PERFORMANCE SPECIFICATION
LIGHTWEIGHT MAINTENANCE ENCLOSURE
(LME)

1. SCOPE.

1.1. Scope. This Performance Specification describes a modular tent system that provides environmental protection to Soldiers and Marines for multiple uses such as a field maintenance facility for wheeled and track vehicles, sheltering for laundries and receiving, shipping and storage areas.

1.2 Classification. The Lightweight Maintenance Enclosure (LME) tent system will be of the following types and classes:

   Types:
   - Type I: Army, Marine Corps
   - Type II: Army, Laundry Advanced System (LADS), Cold Weather Kit

   Classes:
   - Class I: Camouflage Green 483
   - Class II: Tan 686A, Color Chip 33446

2. APPLICABLE DOCUMENTS

2.1 General. Listed in this section are documents specified in Sections 3 and 4 of this specification. Documents cited in other sections of this specification or recommended for additional information or as examples are not included in this listing. While every effort has been made to ensure the completeness of this list, document users are cautioned that they shall successfully satisfy all Section 3 requirements and Section 4 verifications whether or not they are listed.

Beneficial Comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: PM Force Sustainment Systems, SFAE-CSS-FP-F, Kansas Street, Natick, MA 01760-5057 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

2.2 Government documents.
2.2.1 Specifications, standards, and handbooks.

**Military Specifications**
- MIL-PRF-20696 | Cloth, Waterproof, Weather Resistant
- MIL-PRF-44103 | Cloth, Fire, Water, and Weather Resistant
- MIL-PRF-44259 | Light Set, Portable, Fluorescent
- MIL-P-501 | Pin, Tent, Metal
- MIL-P-2383 | Pin, Tent, Wood
- MIL-DTL-53039C | Coating, Aliphatic Polyurethane, Single Component, Chemical Agent Resistant

**Military Standards**
- MIL-STD-130 | Identification Marking of U.S. Military Property
- MIL-STD-810 | Environmental Engineering Considerations and Laboratory Tests
- MIL-STD-1472 | Human Engineering

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

**US Army Regulations**
- AR 70-38 | Research, Development Test & Evaluation of Material for Extreme Climate Conditions

**Federal Standards**
- FED-STD-595C | Colors Used in Government Procurement

(For further information, contact for camouflage colors only: U.S. Army Research Laboratory, CARC Commodity Management, ATTN: AMSRD-ARL-WM-MC, Aberdeen Proving Ground, MD 21005-5069)

2.2.2 Other Government documents, drawings, and publications.

**Technical Manual (TM)**
- TM 10-5410-284-13&P | Operator’s, Unit and Direct Support Manual including Repair Parts and Special Tools List (RPSTL) for the Lightweight Maintenance Enclosure
- 5-4-7861 | Lightweight Maintenance Enclosure (LME) Type I
- 5-4-8762 | Lightweight Maintenance Enclosure (LME) Type II LADS

**NSN**
- 1080-01-475-0696 | ULCANS Desert, General Purpose, Radar Scattering
- 1080-01-475-0697 | ULCANS Woodland, General Purpose, Radar Transparent
- 1080-01-457-2956 | ULCANS Woodland, General Purpose, Radar Scattering

2.2.3 Sources Of Government Documents.
2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issue dates of these documents that are those cited in the solicitation or contract.

2.3.1 Non-Government Documents.

ASTM B221 Aluminum and Aluminum-Alloy, Extruded Bars, Rods, Wires, Profiles and Tubes
ASTM D751 Standard Test Method for Coated Fabrics
ASTM D2136 Standard Test Method for Fabrics, Coated, Low-Temperature Bend Test
ASTM D3951 Packaging, Commercial
ASTM D6413 Flame Resistance of Textiles (Vertical Test)
ASTM G 21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
ISO 105-E05 Textiles, Tests for Colour Fastness, part E05
SAE J1966 Lubricating oil, Aircraft Piston Engine (Nondispersant Mineral Oil)
SAE-AMS-QQ-A-200/8 Aluminum Alloy 6061, Bar, Rod, Shapes, Tube, and Wire, Extruded
USIFI-PRF-44103 Cloth, Fire, Water and Weather Resistant
No Number Chemical Exposure Guidelines, Version 9
No Number Pocket Guide to Chemical Hazards, 3rd printing

2.3.2 Sources of Non-Government Documents Referenced.

AATCC - American Association of Textile Chemists and Colorists
P.O. Box 12215
Research Triangle Park, NC 27709
http://www.aatcc.org

ACGIH - The American Conference of Governmental Industrial Hygienists
Threshold Limit Values
1330 Kemper Meadow Drive
Cincinnati, Ohio 45240

AIHA Workplace Environmental Exposure Level Guide Series
American Industrial Hygiene Association
AIHA Publication Orders, PO Box 27632
Richmond, VA 23261-7632
http://www.aiha.org

ASTM - The American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 19428
http://www.astm.org

Centers for Disease Control and Prevention
1600 Clifton Rd.
Atlanta, GA 30333

National Institute of Occupational Safety and Health
Pocket Guide to Chemical Hazards
http://www.cdc.gov/pubs/niosh.aspx
Email address: cdcinfo@cdc.gov
(Order Publication No. 2005-151)

ISO - International Standards Organization
American National Standards Institute
Attn: Customer Service
11 West 42nd Street
New York, NY 10036
http://www.ansi.org/cat_b.html

Society of Automotive Engineers
SAE World Headquarters
400 Commonwealth Drive
Warrendale, PA 15096-0001
http://www.sae.org

USIFI - United States Industrial Fabrics Institute, a division of IFAI
1801 County Road B West
Roseville, MN 55113
http://www.usifi.com

OTHER PUBLICATIONS

Repeat Insult Patch Test – Modified Draize Procedure- Principle and Methods of Toxicology,
Taylor and Francis
325 Chestnut Street
Philadelphia, PA 19106.
http://taylorandfrancis.co/uk

Marzulli, F. and H. Maibach, “Contact Allergy: Predictive Testing in Humans,” Advances in
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/Conformance/End Item Requirements. The first article sample when specified in the contract shall be defined in the solicitation (see 6.2) and will be subjected to testing and inspection according to section 4 Verification.

3.1.1 Configuration Control. The contractor shall be responsible to ensure that upon successful completion and Government approval of First Article samples, engineering changes that affect interchangeability of LME components or affect component fit or function shall not be implemented in production without the approval of the Configuration Manager. The U.S. Army Product Manager Force Sustainment Systems (PM FSS) is the end item Configuration Manager. The contractor may provide to the Government suggested changes in materials, manufacturing processes, or design, for improving quality, reliability, or performance, which if approved, may be implemented. The contractor shall have a system of configuration controls in place to identify change status for each component and which identifies change date, part numbers affected and reason(s) for the change.

3.2 Interchangeability, Interoperability and Interface Requirements.

### Table 3.0-2

<table>
<thead>
<tr>
<th>Item</th>
<th>Reference Designator / P/N</th>
<th>Title or Description</th>
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</table>
| 1    | NSN 1080-01-457-2956 (Woodland)  
NSN 1080-01-475-0694 (Desert)  
NSN 1080-01-475-0696 (Desert)  
NSN 1080-01-475-0697 (Woodland) | Ultra-Lightweight Camouflage Net Systems (ULCANS) |
| 2    | 16-Inch Diameter Flexible Ducts  
NSN 4720-01-539-7168 | Duct for Large Capacity Field Heater (LCFH) |
| 3a   | MIL-P-501 | Pin, Tent, Metal |
| 3b   | MIL-P-2383 | Pin, Tent, Wood |

3.2.1 Interface, Interchangeability and Interoperability Requirements. All component parts,
including fabric, support system, tent pins and transport covers, shall be functionally interoperable and physically interchangeable with all other LMEs with no binding or misfit affecting ease of operation, visible openings affecting blackout, or form, fit and function incompatibilities. In addition, the LME must interface with standard military shipping equipment; standard military camouflage net systems, standard U.S. Army Large Capacity Field Heater (LCFH) environmental control ducts, and standard tent stakes and tent pins.

3.2.2 Interface to External Components. A listing of the external components LME shall interface with is presented in Table 3.0-2.

3.2.2.1 Item 1. Ultra-Lightweight Camouflage Net System (ULCANS) Interface. LME tents must be compatible with the standard Army ULCANS. Camouflage nets shall be able to be positioned over the LME tent with minimum interference or hindrance by LME tent components. No ladders, vehicles or special equipment shall be required for installation of standard camouflage net systems over LME tents.

3.2.2.2 Item 2. Environmental Conditioning Unit (ECU) duct interface. The LME shall permit the passage of two each, 16-inch diameter flexible environmental control ducts, 5 to 6 feet apart, through the tent intermediate section at a minimum centerline height of 22 inches above ground level to allow interface with existing LCFHs. There shall be a weatherproof sleeve on each duct opening of an intermediate fabric section. This interface shall allow intake and exhaust environmental control ducts from an external LCFH to be utilized without loss of environmental or blackout protection.

3.2.2.3 Item 3a & 3b. Tent Pins and Stakes Interface. Contractor shall determine the type and quantity of anchoring devices required to ensure all physical performance requirements are met. The anchoring devices shall be designed for installation by an individual soldier without requiring the use of power equipment. Existing LME tents are provided with sufficient 18” steel tent pins along with 16” and 24” wooden tent stakes to restrain the tent from movement when subjected to the environmental conditions of 3.5. The LME shall be compatible with existing stocked tent pins. The LME wall connections shall interface with 18-inch long, 0.625 diameter steel tent pins. Along the base of the LME tent lines shall interface with 16-inch and/or 24-inch long electrically non-conductive tent pins/stakes. The tent pins/stakes shall be easily connected, adjusted and removed from the LME and any supporting lines, while providing a secure connection.

3.3 System Performance Requirements - Physical Characteristics.

3.3.1 Dimensions. The LME shall have the minimum interior width of 23 feet at the base, a minimum working height (vehicle door opening) of 13 feet, which is at a minimum of 6 feet wide, and a minimum length of 32 feet when erected.

3.3.2 Weight. The LME shall have a maximum total packed weight of 1,500 lbs. The total maximum weight includes all fabric components, frame components, guy lines, tent stakes, electrical components, dedicated field repair kit, and transport covers/bags/containers (less shipping crates/containers). When components are packed for transport by soldiers, the weight of tent covers and containers with contents shall comply with human factors weight limits of MIL-STD-1472.

3.3.3 Color Requirement. The exterior color of the LME shall be identified by Class as stated in the contract.
3.3.3.1 **Class I.** The exterior color shall be Camouflage Green 483. All hardware, findings, plastic components, fastener tape, webbing, grommets, straps, slips and guy lines, etc., visible from the tent exterior, shall approximate the tent color or shall be black. All support components shall approximate green or black. All components shall have a dull finish to reduce reflectance. Covers and containers shall comply with contract camouflage requirements.

3.3.3.2 **Class II.** The exterior color shall be Tan 686A, Chip Number 33446, in accordance with (IAW) Federal Standard 595C, Colors Used in Government Procurement. The color requirements are detailed in MIL-DTL-53039C Para 3.3.1 Table 1. All hardware, findings, plastic components, fastener tape, webbing, grommets, straps, slips and guy lines, etc., visible from the tent exterior, shall approximate the tent color or shall be black. All support components shall approximate tan or black. All components shall have a dull finish to reduce reflectance. Covers and containers shall comply with contract camouflage requirements.

3.3.3.3 **Backside color of cloth.** The backside color of the cloth for both classes shall be Gray, Color Chip Number 16515, IAW FED-STD-595C.

3.3.4 **Ventilation.** The LME shall provide ventilation. The LME shall have sufficient ventilation to prevent hazardous fumes/combustion product build-up from vehicles or equipment being worked on. The LME shall have sufficient warm weather high rate non-powered air exchange in non-blackout, hot or humid conditions to prevent heat build-up.

3.3.5 **Varying Terrain.** The LME will be used on both prepared and unprepared surfaces. Its design features shall permit the tent to function on uneven terrain with local (point) variations in ground elevation of up to 3 inches in 10ft of unprepared ground including sand or snow cover. When set up on this uneven terrain and subjected to wind, rain, or snow load testing specified in 3.5 there shall be no damage or degradation of setup/strike performance, or blackout compliance.

3.3.6 **Blackout Requirement.** The fully erected LME shall prevent detectable light leakage through the fabric (in accordance with the opacity test requirements stated in MIL-PRF-44103) and all openings when viewed with the naked eye at 100 meters or with the aid of night vision goggles at 300 meters when using the four lights (MIL-L-44259) supplied with the LME.

3.4 **Operating Requirements.**

3.4.1 **Setup/Strike.** The LME shall be easily erected (set-up) following the written instructions found in the US Army Technical Manual (TM) 10-5410-284-13&P, Operator’s , Unit and Direct Support Manual including Repair Parts and Special Tools List (RPSTL) for the Lightweight Maintenance Enclosure without any ladders or special tools not cited in reference TM. The LME shall be capable of assembly and disassembly under varying light conditions without use of special tools or removal of protective gloves. A type of non-powered hand tool may be used for installing tent pins and stakes. The tent shall be capable of assembly and disassembly while wearing protective cold-weather gear including gloves and Mission Oriented Protective Posture (MOPP IV) gear. All fastening and unfastening, opening or closing of flaps, guy lines, fasteners, hook and pile fasteners, vents, doors, windows or other mechanisms of the tent normally operated in day-to-day use shall be operable without binding, special adjustment, interference, or malfunction.
3.4.2 Crew Size. The crew size required to setup/strike the LME shall not exceed twelve (12) personnel for a 32’ tent. Twelve (12) personnel shall be able to erect a single tent in less than 1 hour and perform striking of a tent in no more than 1 hour in temperate climatic conditions. The physical characteristics of the personnel available to setup/strike the tent shall range from a 5th percentile height female (female: 61.8 inches) to a 95th percentile height male (male: 73.5 inches).

3.4.3 Extreme weather operation. The soldiers shall be able to set up, strike, pack, enter, exit, and open and close the vehicle and personnel doors and flaps while wearing environmental wet and/or environmental cold weather clothing. Time required to set-up/strike may be greater than during temperate climatic conditions.

3.4.4 Instruction labels. A permanent instruction label shall be provided with clearly written instructions and/or a stick figure sequence showing how to set up, strike, pack, and operate the LME. The permanent label shall be placed on the interior of one of the LME end walls near or on the personnel door opening at approximately eye height. A copy of this label shall also be placed inside each frame transport cover and each fabric transport cover.

3.5 Environmental requirements. The following conditions define the environmental limits for the LME. The LME shall provide protection for the occupants in all the following environmental conditions without degradation in performance.

3.5.1 Operational Temperature. The LME shall be fully operable in ambient temperatures between -60°F to +120°F. There shall not be increased component stiffness in cold temperatures that prevents the setup/strike of the system. There shall not be any weaknesses due to high temperatures that prevent the setup/strike of the system. Temperature conditions are defined in Army Regulation (AR70-38).

3.5.2 Rain. The fully erected LME shall be capable of withstanding a minimum of one inch of rain per hour for a period of three hours without resulting in degradation of safety and personnel or loss of mission capability.

Rain leakage is defined as:
- Negligible - Damp spots, barely noticeable.
- Minor - Droplets forming on the fabric or at the seams and hanging there (no movement of water) which under ordinary circumstances will not impair its intended military use.
- Major - Water continually leaking and dropping off or running down the item’s inner surface which impairs the item’s intended military use.

3.5.3 Wind-Driven Rain. The LME shall be capable of withstanding a wind-driven rain at 2 inches per hour with wind speeds of 50 miles per hour (MPH) for 30 minutes with three (3) occurrences of five (5) second wind gusts to 65 mph within the same 30-minute period. The LME shall also withstand 35 mph wind-driven rain at a rate of one (1) inch per hour for three (3) hours without evidence of leakage through the tent fabric, flaps, seams or vents that would result in degradation of safety or loss of mission capability.

3.5.4 Wind Load. The LME shall be capable of withstanding a steady wind of 55 miles per hour for 5 minutes when setup per the TM instructions. The LME shall also be capable of withstanding wind gusts of 65 mph in 3-second duration’s from any direction, over the entire surface of the enclosure. The LME shall be capable of sustaining winds without incurring damage, which would prevent the tent
from being repaired, or components used in other locations allowing the tent to continue its mission when all the guy lines are anchored in a way that eliminates the possibility of lines coming loose.

3.5.5 **Snow load.** The LME shall support a maximum snow load of 10 pounds per square foot uniformly distributed over the horizontal projection of the roof. The LME shall support the total load for a minimum of 12 hours without resulting in degradation of safety and personnel or loss of mission capability.

3.5.6 **Sunlight.** The LME shall be capable of withstanding exposure to direct sunlight for 18 months without loss of operational use. Components exposed to this test or in contact with components exposed to this test shall tolerate material temperatures up to 140 degrees Fahrenheit (°F).

3.5.7 **Humidity.** The performance of the LME shall not be adversely affected by ambient humidity between zero and 100% (relative humidity), regardless of ambient temperature. The LME shall minimize condensation on the inside of the tent that may adversely affect personnel or loss of mission capability.

3.5.8 **Salt fog.** The LME shall be operable in seashore and coastal climates.

3.5.9 **Blowing sand and dust.** The LME shall protect occupants from dust and sandstorms.

3.5.10 **Mildew and fungus.** The LME shall not exhibit growth of mildew or fungus (O rating) when subjected to fungi laden atmosphere (82-86°F) at not less than 85% relative humidity for 28 days.

3.5.11 **Insect Resistance.** The LME shall resist physical damage from and entry of insects, from the exterior, including flying insects as small as "no-see-ums" and from crawling insects larger than 1/8 inch high.

3.5.12 **Environmental Acids.** The LME shall resist damage from acids, including acid rain and bird droppings.

3.5.13 **Oil resistance.** Lubricating oil conforming to SAE Viscosity Grade 50 of SAE J1966 shall not leak through, seep through, or permeate the cover material. The LME shall resist permanent operational/functional damage from motor oil and synthetic lubricants.

3.5.14 **Transportation environment.** The LME shall be compatible with typical shock, bounce and vibration environment encountered during shipping by ground vehicle, train and aircraft.

3.6 **Fabric Performance**

3.6.1 **Material Requirements.**

3.6.1.1 **Exterior fabric.** The exterior fabric shall meet or exceed the requirements of MIL-PRF-44103D, with the exception of a deviation in weight up to 18 ounces per square yard maximum and change in Tan color to Tan 686A, Chip Number 33446.

3.6.1.2 **Transport Covers and Containers.** Material used for the body of transport covers and containers shall meet or exceed the requirements of MIL-PRF-20696, Type II, Class 2. When MI-PRF-20696 is used it must also meet minimum flame resistance requirement of MIL-PRF-44103D.
3.6.2 Flame Resistance. All tent fabric, including roof and walls, shall be flame resistant, self-extinguishing and shall have no flaming melt drip or molten pieces when exposed to flame or heat.

3.6.3 Toxicity Requirement. The cloth shall not present a health hazard when used as intended.

3.6.4 Bursting strength/puncture resistance. The cover material shall provide a bursting strength of 600 lbf and puncture resistances of 60 and 180 lbf for the screwdriver and rod probes, respectively.

3.6.5 Cold Crack. The fabric shall be resistant to cold crack at –50°F when tested IAW ASTM D2136.

3.6.6 Seam Strength. The cloth shall provide seam strength of 160 lbf/1 in.

3.6.7 Dead Load Seam Strength. The fabric seam bonded using a dielectric or hot air welder and 1 inch seam width shall withstand a 50lb load for 4 hours at 160°F and a 100lb load for 4 hours at room temperature when tested IAW ASTM D751.

3.6.8 Adhesion of coating. The fabric (roof and walls) shall have a minimum adhesion of coating of 8lbs/inch when tested IAW ASTM D751, dielectric or hot air bonding, and pulling clamp speed of 5 mm/s. Three specimens shall be tested by adhering face to face and three specimens shall be tested by adhering back to back.

3.7 Frame Components. Major frame components are listed in paragraph 6.1.

<table>
<thead>
<tr>
<th>Table 3.0-6</th>
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<tr>
<td>Frame Material Requirements</td>
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<table>
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<tr>
<th>Frame Assembly</th>
<th>Primary Member Frame Material Must Meet or Exceed Strength and Rigidity of</th>
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<tbody>
<tr>
<td>Upper Arch Assembly, Lower Arch Assembly, Door Header Assembly, Sider Assembly</td>
<td>Extruded 6061-T6, SAE-AMS-QQ-A-200/8 Aluminum</td>
</tr>
<tr>
<td>Purlin Assembly</td>
<td>Tubing 6061-T6, Aluminum per ASTM-B221</td>
</tr>
</tbody>
</table>

3.7.1 Tent Frame Assembly. Frame components shall be capable of field assembly in the form of extendable 8’ sections. All support components shall be a non-gloss green or black in color. The frame shall be lightweight, rigid and collapsible, and use quick, positive, snap-in-place locking, and quick-disconnect designs to minimize tent assembly and striking time using common standard tools. There shall be a minimum of loose parts. Quick-release pin-lanyard assemblies shall be used to secure the frame sections to each other. Fabric connections to the frame shall safely transmit loads from the fabric to the support subsystem under the operating environments specified in 3.5 without rendering the frame or its components unserviceable/uns usable. All frame assemblies and components shall be constructed with rust and corrosion-resistant material. (i.e. extruded rigid shapes or tubing of lightweight metal or other materials meeting performance requirements) The frame joints and all
frame members shall maintain their rigidity and strength when subjected to the environments specified in 3.5. Frame member strength shall be equal to or greater than the materials in Table 3.0-6.

3.7.2 Frame Physical Constraints. The tent frame support system shall not interfere with or impede access to the doors, windows, or tent external interfaces. (i.e. ECU duct, electrical supply feed-through for the wire/cable bundle, etc.) The frame support system shall not interfere with the access to windows, the electrical power box or operations of mechanisms for opening or closing screened opening covers.

3.7.3 Frame Support System Base Restraints. All frame support subsystem components that are in contact with the ground shall include provisions for pinning the base to prevent horizontal and vertical movement. Tent pins shall be able to be installed by left or right-handed soldiers without interference from tent supports or fabric. The base of the support system shall have design features for resisting frame movement or slipping on slick surfaces.

3.8 Electrical.

3.8.1 Light Set, General, Illumination. The LME shall be supplied with a general illumination, energy efficient lighting system providing a minimum of five-foot candles of light at thirty inches off the ground at the center of the LME. Four individual EMI lights (MIL-PRF-44259) shall be suspended from the tent frame by four individual light support straps. These four lights allow operations to continue during periods of reduced visibility, nighttime operations or when fully closed.

3.8.2 Power Distribution Sub-System. The LME Type I configuration has a weather-sealed electrical power distribution box providing 70 amps of service. The electrical power distribution box shall be grounded, provide for operation of the lights (10-amps) and include at least three (3) duplex weather-resistant Ground Fault Circuit Interrupter (GFCI) protected outlets (20-amps each) to provide power for maintenance operations. The power distribution box is supported by the frame assembly and shall be located on the right side of the door when entering the LME.

3.9 Ownership and Support requirements.

3.9.1 Safety and Health. The LME shall have no uncontrolled safety or health hazards and shall conform to OSHA requirements, best commercial practices and military standards when applicable. No part of the LME shall introduce safety hazards to the soldiers who shall transport and use the LME. This includes, but is not limited to, sharp or rough edges, pinch hazards or components that could swing out and strike a soldier. The LME shall minimize flammability and personnel hazards.

3.9.2 Personnel hazards. The LME shall be free of hazardous burrs, nicks, sharp edges, foreign materials, or other conditions creating physical danger to a user and be physically safe to erect strike and operate.

3.9.3 Service Life. LME and all component parts, except tent pins service life shall be 3 years minimum, with multiple operational deployments. LMEs expected typical peacetime usage is 15 erect/strike cycles per year for 3 years (45-setup and strike cycles) without significant performance degradation from weathering and handling effects that render the tent un-useable.
3.9.4 Shelf Life. The tent shall have a minimum depot shelf life of 10 years. No part of the tent shall be degraded beyond use by wet or dry storage. The stored tent shall be resistant to deteriorating effects of rot, fungus, mildew or corrosion. Tent components shall not lose strength, show evidence of increased water permeability or degrade blackout compliance as a result of storage and transportation temperatures of -60 °F to +160 °F. Tent setup after storage at these temperatures shall show no evidence of damage, degradation or loss of operational use. This requirement applies to storage of new tents still in their original crates.

3.9.5 Transportability. LME components, when packaged for transport, shall allow manual loading. Up to eight (8) soldiers shall be able to safely lift, and carry each fully loaded transport cover, bag and/or container under all climatic conditions. Each transport cover, bag and/or container shall weigh no more than 240 pounds when packed with LME components. Marking for weight/lift requirements shall be provided on each transport cover, bag and/or container. Any applicable warnings related to weight/lifting shall be clearly marked on the outside of the containers. A list of components shall be provided on each transport cover on the interior and exterior sides. For transport covers, bags, and containers a list of components shall be required on the exterior side only. The safe lifting limits for one to eight soldiers are respectively: 37, 74, 102, 130, 157, 185, 213, and 240 pounds (IAW MIL-STD-1472).

3.9.5.1 Transport covers bags and/or containers. Transport covers, bags and/or containers shall provide protection for components during shipment and storage. Transport covers, bags and/or containers shall allow a folded LME to be easily placed onto/into the opened cover, bag, and/or container while on the ground. Based on the safe lifting limits a soldier may lift, all transport covers, bags and/or containers shall have permanently attached handles to allow one (1) to eight (8) soldier to safely lift as required.

3.9.5.2 Maximum component size. No packaged component shall be longer than 100 inches, wider than 84 inches, or higher than 86 inches in order to fit on one 463L Air Force shipping pallet.

3.9.5.3 Maximum weight. The LME shall have a maximum total packed weight of 1,500 lbs. The total maximum weight includes all fabric components, frame components, guy lines, tent stakes, electrical components, dedicated field repair kit, and transport covers, bags and/or containers less shipping crates and containers.

3.9.5.4 Maximum volume. The LMEs maximum packaged volume shall be 110 cubic feet.

3.9.6 Maintainability. The LME shall be field repairable in accordance with the Operator's, Unit and Direct Support Technical Manual (TM) that is over packed with each LME. A dedicated field tentage repair kit shall be provided with each LME intended for operator level maintenance. The LME shall require no special tools or equipment that is not listed in the TM for assembly/disassembly.

3.9.7 Identification and Marking. The letters U.S. shall be permanently placed on the outside of the LME roof and transportation covers. Each separate component shall be marked with the letters U.S., the name of the component conforming to the instruction label description, contractor’s name, trade name or trademark, and the year of the contract. Marks shall be legible, durable, and placed approximately in the center of the component, lengthwise. (MIL-STD-130)
3.9.8 Instructions. Printed abbreviated setup Instruction labels according to TM 10-5140-284-13&P, Chapter 2, for unpacking, erecting, striking and repacking the LME shall be permanently attached to the inside surface of each End Wall and Transport Cover.

3.9.9 Workmanship. Non-organic webbings, lines, ropes and tapes shall be fused at the exposed ends to prevent sharp edges or fraying. Becket lacing shall be properly aligned for secure fastening without difficulty in lacing. All weather flaps shall completely cover the seam or opening they are intended to cover. Hook and pile fasteners shall properly align, be free of distorted hook or pile, and fasten securely. All edges of metal components shall be free of burrs and sharp edges. All guy lines and fabrics shall be free of tears, fraying, rips, punctures, and seam separation. Grommets shall have smooth surfaces, and be firmly attached to fabrics with no evidence of tears or fraying around the edges. Quick-release and hitch-clip pins shall interface smoothly and securely. Frames shall be free of stress bends, distortions, stress fractures, cracks, or gouges. Arch spindle pins shall be smoothly rounded at the tip, without any sharp edges at the tip or along their length that could cause guy line fraying. All buckles shall lock securely and release smoothly. Gusset plates shall align correctly with their mating components for smooth fitting of quick-release pins without hindrance. Lanyards of hitch-clip pins and quick-release pins shall attach securely to frame members or extenders, but be free to rotate to prevent stressing the lanyard-fastener junction point.

3.9.10 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. The inspection requirements specified herein are classified as follows: First Article Inspection (4.1.1) and Conformance Inspection (4.1.2).

4.1.1 First article inspection. When specified (see 6.2 and 6.3), first article inspection shall consist of the first article tests specified in Table 4.0-1. First article samples shall be as specified in the contract.

4.1.2 Conformance inspection. When specified (see 6.2 and 6.4) a sample shall be subjected to the conformance tests and examinations specified in Table 4.0-1. Conformance inspection shall verify that the LME meets the minimum performance requirements of section 3.

| Table 4.0-1 |
| Requirements Verification Matrix |
| F= First Article Applicable  C= Conformance Inspections  
Class = Inspection Classification |

<table>
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<tr>
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### Fabric Performance

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### Frame Components

| Frame Components             | F     | 3.7         | 4.9          |

### Electrical Components

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<td>Power Distribution Sub-System</td>
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### Ownership and Support Requirements

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<tr>
<td>Personnel hazards</td>
<td>C</td>
<td>3.9.2</td>
<td>4.11.2</td>
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</table>
4.2 Verification methods. Acceptable verification methods include visual inspection, measurement, sample tests, full-scale demonstration tests, simulation, modeling, engineering evaluation, component properties analysis, and similarity to previously approved or previously qualified designs.

4.2.1 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.

4.2.2 Verification using standard samples. Use standard samples to verify colors with visual inspections. Compare with the naked eye in simulated daylight.

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

4.4 Interface and Interchangeability demonstration. Compare the Sample LME with a Baseline LME.

4.4.1 Tent interface demonstration. Erect the LME in each of the following configurations:
- Baseline LME support frame with Sample LME outer shell fabric sections
- Baseline LME outer shell fabric sections with Sample LME support frame and tent pins
- Sample LME support frame with baseline LME outer shell fabric sections
- Sample LME outer shell fabric sections with baseline LME support frame and tent pins

4.4.2 Transportability interface demonstration. Perform the transportability demonstration (4.7.4) with the following configurations:
- Baseline LME carried in Sample LME transport covers, bags/containers
- Sample LME carried in baseline LME transport covers, bags/containers
4.4.3 **Interface and interchangeability criteria.** Visually examine each configuration for compatibility between the baseline LME components and Sample LME components. Verify no binding or misfit affecting ease of operation, visible openings affecting blackout, or form, fit and function incompatibilities between the Sample LME and the baseline LME. Inspect each configuration for galling, abrasion, pinching, mutilation, misalignment, distortion, distention, bent, misshapen, or deformed components, or other evidence the reassembled LME’s are not totally interchangeable.

4.4.3.1 **Interface requirements verification.**

4.4.3.1.1 **ECU duct interface measurement.** Visually inspect for the two ECU duct openings and one electrical cable feed through on one side of an intermediate fabric section. Verify the presence of weatherproof sleeves.

4.4.3.2 **Tent pins interface demonstration.** Visually inspect for 18 inch steel tent pins, 16 and 24 inch electrically non-conductive wood tent stakes, with the number of tent pins/stakes appropriate to LME connections. Attach a sample tent line and wall connector to tent pins/stakes and verify a secure connection.

4.4.3.3 **Use with ULCANS camouflage nets.** Visually inspect for compatibility of using the LME with standard Army ULCANS.

4.5 **Physical characteristics.**

4.5.1 **Dimensions.** Visually inspect the LME. Measure minimum interior dimensions to be 23 ft wide at the base. Measure minimum working height to be 13 ft high at a minimum of 6 ft wide at the vehicle door opening. Measure the length of the LME to be 32 ft when erected.

4.5.2 **Weight.** Weigh the total components required for each type LME. The LME has a maximum total packed weight of 1,500 lbs. The total maximum weight includes all fabric components, frame components, guy lines, tent stakes, electrical components, dedicated field repair kit, and transport covers, bags and/or containers less shipping crates and containers.

4.5.3 **Color.**

4.5.3.1 **LME color inspection.**

4.5.3.1.1 **Class I.** Visually inspect the exterior LME color for similarity to the standard sample color of Class I LME, as specified by the contract. Verify that no shiny or light reflective components are visible on the tent exterior. The color and appearance of the face side and the back side of the cloth shall match the standard sample when viewed under filtered tungsten lamps that approximate artificial daylight and that have correlated color temperature of 7500 +/- 200° K, with illumination of 100 +/- 20 foot candles, and shall be a good match to standard sample under incandescent lamplight at 2856 +/- 200° K.

4.5.3.1.1.1 **Hardware and findings color - Class I inspection.** Visually inspect findings and hardware visible from the tent exterior are similar to Camouflage Green, Olive Drab or Black. Verify metal and plastic components are a subdued color. These may retain the color from manufacturing if not shiny or light reflective.
4.5.3.1.2 **Class II.** The exterior color shall be Tan 686A, Chip Number 33446, in accordance with Federal Standard 595C, Colors Used in Government Procurement. The color requirements are detailed in MIL-DTL-53039C Para 3.3.1 Table 1. This new camouflage color, Tan 686A, will replace Desert Tan 459. The average infrared reflectance shall be 62 to 72 percent between 720 to 860 nanometers. Paragraph 6. Notes of FED-STD-595C provides additional important information as follows: “The chips for camouflage colors shall be used for general color matching purposes only, the specifications for camouflage coatings contain requirements for infrared reflectance which must be met in addition to color. The color cards (chips) for the camouflage colors contain pigments chosen for their suitability and compatibility with the color card coating and, therefore, have different infrared reflectance characteristics than those required for camouflage coatings. Merely matching the color chip for color will not be sufficient to assure product acceptance by the contracting activity. For further information, contact for camouflage colors only: U.S. Army Research Laboratory, CARC Commodity Management, ATTN: AMSRD-ARL-WM-MC, Aberdeen Proving Ground, MD 21005-5069.” All hardware, findings, plastic components, fastener tape, webbing, grommets, straps, slips and guy lines, etc., visible from the tent exterior, shall approximate the tent color or shall be black. All support components shall approximate tan or black. All components shall have a dull finish to reduce reflectance. Covers and containers shall comply with contract camouflage requirements.

4.5.3.1.2.1 **Hardware and findings color - Class II inspection.** Visually inspect findings are approximately the same color as the LME. Verify hardware, guy ropes and plastic components visible from outside are black.

4.5.3.1.3 **Backside of cloth.** The backside color shall be Gray, Chip Number 16515, in accordance with Federal Standard 595C, Colors Used in Government Procurement.

4.5.4 **Ventilation verification.** Satisfy one-cold weather and one-warm weather verification.

4.5.4.1 **Cold weather ventilation verification.** Demonstrate the ventilation rate can be manually adjusted from zero to the maximum rate, and then meet the cold weather ventilation demonstration or the cold weather ventilation analysis.

4.5.4.1.1 **Cold weather ventilation demonstration.** Measure the ventilation rate on a fully erected LME with ambient temperature at 30 °F or below. Ventilation rate shall be between 8 and 20 cubic feet per minute with the interior temperature maintained at a minimum of 50 °F.

4.5.4.1.2 **Alternative cold weather ventilation analysis.** Measure the fully open ventilation area to be at least 5 square feet and not extending more than 40 inches below the roof peak.

4.5.4.2 **Warm weather ventilation demonstration.** Meet one demonstration or the analysis method in section 4.5.

4.5.4.2.1 **Warm weather ventilation demonstration.** Test a fully erected LME with doors and other openings adjusted for a tropical, non-blackout environment. Measure the ventilation rate is at least 450 cubic feet per minute in full sunlight with ambient Temperature at + 80 °F +/- □ 50°F and wind of 1 knot or less.
4.5.4.2.2 **Alternative warm weather ventilation demonstration.** Test a fully erected LME with doors and other openings adjusted for a tropical, non-blackout environment. Verify the internal Temperature remains below +100 °F over a 5-hour period with the measurement taken at the center of the LME, 5 feet above floor level. Ambient conditions are full sunlight with Temperature at + 80 °F +/- 5 °F, wind and of 1 knot or less.

4.5.4.2.3 **Alternative warm weather ventilation analysis.** Measure the minimum open ventilation area to be at least 350 square feet, distributed evenly on each half of the LME. LMEs that use roll-up walls and ends (exclusive of insect screening) meet this criterion.

4.5.4.3 **Odors verification.** Satisfy one-odor criteria and one-toxicity criteria.

4.5.4.3.1 **Odors measurements.** After completing each of the operating environment tests, a panel of three inspectors performs the odor test. If anyone 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 rubber compounds are not objectionable.

4.5.4.3.2 **Alternative odors analysis.** Demonstrate by analysis, the tent materials and manufacturing processes do not result in a product that can produce noxious odors.

4.5.5 **Varying terrain evaluation.** Evaluate the cold weather and the tropical, non-blackout, high ventilation configurations tent design and construction details for compatibility with variations in terrain up to 12 inches anywhere along the LME. Verify tent design incorporates provisions, such as adjustable skirts, to protect from entry of running water, to prevent loss of environmental or blackout protection and to protect from insect entry along the base perimeter. Verify the adjustment can be deployed either on the inside or outside of the LME.

4.5.6 **Blackout protection demonstration.** Conduct this test with a fully erected LME with doors and other openings closed. Perform the test on a moonless night in an area absent of man-made light sources. Locate and position general illumination fluorescent light set provided with the LME per the manufacturer’s instructions. Visually verify no visible light is detectable, using the naked eye, from a distance of 100 meters. Begin observations directly in front of the light source. Continue observations 360 degrees around the LME at 45-degree increments. Perform the night vision blackout test, using a night vision device (NVGs) from a distance of 300 meters from the LME. Verify the light source is not detectable through the NVGs.

4.6 **Operating requirements verification.**

4.6.1 **Ease of operation verification.** Set-up the LME with a maximum of twelve (12) 5th to 95th percentile soldiers following Technical Manual and/or permanently attached instruction labels. Use a LME in a configuration packed for transportation. Special tools or equipment that is not listed in the TM or ladders are not permitted to set-up/strike the LME. Complete this demonstration in a maximum of 60 minutes. Manually adjust the LME by fastening and unfastening all closures, slide fasteners, vents and other controls. And all guy lines shall also be adjusted. Complete all operations without binding or interference. Demonstrate LME strike and pack by a maximum of twelve (12) soldiers, following TM instructions. Complete this demonstration in a maximum of 60 minutes.
4.6.2 Extreme weather operation demonstration. Perform set-up demonstration. Perform LME strike and pack for transport demonstration. Accomplish all demonstrations while wearing cold weather clothing and gloves. Do not remove gloves to perform any operation.

4.6.3 Access inspection. Visually inspect for a minimum of one vehicle and one personnel door at each end of the LME.

4.6.3.1 Vehicle door. Visually inspect the vehicle door opening when fully open for a minimum height of 13 feet. With the vehicle door fully open visually inspect that the door can be secured in the closed configuration and in the open position and provide a minimum of 12 feet width at the base and 6 feet width at 13 feet height. Visually inspect the door for any zippers. Open, completely close, and fasten doors while wearing cold weather clothing, including gloves. Verify that doors operate smoothly without binding or hang-up.

4.6.3.2 Personnel door. Visually inspect the personnel door for a minimum opening size of 6 feet 6 inches in height and 3 feet in width. Inspect personnel door capability of being secured in either the open or closed configuration.

4.6.4 Instruction labels inspection. Visually inspect for legible, permanent labels attached to the interior of each end wall. Visually inspect that labels contain clear written instructions and/or a stick figure sequence noting how to erect, strike, pack, and operate the LME. Visually inspect that the label is permanently attached to the frame and fabric transport covers.

4.6.6 Fabric section functional requirements.

4.6.6.1 End section. Visually inspect the end fabric section for one vehicle door and one personnel door.

4.6.6.2 Intermediate section. Visually inspect the intermediate fabric section for four window assemblies, two on each side and two Environmental Control Unit (ECU) duct openings on one side only. Inspect windows for a barrier against wind, rain, sand and dust. Inspect windows for a means of containing interior light during blackout operations. They shall include a means of preventing the intrusion of insects while permitting the passage of air through the window opening. Inspect for an electrical supply feed through for electric wires or bundle of wires up to five inches in diameter through the intermediate section. It shall include an ability to seal the outer wall to the wires to prevent water migration and minimize the exchange of air between inside and outside. The feed through shall seal against the intrusion of water and dust when in use and when closed.

4.7 Operating Environment Requirements.

4.7.1 Temperature verification. Perform the cold temperature operational demonstration or the LME component demonstration for cold temperatures. Perform the LME component demonstration for high temperatures on separate samples.

4.7.1.1 Cold temperature operational demonstration. Erect a packed for transport LME in the cold weather configuration, after conditioning for 8 hours at - 25 °F +/- 5 °F. The LME shall remain in this environment during the demonstration. Anchor points may be substituted for tent pins. After completing the erection, examine the LME for cracking or other failures.
4.7.1.2 **LME components demonstration.** Perform the cloth component test and the fastener test, with the cold and hot conditions as defined below.

4.7.1.2.1 **Cold temperature conditioning.** Use two, 1 by 4-inch specimens of each type of cloth and condition cloth specimens for 4 hours at - 50 °F +/− 2 °F. For fasteners, condition fasteners for 4 hours at - 25 °F +/− 5 °F.

4.7.1.2.2 **Hot temperature conditioning.** Use two, 2 by 6-inch specimens of each type of cloth and condition cloth specimens and fasteners for 4 hours at +140 °F +/− 2 °F.

4.7.1.2.3 **Cloth components test.** Cut specimens of each type of tent material (including any tent lines and insect barriers) with one long dimension in warp and one long dimension in fill. If components cannot physically meet this size requirement, such as in 2 inch wide webbing, use the typical size, but test in both dimensions, except for tent lines. Remove sample from the conditioning environment. Bend each sample 180° lengthwise over a 1/8-inch diameter steel rod conditioned to the same Temperature. Complete this procedure within 30 seconds after removing the specimen from the conditioned environment. Verify the sample remains intact, without visible signs of deterioration.

4.7.1.2.4 **Fasteners test.** While still in the conditioning environment, operate each type of fastening device after the exposure period. Verify no binding or deterioration.

4.7.2 **Rain resistance demonstration.** Erect a LME configured with all doors, flaps and other openings in the closed position. Perform the rainfall test and wind driven rain test.

4.7.2.1 **Rainfall test.** Simulate a one-inch per hour rainfall, evenly distributed over the top surface of the LME, for three hours. Inspect the interior during the test for evidence of water leakage that would result in degradation of safety or loss of mission capability.

4.7.2.2 **Wind driven rain test.** Simulate a wind driven rain at a rate of two inches per hour for 30 minutes at wind speeds of 55 MPH with occasional gusts to 65 MPH for 5 seconds every 10 minutes. Inspect the interior during the test for evidence of water leakage, indicated by visible streams of water, running down the inside of the LME, falling from the inner surface, or by blown water detectable to LME occupants.

4.7.3 **Wind resistance verification.** Perform the wind load demonstration or the alternative analysis.

4.7.3.1 **Wind load demonstration.** Perform a wind test for one hour with the wind speed at 25 mph, with one 5-minute period at 55 mph, and two periods at 65 mph for 3 seconds each. All anchor points may be reinforced for this test. Typical user adjustments, such as line tensioning, may not be performed. Verify the LME is not damaged and retains structural integrity.

4.7.3.2 **Alternative wind load analysis.** Demonstrate LME materials and designs have sufficient strength to withstand a constant wind of 55 mph, with gusts to 65 mph.

4.7.4 **Snow and sleet resistance verification.** Perform the snow load test or the alternative analysis.

4.7.4.1 **Snow load test.** Erect a LME with all doors, flaps and other openings configured for cold
weather blackout conditions. Perform this test on frozen soil, or hardpan dry soil to simulate winter soil conditions. Evenly load the entire top surface of the LME at 10 pounds per square foot. Apply the weight gradually over 12 hours and leave in place for an additional 12 hours. Typical user adjustments, such as line tensioning, may be performed as necessary.

4.7.4.2 Snow load alternative analysis. Demonstrate tent materials and the tent design has sufficient strength to provide protection while loaded at 10 pounds per square foot.

4.7.5 Sunlight resistance demonstration. If the accelerated durability demonstration was performed as part of the verification process, no additional verification is required. If durability was verified by analysis, perform the sunlight resistance test.

4.7.5.1 Sunlight resistance test. Erect a LME configured with all doors, flaps and other openings in the closed position. Subject all exterior LME components to a uniform 100 Kilojoules ultraviolet environment for at least 500 hours. After completing the exposure, verify no cracking, crazing, blooming, and chalking or appreciable color change on any exterior LME component.

4.7.6 Humidity compatibility demonstration. Assemble LME into a humid environment with Temperature above +70 °F and relative humidity at least 75 percent for a period of two weeks. Then manipulate all fasteners, flaps, doors and tent adjustments to verify smooth, non-binding operation. Verify no residue or discoloration from corrosion on the operator’s hands. This test may be performed in the field or test chamber.

4.7.7 Salt fog compatibility verification. Perform the salt fog chamber test or the alternate field demonstration and meet the salt fog resistance criteria.

4.7.7.1 Salt fog chamber test. Test samples of each type of tent material (including any tent lines and insect barriers) and all tent fasteners and metal components. Subject the samples to a continuously atomized, finely divided, wet, dense salt spray mixture of 5% sodium chloride and 95% water. Verify the spray apparatus, piping, and reservoir is not reactive to salt spray.

4.7.7.1.1 Salt fog chamber test procedure. Uniformly distribute the salt fog over each sample at a fallout rate between 0.5 and 3-ml/80 cm2/hr for at least 48 hours at a constant 95 °F with minimal air circulation. After the test, dry the samples at ambient conditions for at least 48 hours, then meet the salt fog resistance criteria.

4.7.7.2 Alternate salt fog field demonstration. Place the assembled LME into a salt atmosphere for a period of two weeks. Permissible sites include beach areas with direct exposure to on-shore ocean breezes and temperatures above +70 °F. Meet the salt fog resistance criteria following the exposure period. This field test may be combined with the humidity field test.

4.7.7.3 Salt fog resistance criteria. Examine fabric samples and components, with particular attention to high stress areas, locations where metal components mate, metallic surfaces, surface treatments and coatings. Verify no evidence of corrosion as indicated by deposits on a surface accompanied by etching or pitting of the base material. Deposits that wipe off without any surface damage are acceptable. Manipulate all fasteners, flaps, doors and tent adjustments to confirm smooth, non-binding operation. Verify no residue or discoloration from corrosion on the operator’s hands.
4.7.8 **Sand and dust resistance inspection.** Inspect a fully erected LME, in blackout configuration, for any openings larger than 1 square inch that would allow entry of blowing sand and dust.

4.7.9 **Mildew resistance.** To determine conformance the tent material shall be tested IAW ASTM G21 and shall pass with a rating of zero, when subjected to fungi laden atmosphere at 82 -86°F, at not less than 85% relative humidity for 28 days. A 10x objective for final magnification of 100 xs with the 10x ocular shall be used to evaluate growth.

4.7.10 **Insect resistance verification.** Verify the LME is not susceptible to damage from insects, that the LME protects occupants from insects, and no metal materials are used in insect barriers.

4.7.10.1 **Insect damage resistance verification.** Verify resistance to insect damage by demonstration or analysis.

4.7.10.1.1 **Insect resistance demonstration.** Test LME samples following ISO 3998 Textiles -- Determination of resistance to certain insect pests, or equivalent methods.

4.7.10.1.2 **Alternative insect resistance analysis.** Demonstrate tent materials are similar to the currently fielded LME’s.

4.7.10.2 **Insect protection verification.** Verify protection from insects, including flying insects as small as “no-see-ums”, and from crawling insects larger than 1/8 inch high with the evaluation, then the barrier burst strength demonstration.

4.7.10.2.1 **Insect protection evaluation.** Evaluate the tropical, non-blackout, high ventilation configuration LME design and construction details. Verify the design incorporates insect barrier openings less than .044 inches for 100 percent of all ventilation openings. Verify at least 99.5 percent of LME surface area prevents entry of insects by meeting the maximum opening size criterion (this includes openings around any fasteners or other interfaces). Verify the tent-to-ground interface and any other openings are 1/8 inch maximum.

4.7.10.2.2 **Insect barrier burst strength demonstration.** Test three samples of insect barrier with a procedure capable of providing 99 percent repeatable accuracy. Verify the minimum burst strength for an evenly distributed load over a 4-inch square sample is 165 pounds per square inch (psi).

4.7.10.2.3 **Insect barrier materials inspection.** Visually inspect the insect barriers.

4.7.11 **Environmental acids verification.** Use ISO 105-E05, Textiles, Tests for Colour Fastness, Part E05, to demonstrate compatibility with environmental acids, such as acid rain and bird droppings.

4.7.12 **Oil resistance.** To determine conformance a 0.5 in. circle of Viscosity Grade 50 lubricating oil IAW SAE J1966 shall be poured onto an area of approximately one square inch on one side of the cover material and shall be allowed to stand for 1 hour. The lubricating oil shall not leak through, seep through, or permeate the cover material.

4.7.13 **Transportation environment compatibility verification.** Perform the Temperature storage limits test, vibration test, shock test, and bounce test, in order, on a LME in the packed for transport configuration. Then unpack LME and visually inspect for abraded areas, cuts, tears or rips, especially
in fabric areas that contact metal components. Verify LME and framework fasteners, adjusters and connectors operate smoothly. Erect the LME and verify no damage, such as broken or non-functional components and abrasions that affect performance. This may be combined with any other LME erection demonstration.

4.7.13.1 Temperature storage limits test. Cold soak the LME components at -25°F for 24 hours, and then allow to stand at ambient Temperature for 12 hours. Heat soak at +160°F for 24 hours, then allow to stand at ambient Temperature for 12 hours.

4.7.13.2 Vibration test. Mount the LME components in a fixture free from resonance over the test frequency range. Subject each packed LME component to a simple harmonic motion with amplitude of 0.03 inches (0.06 inches maximum excursion). Vary the frequency between 5 and 500 Hertz, with a full cycle time of ten minutes. Apply this motion for 2 hours in each of three, mutually perpendicular directions for a total test time of 6 hours.

4.7.13.3 Shock test. Cold soak the LME components at -25°F +/- 5°F for 8 hours. Drop each component, in its packed configuration from at least 4 feet onto a concrete surface. If different impact orientations are possible, for example, lengthwise and end impacts, test each orientation once, sequentially.

4.7.13.4 Bounce test. Place all packed LME components onto a plywood-covered test bed (marine plywood is recommended for durability). Verify the tester configuration produces random bounce and prevents continuous orbital motion. Subject the components to a circular, 1 inch diameter orbital path at 5 Hertz, or a package tester set at 300 rpm, for at least 45 minutes to simulate truck transportation.

4.8. Performance


4.8.2 Flammability verification. Meet the flammability criteria. This requirement does not apply to tent stakes, frame sections or guy lines.

4.8.2.1 Flammability demonstration. Use The American Society for Testing and Materials (ASTM) D6413 – Standard Test Method for Flame Resistance of Textiles (Vertical Test). Verify the fabric(s) used in the production of the LME shall be self-extinguishing within 2.0 seconds after exposure to the flame source for 12 seconds in both the warp and fill directions. Damaged length shall be less than 50% of the sample length. There shall be no flaming melt drip or molten pieces of fabric at any time.

4.8.3 Toxicity test. When required, an acute dermal irritation study and a skin sensitization study shall be conducted on laboratory animals. When he results of these studies indicate the finished cloth is not a sensitizer or irritant, a Repeat Insult Patch Test shall be performed in accordance with the Modified Draize Procedure. If the toxicity requirement can be demonstrated with historical data, toxicity testing may not be required.

4.8.3.1 Alternate toxicity analysis. Demonstrate materials and manufacturing processes do not contain compounds listed in the NIOSH Pocket Guide to Chemical Hazards. Demonstrate the LME does not produce dangerous toxic exposures by meeting published chemical threshold limit values. Acceptable limits are any one of the following: The American Conference of Governmental Industrial Hygienists.
4.8.4 Bursting strength/puncture resistance. To determine conformance the cover material shall be tested IAW ASTM D751 for bursting strength and puncture resistance. Samples shall exhibit a ball bursting strength of not less than 600 lbf and a screwdriver puncture resistance of not less than 60 lbf. Additionally, when tested IAW ASTM D4833, the cover material shall exhibit a rod puncture resistance of not less than 180 lbf.

4.8.5 Cold Crack. The fabric shall be resistant to cold crack at -50 °F when tested IAW ASTM D236.

4.8.6 Seam Strength. The fabric shall provide a seam strength of 160 lbf/in when tested IAW ASTM 751 using a 1 inch by 8 inch sample.

4.8.7 Dead Load Seam Strength. The fabric seam, bonded using dielectric or hot air welder and 1 inch seam width, shall withstand a 50lb load for 4 hours at 160°F and a 100lb load for 4 hours at room temperature when tested IAW ASTM D751.

4.8.8 Adhesion of Coating. The fabric (roof and walls) shall have a minimum adhesion of coating of 8lbs/inch when tested IAW ASTM D751, dielectric or hot air bonding, and pulling clamp speed of 5 mm/s. Three specimens shall be tested by adhering face to face and three specimens shall be tested by adhering back to back.

4.9 Frame Components. Verify all frame components are capable of field assembly. Verify frame components operate and function as intended. Ensure they do not interfere with or impede access to doors, windows or tent external interfaces. Verify the base of the support system has design feature for resisting movement or slipping during use.

4.10 Electrical. Verify all electrical components operate and function as intended.

4.10.1 Lighting. Visually inspect that the lights supplied provide general illumination and are energy efficient lighting system sufficient to allow operations to continue during nighttime operations, periods of reduced visibility, or when fully closed. Ensure lights meet minimum performance requirements of MIL-PRF-44259. Visually inspect that the LME possesses a means to support the lights. Visually inspect that there is sufficient quantity and length of power cables to connect lights and to connect to power distribution box.

4.10.2 Power distribution. Visually inspect that the main electrical power distribution box is weatherproof. Perform appropriate testing to determine that the main electrical box is grounded, provides for operation the lights of the LME and has electrical duplex outlets using input from a 5-wire system. Visually inspect that the cable attachment points are clearly identified and the cable wires can be easily installed using common hand tools. Visually inspect that the electrical distribution box has at least six (6) weather-resistant Ground Fault Circuit Interrupter (GFCI) protected outlets to provide power for maintenance operations.
4.11 **Ownership and Support requirements verification.**

4.11.1 **Safety and health verification.** Complete the flammability verification and the hazard inspection.

4.11.1.1 **Personnel hazards inspection.** Visually inspect the LME is free of hazardous burrs, nicks, sharp edges, foreign materials, or other conditions creating physical danger to a user.

4.11.2 **Service Life.**

4.11.2.1 **Durability demonstration.** Demonstrate durability by accelerated weathering or analysis.

4.11.2.1.1 **Alternative durability analysis.** Demonstrate tent materials and manufacturing processes are similar to the currently fielded Lightweight Maintenance Enclosures.

4.11.2.2 **Reliability verification.** Perform the reliability demonstration on a fully erected LME. Fasten and unfasten all connectors, interfaces, toggles, and other methods of tent assembly through a minimum of 50 cycles. For adjustable components, such as tent lines, flaps, vents, doors, deployable insect barriers and other user-operated features, cycle through open and closed positions a minimum of 1000 cycles. Any binding or misfit that affects ease of operation, or any form, fit and function incompatibilities constitutes 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 tent components do not fit and perform properly.

4.11.3 **Shelf life verification.** Demonstrate shelf life by accelerated aging or by analysis.

4.11.3.1 **Transportability demonstration.** Lift each component from floor level to a height of 3 feet with a maximum of eight soldiers. Weigh or suspend each LME component from a suitable measuring device, simulating the user’s lifting position and measure individual weight loads to be 37 pounds maximum.

4.11.3.2 **Transport covers demonstration.** Visually inspect cover for permanently attached handles to allow up to eight-soldier lift. Place a folded LME onto the fully opened cover, while positioned on the ground. Perform the transportability demonstration with soldiers wearing cold weather gloves. Verify a secure, comfortable interface with operators’ hands. Repeat the transportability demonstration without gloves and verify no abrasions, pinching or other uncomfortable conditions on the operators’ hands.

4.11.3.3 **Maximum component size measurement.** Measure the LME in the transport configuration. Maximum length is 100 inches. Maximum width is 84 inches. Maximum height is 86 inches.

4.11.3.4 **Maximum weight measurement.** Weigh all fabric components, frame components, guy lines, tent pins/stakes, electrical components, dedicated field repair kit, and transport covers/bags/containers as a total tent system packaged for shipment. The Type I LME maximum total packed weight shall not exceed 1,500 lbs. The total maximum weight includes all fabric components, frame components, guy lines, tent pins/stakes, electrical components, dedicated field repair kit, and transport covers/bags/containers less shipping crates/containers.
4.11.3.4 **Maximum folded volume measurement.** Measure the physical envelope of the packaged LME. Multiply maximum length by maximum width by maximum height to be less than 110 cubic feet.

4.11.4 **Maintainability verification.** Demonstrate repairs on representative fabric samples and other LME components such as fasteners and reinforcements with repair kit provided with the LME.

4.11.4.1 **Hole patching demonstration.** Patch a 2-inch diameter hole and a rectangular 1 square foot area by hand, and by machine operations where appropriate.

4.11.4.2 **Rip and tear repairs demonstration.** Repair a 12-inch length fabric tear by hand, and by machine operations where appropriate.

4.11.4.3 **Seam restitching demonstration.** Repair a 12-inch length representative seam rip and a 12-inch length, or an appropriate sample, of all different types of fasteners and fittings by hand, and by machine operations where appropriate.

4.11.4.4 **Hardware and components repairs demonstration.** Demonstrate or define field repair procedures on other sample LME components, such as reinforcements, grommets, toggles, and screening by hand and machine operations.

4.11.5. **Special identification inspection.** Visually inspect that the letters U.S. is permanently placed on the LME roof and transportation covers, bags, and containers. Visually inspect the remaining components for the letters U.S., the name of the component conforming to the instruction label description, contractor’s name, trade name or trademark, and the year of the contract. Verify marks are legible, durable, and placed approximately in the center of the component, lengthwise.

5. **PACKAGING**

For acquisition purposes, the contract or order specifies packaging requirements (see 6.2). When DoD personnel perform material packaging, those personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. The Inventory Control Point packaging activity within the Military Department of Defense Agency, or within the Military Department's System Command, maintains packaging requirements. 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 general or explanatory information that may be helpful, but is not mandatory)

6.1 **Intended use.** The modular LME is a quickly deployed mobile tent, sized to allow the performance of maintenance functions across the battlefield in all environmental conditions. The primary use of the Type I LME is to provide shelter for repairing tracked and wheeled vehicles in the Unit Maintenance Collection Point, Brigade Support Area, and Tactical Assembly Area of the battlefield. The Type II LME is to provide environmental protection for the U.S. Army Laundry Advanced System (LADS). There is no Chemical-Biological compatibility requirement for this tent system.
6.1.1 Major Lightweight Maintenance Enclosure (LME) Components. The major components of the LME tent are described in the following paragraphs. The major fabric components shall utilize material that meets or exceeds MIL-PRF-44103D (with exceptions as noted herein). A new commercial fabric performance specification (USIFI-PRF-44103) is currently being developed and may be adopted as the primary performance specification when accepted by the Configuration Manager.

6.1.1.1 Fabric Assembly, End Panel. Two end fabric panels enclose the ends of the structure. These attach with grommets and becket lacing to the large intermediate fabric panels. A hook and loop wind flap covers the becket lacing, making the joint weatherproof.

6.1.1.2 Fabric Assembly, Intermediate Section. Two large rectangular fabric panels make up the bulk of the LME enclosure. The panels are secured together using built-in grommets and becket lacing. A hook and loop wind flap covers the becket lacing, making it weatherproof.

6.1.1.3 Windows. Four rectangular windows are built into each intermediate fabric section. Each window consists of a screen section for ventilation and a clear plastic window panel that can be removed and replaced if damaged. The window panel attaches by means of hook and loop fastener tape. A roll-down exterior flap, which is part of the intermediate fabric section, covers each window section making them weatherproof and light secure.

6.1.1.4 Ducts. Three fabric ducts are built into each intermediate fabric section near ground level. Use the two large (18 inches in diameter) ducts to provide heating and the small duct (5 inches in diameter) for external power cable access. The ducts can be closed using tie straps to make them weatherproof and light secure.

6.1.1.5 Vehicle Access Door. A large vehicle access door is built into each end fabric panel. This door is attached to the door header assembly, allowing the upper section of the door to slide. The vehicle door shall be capable of being secured in the open position and provide a minimum of 12 feet width at the base and 6 feet width at 13 feet height. The vehicle door shall not have any zippers. The vehicle door shall provide blackout capabilities when fully closed and secured. The vehicle door shall be securable in either the open or closed configuration. The vehicle door shall allow tactical vehicles to enter/exit from either end of the LME.

6.1.1.6 Personnel Access Door. A smaller personnel access door is also built into each end fabric panel. This allows access into the structure without opening the large vehicle door. The personnel door shall provide a minimum opening size of 6 feet 6 inches in height and 3 feet in width and shall be capable of being secured in either the open or closed configuration. The personnel door shall not have any zippers. The personnel door shall provide blackout capabilities when fully closed and secured.

6.1.1.7 Upper Arch Assembly. The upper arch assembly forms the ridge of the structure. It folds for storage and has a built-in ridge post for securing the large grommet on the intermediate and end fabric panels.

6.1.1.8 Lower Arch Assembly. The lower arch assembly forms the eave section of the structure. It plugs into the lower end of the upper arch assembly and is secured with the attached quick release pin. The hinged portion has a built-in eave post for securing the eave grommet on the intermediate and end
fabric panels.

6.1.1.9 Lower Leg Assembly. The lower leg assembly plugs into the lower end of the lower arch assembly and is secured using the attached quick release pin. The footpad has a stud, which is pressed into the ground to help stabilize the structure.

6.1.1.10 Purlin Assembly. The purlin assemblies are made of tubular aluminum approximately 96 inches long and 1.5 inches in diameter. U shaped brackets are riveted near each end of the purlin. These provide a hinge point for the folding braces that lock the purlin to the arch frame assembly. At the end of each folding brace is a rotating shackle that is inserted into a matching hole in the arch frame assembly.

6.1.1.11 Door Header Assembly. The door header assembly is used to strengthen the arch frame assembly and to mount the vehicle access door. It is secured using the attached quick release pins.

6.1.1.12 Cable Header Assembly. The cable header assembly is made from stranded steel cable with steel fittings at the ends. It is used to strengthen the remaining arch frame assemblies and is secured with quick release pins.

6.1.1.13 Sider Assembly. The sider assemblies add strength to the eave sections of the structure. The upper slotted end of the side is installed over the pins on the arch frame assembly and the side is swung outward. When the holes in the side align with the holes in the arch frame assembly, it is secured with the attached quick release pin.

6.1.1.14 Power Distribution Box. The box is mounted on the frame structure and brings external power into the LME. The power distribution box contains a lighted switch, which controls the light string. Four ground fault protected convenience outlets have separate circuit breakers. A 25-ft extension cord with a 90 degree male plug is provided to connect the lights to the Power Distribution Box. A 10-ft extension cord is provided to connect power tools.

6.1.10.15 Assembly, Light Kit. Four fluorescent lights are provided with the LME. Each light consists of a fluorescent bulb mounted in a reinforced plastic tube with a molded cap and cable assembly at each end. The lights are suspended, one to each bay, using the eight light support straps provided.

6.1.1.16 Light Support Strap Assembly. Four light support straps are provided with the LME. Each strap consists of a looped end, loop strap fastener, and hook and loop fastener. The light support straps are secured to the ridge purlin and suspend the lights in place.

6.1.1.17 Extension Assembly. The purpose of the fabric extension assembly is to connect the intermediate sections of two erected LMEs. The extension assembly is available as an additional item.

6.1.1.18 Transport Covers. Fabric transport covers are required for storage and movement of fabric and frame components.

6.1.1.19 Differences Between Models

6.1.1.19.1 The LME Type I, Type II, or 8-ft Extension Assembly kit may be provided in Monotone Camouflage Green 483 (Class I) or Tan 686A (Class II).
6.1.19.2 The Type II LME is configured to house the Laundry Advanced System (LADS), and has appropriate vents in the intermediate fabric sections to meet the operational requirements of the LADS.

6.2 Ordering data. Procurement documents should specify the following:

   a. Title, number, and date of this specification
   b. Type and Class (see 1.2).
   c. Issue of DODISS to be cited in the solicitation.
   d. When First Article Inspection is required (see 4.1.1 and 6.3).
   e. When Conformance item is required (see 4.1.2 and 6.4).
   f. Packaging requirements (see 5).

6.3 First Article. When requiring a first article inspection, contracting documents should provide specific guidance to offerors. This guidance should cover whether the first article is a first article sample, a first production item, or a number of items to be tested. These documents should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. Pre-solicitation documents should provide Government waiver rights for samples for first article inspection to bidders offering a previously acquired or tested product. Bidders offering such products, which wish to rely on such production or test, shall furnish evidence with the bid, that prior Government approval is appropriate for the pending contract.

6.4 Conformance Inspection. Affordable conformance inspection with confidence varies depending upon a number of procurement risk factors. Some of the factors include: Contractor past performance, Government schedules and budget, product material and design maturity, manufacturing capital equipment and processes applied, the controlled uniformity of those processes, labor skill and training, and the uniformity of measuring processes and techniques. During the solicitation, contracting documents should indicate those tests desired from Table 4.0-1 and their designated frequency based on a risk assessment for the procurement.

6.5 Standard Color Samples. Standard Color Samples are available from the contracting officer. Class I and Class II colors are similar to Camouflage Green 483 and Tan 686A in FED-STD-595.

6.6 White color standard. Eastman Kodak Company supplies barium sulfate of suitable quality for use as a white reference standard. The same source has available magnesium reagent (ribbon) and Halon. Suitable tiles can be obtained from the National Bureau of Standards or the instrument manufacturers.

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

6.8 International standardization agreements. Certain provisions of this document are the subject of international standardization agreement as cited in NATO, STANAG No. 2882, relative to camouflage requirements for shelters, and subsidiary components. When proposing amendment, revision, or cancellation of this specification that will affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization
channels including departmental standardization offices.

6.9 Subject term (key word) listing.

Tent
Vehicle Maintenance

Custodians:  Preparing activity:
Army – GL  Army – GL
Navy – NU  
Air Force – 99

Review activities:
Army – MD
Air Force – 82
DLA - CT