the height of the center line. Measure the length of the shelter when erected.

4.5.1.2 Weight: Visually inspect by weighing the total components required for each shelter. The total weight includes all fabric components, frame components, guy lines, ground anchors, ground anchor installation kit, electrical components, dedicated field repair kit, erection kit and shipping/transport containers. Complete shelter components and ISO container as aggregate shall suffice. Weigh Types Aviation, Vehicle and Storage or calculate with verification list of all components broken out. COTS equivalent items with military variations acceptable.

4.5.2 Shelter erection demonstration: Erect the shelter with a maximum of ten (10) soldiers following the manufacturer's instructions. Use a shelter in a configuration packed for transportation. Complete this demonstration in a maximum of 60 work hours. Manually adjust the shelter by fastening and unfastening all closures, slide fasteners, vents and other controls. Adjust all shelter lines intended to be manipulated during shelter use. Complete all operations without binding or interference.

4.5.2.1 Shelter erection kit: Perform erection demonstration using erection kit.

4.5.2.2 Shelter anchoring system: Perform erection demonstration using anchoring kit supplied with each shelter. Verify that sufficient anchors are provided to support three (3) complete erect/strike cycles. Verify (if applicable) what type of fuel is used to power anchoring emplacement device.

4.5.2.3 Strike, Pack and Package demonstration: Demonstrate shelter strike, pack and package for transport by a maximum of ten (10) soldiers, following manufacturer's instructions. Complete this in a maximum of 480 man hours.

4.5.3 Entry and exit demonstration: Open, completely close, and fasten doors while wearing cold weather clothing, including gloves. Verify that doors operate smoothly without binding or hang-up. Visually inspect for a minimum of two personnel doors on the shelter. Measure personnel door height and width to be a minimum of 6 feet 6 inches high and 3 feet 0 inches wide.

4.5.4 Blackout protection demonstration: Conduct this test with a fully erected shelter, (including liner if applicable), with doors and other openings closed per manufacturer's instructions. Perform the test on a moonless night in an area absent of man-made light sources. Install the lighting system provided with the shelter system in accordance with procedures defined in the operator level manual. Visually verify no visible light is detectable, using the naked eye, from a distance of 1,000 feet. Verify visual blackout criteria for each of the four quadrants. Continue observations 360 degrees around the shelter at 45 degree increments. Night vision blackout criteria: Perform the quadrant test, using a Night Vision Device from a distance of 1,650 feet from the shelter. Verify the light source is not detectable through the night vision device used to demonstrate compliance.

MIL-PRF-32504

4.5.5 Shelter weather barrier fabric: Fabric and fabric panel components shall meet or exceed all requirements listed in Table II, Fabric Requirements, prior to Accelerated Weather Test AATCC Method 169, Xenon exposure or UV exposure test. After initial testing, the shelter materials shall show no evidence of structural damage, degradation or permanent deformation. After performance of accelerated weathering test AATCC Method 169 (Xenon) or UV effects testing, the weather barrier fabric shall show no signs of performance degradation in Breaking Strength, Coating Adhesion, Tongue Tear, Grab or Strip Tensile, Flame Resistance or Dead Load Capacity.

4.5.5.1 Flammability verification/demonstration: Test all fabric components (weather barrier, insulated liner, if applicable) per NFPA 751. All fabric shall be self-extinguishing. There shall be no flaming melt drip or molten pieces of fabric at any time.

4.5.5.2 Hardware and findings color: Visually inspect all external hardware, fittings and findings are absent polished or light reflective surfaces.

4.5.5.2.1 Shelter color inspection: Visually inspect the exterior shelter color for similarity to the standard sample color of the shelter, as specified by the contract. Verify that no shiny or light reflective components are visible on the shelter exterior.

4.5.6 Interior shelter environment:

4.5.6.1 Ventilation Verification and Demonstration: Demonstrate that the ECU ventilation ducts properly interface with the fabric duct openings. Ensure that ducts are properly supported and that the joint is weather resistance and satisfies blackout requirements. Demonstrate that shelter mounted ventilation fans are properly switched and operational. Examine any passive ventilation venting features for self-operation and that they satisfy blackout requirements.

4.5.6.2 Odors verification: Satisfy one odor criteria and one toxicity criteria.

4.5.6.2.1 Odors measurements: After completing each of the operating environment tests, a panel of three inspectors performs the odors test. If any one inspector detects any smell, persisting after 15 seconds, classified as nauseous, repellent, burning, strongly penetrating, drying nasal passages causing dizziness, sneezing or any adverse reaction, the results are not acceptable. Aromatic odors usually associated with specific types of vinyl compounds are not objectionable.

4.5.6.2.2 Alternative odors analysis: Demonstrate, by analysis, the shelter materials and manufacturing processes do not result in a product that can produce noxious odors.

4.5.6.2.3 Toxicity measurements: Demonstrate the shelter does not produce dangerous toxic exposures by meeting published chemical threshold limit values. Acceptable limits are any one of the following: OSHA Permissible Exposure Limits – Table One or the NIOSH Pocket Guide to Chemical Hazards, Exposure Limits and Signs/Symptoms of Exposure.

MIL-PRF-32504

4.5.6.2.4 Alternate toxicity analysis: Verify the shelter system and component products qualify for commercial sale in the state of California.

4.5.6.3 Safety verification: Complete one flammability verification and the hazards inspection. Visually inspect the shelter system is free of hazardous burrs, nicks, sharp edges, foreign materials, or other conditions creating physical danger to a user.

4.5.7 Electrical Power distribution system: Visually inspect the complete electrical system to verify that it contains an Underwriter Laboratory (UL) approved main electrical power distribution panel as well as the required electrical components for the operation of the shelter.

4.5.7.1 Power distribution panel: Visually inspect the main electrical power distribution panel to verify it contains the UL approval for wet weather locations. Determine the main distribution panel is of three phase 120/208 volt design and the circuits are balanced. Verify the main circuit breaker controls the sub circuits. Inspect the individual circuit breakers to determine that they are of the proper current carrying capacity and are of the Ground Fault Circuit Interrupter (GFCI) design. Visually inspect to determine the main electric panel is properly grounded.

4.5.7.2 Electrical duplex outlets: Visually inspect the duplex outlets to determine that they are weatherproof design of 20 amp capacity and are equally spaced about the shelter.

4.5.7.3 Electric winches: Visually inspect each electric winch to determine that they are approved by UL for wet locations and are of heavy-duty construction, operating on 120/208 power. Measure the time that is required to fully open or fully close the full width end door to determine that it does not exceed five (5) minutes duration.

4.5.7.4 Power connecting cables: Inspect all the power connecting cables to determine that they are of the heavy-duty commercial type SOOW or equivalent and of the proper current carrying size for the specific application. The quick disconnect twist lock or screw type connectors shall be connected with the main power distribution panels or other components to insure their interface compatibility.

4.5.7.5 Exit signage: Verify that signage is in accordance with UFC 3-600-01 Section 2-5.2 "Means of Egress Marking".

4.5.7.6 Electric ventilation fans: Each electric ventilation fan shall be checked for operation by connecting it to the specified connector on the main electrical power distribution panel. Turning the switch to "ON" shall cause operation of the ventilation fan.

4.5.7.7. Lighting: Visually inspect that the lights supplied with the shelter system provide general illumination and are energy efficient. Visually inspect that the system is sufficient to allow operations to

MIL-PRF-32504

continue during periods of reduced visibility, nighttime operations or with the shelter doors fully closed. Visually inspect that the shelter system possesses a means to physically support the lights.

4.5.7.8 Environmental Control Unit: Verify that ECU's operate on power supply systems which match those of the Main Electrical Distribution Panel. Observe performance which will accommodate and secure a minimum of two sets of 16" diameter fabric ducts. These ducts and fabric interface shall allow intake and exhaust from an external ECU, without loss of environmental or blackout protection.

4.6 Operating environment requirements:

4.6.1 Wind resistance verification: Perform the wind load demonstration or the alternative analysis.

4.6.1.1 Wind load demonstration: With the test shelter in the fully installed condition and all doors/openings secured, perform a wind test for one hour with the wind velocity at 40 mph, with one 15 minute period at 90 mph at the following sites: Full Width End Door, Main Bay Fabric Panel/Framing member interface, Personnel Access Door and the Roll-up or Sliding Vehicle Access Door. Inspect for damage to fabric, findings, framing or operational deficiencies. Degradation of material or material interface or operational capability shall constitute failure of this test.

4.6.1.2 Alternative wind load analysis: Demonstrate through mathematical analysis that shelter materials and design have sufficient strength to withstand forces consistent with constant 90 mph wind velocity.

4.6.2 Wind Driven Rain resistance demonstration: Perform rain resistance test on shelter fabric representative sample which includes weather barrier fabric, the frame to fabric interface, frame to frame assembly joint and external wind driven rain covering assembly. Test shall in accordance with MIL-STD 810 G, 506.5, Test Procedure II or equivalent.

4.6.3 Water resistance: Visually inspect erected shelter to determine if any water collects or pools on the exterior of the erected test shelter.

4.6.4 Snow and sleet resistance verification: Perform the snow load test or the alternative analysis.

4.6.4.1 Snow load test: Erect a shelter with all doors, flaps and other openings configured for cold weather blackout conditions. Perform this test on frozen soil, hard pan dry soil or asphalt/concrete to simulate winter soil conditions. Evenly load the entire top surface of the shelter at a maximum of 8 lbs per square foot. Apply the weight gradually and leave in place for an additional 12 hours. Typical user adjustments, such as line tensioning, may be performed as necessary. Verify structural integrity and no damage to the shelter.

4.6.4.2 Snow load alternative analysis: Demonstrate shelter material and design has sufficient strength to provide protection while loaded at a maximum 8 lbs per square foot.

MIL-PRF-32504

4.6.5 Temperature verification: Perform the cold temperature operational demonstration or the shelter components demonstration for cold temperatures. Perform the shelter components demonstration for high temperatures on separate samples.

4.6.5.1 Cold temperature operational demonstration: Select operational components such as full width end door fabric, full width electric winch operation, personnel door closer for cold weather operations. Perform test procedures in accordance with MIL-STD 810 502.5 Basic Cold C-1. Ensure full operations with no loss of functionality or evidence of damage.

4.6.5.2 Shelter components demonstration: Perform the fabric components test and the fasteners test with the cold and hot conditions as defined below.

4.6.5.3 Cold temperature conditioning: Specimens of each type of fabric shall be in accordance with performance tests. Condition fabric specimens for 4 hours at -25°F ($\pm 5^{\circ}\text{F}$).

4.6.5.4 Hot temperature conditioning: Specimens of each type of fabric shall be in accordance with performance tests. Condition fabric specimens and fasteners for four hours at 160°F ($\pm 2^{\circ}\text{F}$).

4.6.5.5 Fabric components test: Test samples of exterior weather barrier fabric and samples of insulating liner material if applicable. Test in accordance with ASTM D2136 Low temperature Bend Test. Pass at -40°F with no cracking, delamination or crazing of fabric. Test in accordance with ASTM G155, Weathering Resistance of Coated Fabrics. Pass at 160°F with no delamination, cracking or crazing of fabric or test in accordance with Accelerated Weather Test AATCC Method 169, Xenon exposure or UV exposure test. Pass with no degradation from initial performance in Breaking Strength, Coating Adhesion, Tongue Tear, Grab or Strip Tensile, Flame Resistance or Dead Load Capacity.

4.6.5.6 Fasteners test: While in the conditioning environment, operate each distinct type of fastening device after the exposure period for 25 cycles. Verify no binding or deterioration of performance.

4.6.6 Humidity compatibility demonstration: All end door hardware, light fixture components in addition to weather and insulating liner fabric samples shall be subjected to 95% humidity levels at a 140°F minimum temperature in accordance with Mil-Std 810G Method 507.5 Procedure II – Aggravated cycle for a minimum of 10 24-hour test cycles. After cycling has been completed, components are to be inspected. Failure shall be indicated by any evidence of delamination, cracking, corrosion or deterioration to any component and any malfunction of hardware.

4.6.8 Sunlight resistance demonstration: If the accelerated weathering demonstration (4.6.5.5) was performed as part of the verification process, no additional verification is required. If durability was verified by analysis, perform the sunlight resistance test. Certification for fabric components is acceptable.

MIL-PRF-32504

4.6.8.1 Sunlight resistance test: Subject shelter weather fabric, insulation liner material and findings samples to testing in accordance with Mil-Std 810 Section 505.5, Cycle A1, Procedure II. Verify that there is no visible deterioration, cracking, crazing, blooming, chalking or appreciable color change on any exterior shelter component. The shelter materials shall show no evidence of structural damage, degradation or permanent deformation. After performance of accelerated weathering or UV effects, the weather barrier fabric shall show no signs of performance degradation in Breaking Strength, Coating Adhesion, Tongue Tear, Grab or Strip Tensile, Flame Resistance or Dead Load Capacity.

4.6.9 Sand and dust resistance inspection: Inspect a fully erected shelter, in blackout configuration, for any openings larger than 1 square inch that would allow entry of blowing sand and dust.

4.6.10 Mildew and fungus resistance verification: Perform one mildew and fungus test each or verify by alternative analysis.

4.6.10.1 Alternate mildew and fungus resistance test: Meet the criteria on ANSI/AATCC 30, Fungicides, Evaluation on Textiles: Mildew and Rot Resistance of Textiles. Ensure that all natural and synthetic materials do not support direct attack and do not break down mechanically due to fungal and mildew propagation.

4.6.10.2 Mildew and fungus alternative analysis: Demonstrate materials and manufacturing processes do not contain compounds that will support mildew and fungus growth and are not susceptible to deterioration by mildew and fungus.

4.6.11 Environmental acids verification: Use ISO 105-E05, Textiles, Tests for Color Fastness, Part E05, to demonstrate compatibility with environmental acids, such as acid rain and bird drippings.

4.6.12 Varying terrain evaluation: Evaluate the shelter design and construction details for compatibility with variations in terrain up to 1.5 percent in width and length of the shelter. Pay particular attention to purlin connections, Roll-up Door configuration and wall/roof shear cables to ensure that allowances are made for variations in grade level. When possible, select demonstration construction site to induce elevation variation within the 1.5 percent parameter.

4.6.13 Petroleum, oil and lubricant resistance verification: Shelter vendor shall supply certification from independent industry organizations that end products used in the shelter components are resistant to petroleum products, military grade fuels, lubrication oils and common solvents.

4.6.14 Transportation environment compatibility verification: Initial condition shall be a shelter in the 'packed for transportation' configuration. Unpack shelter and visually inspect for abraded areas, cuts, tears or rips, especially in the fabric areas that contact metal components. Verify shelter and framework fasteners, adjusters and connectors operate smoothly. Erect the shelter and verify no damage, such as broken or non-functional components and abrasions that affect performance. This may be combined with any other shelter erection demonstration.

MIL-PRF-32504

4.7 Interface requirements verification: Perform the inspections and measurements in section 4.3

4.7.1 Interoperability and interchangeability demonstration: Compare the test shelter with a similar MLAMS from existing supply or production run. Test main structural parts from other classes of MLAMS for interchangeability.

4.7.1.1 Shelter interchangeability demonstration: Erect a baseline shelter and test for the following configurations (if applicable)

Baseline shelter with test shelter outer fabric skin.

Baseline shelter with test shelter structural framing and shelter fasteners.

Test shelter with baseline shelter outer fabric skin.

Test shelter with baseline structural framing and shelter fasteners.

4.7.1.2 Interoperability and interchangeability criteria: Visually examine each configuration for compatibility between the baseline shelter components and test shelter components. Verify no binding or misfit affecting ease of operation, visible openings affecting blackout, or form, fit and function incompatibilities between the test shelter and the baseline shelter. Inspect each configuration for galling, abrasion, pinching, mutilation, misalignment, distortion, distention, bent, misshapen or deformed components or other evidence the reassembled shelters are not totally interchangeable.

4.7.2 ECU duct interface measurement: Measure the diameter (+1, -0) inches of two ECU duct openings. Verify the presence of weatherproof sleeves.

4.7.3 Electrical Supply: Ensure that the MLAMS main electrical supply panel is compatible with Military Power Distribution Systems, i.e. - the utilization of MIL-DTL-22992 Class L connectors for input power to the power distribution panel. The panel shall be capable of accepting and distributing standard electrical power of five-wire three-phase power as supplied by standard military generators.

4.8 Ownership and support requirements verification: Perform the inspections and measurements in section 4.4 as applicable.

4.8.1 Shelf life: Demonstrate shelf life by accelerated aging or by analysis.

4.8.2 Durability: Demonstrate durability by accelerated weather or analysis.

4.8.2.1 Marking durability criteria: The nameplate or product markings will be verified by inspection.

4.8.3 Reliability verification: Satisfy the demonstrations defined in section 4.8.3

MIL-PRF-32504

- 4.8.3.1 Shelter reliability demonstration: Perform the reliability demonstration on a fully erected shelter. Fasten and unfasten all connectors, interfaces, toggles, slide fasteners and other methods of shelter assembly through a minimum of 50 cycles.
- 4.8.3.2 User adjustments reliability demonstration: Verify adjustable components, such as shelter guy lines, and other user-operated features such as personnel door, ventilators, cycle through open and closed positions a minimum of 100 cycles.
- 4.8.3.3 Reliability criteria: Any binding or misfit that affects ease of operation, or any form, fit and function incompatibilities constitute test failure. Inspect all components following the demonstration for any galling, abrasion, pinching, mutilation, misalignment, distortion, distention, bent, misshapen, or deformed components, or other evidence the shelter components do not fit and perform properly.
- 4.8.4 Transportability demonstration: Lift each component from floor level to a height of 3 feet with a maximum of ten soldiers. Weigh or suspend each shelter component from a suitable measuring device, simulating the user's lifting position and measure individual weight loads to be 37 pounds maximum including transport cover.
- 4.8.5 Exterior Fabric Skin Panel lift demonstration: Demonstrate that individual fabric panels, as packed for shipment, can be transported by hand with no more than four persons. Include samples of Main Bay weather barrier panels, Main Bay Insulation Liner panels, Flat Wall End panel and Full Width Door panel.
- 4.8.6 Shipping containers: Visually inspect that the shipping containers are 8ft wide, 8.5ft high and 20 feet long and possess the required ISO fittings. The as-shipped container load configurations shall have centers of gravity at or below their geometric centers and be verified by analysis.
- 4.8.7 Maintainability verification: Demonstrate the field repair kit functions as intended.
- 4.8.8 Product markings: Visually inspect the major components for legible and durable identification.
- 4.8.9 Operators manual: Visually inspect the operator's manual supplied with each shelter. Visually inspect how the manual describes how the shelter should be unpacked, set up, maintained, struck, packaged for transport, repaired with the field repair kit and contains a component listings inventory.

5.0 PACKAGING

- 5.1 Packaging: For acquisition purposes, the packaging requirements shall be as specified in the contract or order. When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contract 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

MIL-PRF-32504

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 Modular Large Area Maintenance Shelter- Type Aviation (A) is intended to be a portable facility of modular construction to support Army rotary and fixed wing aircraft maintenance in forward operational areas without fixed facilities. The MLAMS-A is needed by all aviation maintenance units and is intended to be capable of sheltering the following aircraft: UH-60, CH47-D, AH-64, OH-58D, MH-60K, MH-47E, C-12 and RC-12 aircraft in operational configuration. Maintenance activities during deployments frequently require personnel to perform highly technical/accurate repairs in adverse climatic conditions and under blackout conditions. The MLAMS components are considered to be as a minimum: the structural members, weather barrier fabric, erection kit, electrical system and lighting, ventilators, the installation and operator's manual, shelter anchoring system for earth and concrete and the shipping containers. The MLAMS is required to withstand human factors and environmental considerations as described in this document.

6.2 Standard Color Samples: Standard color samples are available from the contracting officer.

6.3 Weather barrier fabric: Exterior color are to be similar to Tan-Camo 686A, # 33446 in FED-STD-595.

6.3 White color standard: Interior face of the weather barrier fabric and of optional insulating liners will be similar to White, Untinted #17925 in FED-STD-595.

6.4 Subject term (key word) listing:

Arch
 Fabric Panel
 Full Width Door
 Purlin
 Relocatable
 Structure
 Tension

MIL-PRF-32504

CONCLUDING MATERIAL:

Custodians:
Army – GL

Preparing Activity:
Army – GL

Review Activities:
DLA – DH

(Project 5410 2014-001)

Note: The activities listed above were interested in this document on the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>