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MILITARY STANDARD

ENGINEERING AND DESIGN

CRITERIA FOR SHELTERS, EXPANDABLE

AND NON-EXPANDABLE

FSC 5411

DEPARTMENT OF DEFENSE

WASHINGTON, DC 20301

Engineering and Design Criteria for Shelters, Expandable and Non-Expandable
MIL-STD-907B

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: United States Army Natick Research and Development Center, Natick, MA 01760-5014 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FOREWARD

1. This standard establishes specific requirements for the design and development of rigid walled shelters. Its purpose is to present engineering and design criteria to be applied in the design of shelters so as to:

a. Achieve required performance and versatility by shelters.

b. Minimize personnel man-hours to erect or strike mobile shelters.

c. Foster design standardization of tactical shelters within the Armed Services and other Departments and Agencies of the Department of Defense.

2. The Department of Defense standard family of shelters consists of five classes of shelters as follows:

a. Non-Expandable shelters (Class 1) which are used in the same size and shape in which they are transported.

b. Expandable shelters (Class 2) which are expanded from the transport size to a larger size, at expansion ratios of three-to-one or less and perhaps different shape, for use as shelters.

c. Highly expandable shelters (Class 3) which have expansion ratios greater than three-to-one from their transport size.

d. Knockdown shelters (Class 4) which are reduced in height and nested with identical items for transportation.

e. Large area shelters (Class 5) which are disassembled and packed in dedicated or general-purpose containers for shipment.

The shelters are further classified as ISO or non-ISO depending on whether they can be transported as containers in accordance with the standards of the International Organization for Standardization (ISO). As indicated in the text, individual provisions of this standard may be limited to the container or shelter configuration of ISO or non-ISO shelters of any number of classes from Class 1 to Class 4, but not Class 5. Separate standards for Class 5 are in preparation for future implementation as a change or separate standard.

3. Failure of a shelter to meet the requirements specified herein may be grounds for rejection from inclusion into the Department of Defense standard family of shelters.

4. This standard does not alter requirements within existing specifications for tactical shelters designed specifically for any of the Armed Services.

FOREWARD (cont'd)

5. The use of the words "shall," "should," "may," and "will" in this standard accords with Defense Standardization Manual 4120.3, wherein "shall" expresses provision that is binding, "should" and "may" express nonmandatory provisions, and "will" expresses a declaration of purpose or is used in cases where simple futurity is required.

6. Requirements herein are expressed in the customary system of units. As a convenience, the customary units are accompanied by their approximate metric system equivalents (in parenthesis).

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ENGINEERING AND DESIGN

CRITERIA FOR SHELTERS, EXPANDABLE

AND NON-EXPANDABLE

1. SCOPE

1.1 General. This standard establishes engineering and design criteria required for the development of shelters.

1.2 Purpose. The purpose of this standard is to present engineering and design requirements for effective reliable shelters which are operable in a variety of environments without degradation, capable of all necessary transport modes, and useable by all branches of the Armed Services.

1.3 Application. This standard shall be applied to the design of expandable and non-expandable shelters. Existing shelters currently in use by the Armed Services under current specifications should not be affected by application of this standard.

2. REFERENCED DOCUMENTS

2.1 Government documents. Unless otherwise specified, the following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this document to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-M-8090	-	Mobility, Towed Aerospace Ground Equipment, General Requirements for
MIL-A-8421	-	Air Transportability Requirements, General Specification for
MIL-F-14072	-	Finishes for Ground Electronic Equipment
MIL-C-22992	-	Connector, Plugs and Receptacles, Electrical, Water-proof, Quick Disconnect, Heavy Duty Type General Specification for

STANDARDS

MILITARY

MIL-STD-105	-	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-209	-	Slinging and Tiedown Provisions for Lifting and Tying Down Military Equipment

MIL-STD-285 - Attenuation Measurements for Enclosures, Electromagnetic Shielding, for Electronic Test Purposes, Method of
MIL-STD-810 - Environmental Test Methods and Engineering Guidelines
MIL-STD-889 - Dissimilar Metals
MIL-STD-1472 - Human Engineering Design Criteria for Military Systems, Equipment and Facilities
MIL-STD-45662 - Calibration Systems Requirements

(Copies of documents required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publication. Unless otherwise specified, the following documents of the issue in effect on date of invitation for bids or request for proposals, form a part of this document to the extent specified herein.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

G 21 - Recommended Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

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

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO 668-1976, Dimensions and ratings
ISO 1161-1980, Corner fittings
ISO 1496/I-1978, Specification and test document
ISO 1496/VII-1974, Air mode, Annex B

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

3. DEFINITIONS

3.1 Degradation. Damage by weakening or loss of some property, quality or capability.

3.2 Delamination. Separation into constituent layers.

3.3 Galvanic corrosion. The corrosion of metallic objects in the presence of moisture, caused by electrolytic action.

3.4 Special tools. Tool other than common hand tools or those specifically designed for use with a delivered product.

4. GENERAL REQUIREMENTS

4.1 Objectives. Shelters shall be designed and built to withstand a variety of environments, while providing an effective and reliable facility for system/equipment. Design shall also be directed toward minimizing man-hours required to strike or erect shelters using common hand tools.

4.2 Standardization. The design and engineering requirements specified herein are designed to encourage standardization of shelters among the branches of the Armed Services, but not to exclude existing shelter specifications currently in use. Existing performance and test criteria have been used to the maximum extent possible.

4.3 Simplicity of design. The shelter shall represent the simplest design consistent with the functional requirements, expected service conditions, and shelter life.

4.4 Shelter life, reliability and maintainability. Unless otherwise stated, the design life for a typical shelter shall be 15 years with a calculated mean time to repair at the organizational and intermediate level not to exceed 4 hours at the 90th percentile. All shelters entering the standard family of shelters shall have a Maintainability Index (MI) calculated and assigned.

4.5 Materials. All materials shall be recovered materials to the maximum extent possible consistent with quality and performance. All specified material shall be as described. Material not specified shall be the same quality as commercial materials used for the same purpose. All materials shall be free of defects which would adversely affect the performance or maintainability of individual components or the overall assembly.

4.5.1 Dissimilar materials. Intimate contact of dissimilar materials, as defined in MIL-STD-889 which can be expected to cause galvanic corrosion, shall be avoided. When such contact cannot be avoided, an insulating material shall be provided to minimize the corrosive effect.

4.6 Outside dimensions and weights. The maximum external dimensions of the shelter in shipping configuration shall be 8 feet by 8 feet by 20 feet (2.44 m by 2.44 m by 6.10 m), nominal. Maximum weights per unit external surface area for shelters are outlined in table I by shelter type.

TABLE I. Shelter weights

Shelter Type	Maximum weight per external surface foot, lb/ft^2 (kg /m^2) 1/
ISO	5 (24)
Non-ISO	3 (15)
ISO Expandable	5.0 + 1 m A*

1/ The external surface area of a shelter is the surface area in the closed configuration.

*The symbol A represents the first term in the expansion ratio.

4.7 Doors. Door size shall be as indicated in table II.

TABLE II. Door sizes

ISO	Dimension, inches, (mm)	NON-ISO
	Fixed Walls	
76 1/ x 36 (1930 x 914)		65 x 35 (1651 x 889)
76 1/ x 48 (1930 x 1219)		55 x 30 (1397 x 762)
76 1/ x 72 (1930 x 1828) (double doors)		
ISO	**Expandable Walls**	**NON-ISO**
76 1/ x 30 (1930 x 762)		65 x 35 (1651 x 889)

1/ This is a minimum value.

4.8 Interchangeability of parts. Like units, assemblies, sub-assemblies, and replaceable parts shall be physically and functionally interchangeable without modification of such items or of the unit. Demonstration of interchangeability of selected panels and hardware shall be conducted.

4.9 Special tools. Potential repair problems will be analyzed during development to determine maintenance requirements and materials needed at all repair levels, particularly the user level. There will be no special tools or equipment required to erect or strike shelters. Standard hand tools may be provided as required.

4.10 Physical security. A means shall be provided to secure all openings, folding panels, and removable components to prevent unauthorized entry.

4.11 Lighting provision. The lighting provision may be provided by the system engineer and installed per instructions specified in the shelter procurement package. If lighting is installed as part of the basic shelter, all shelter tests shall be conducted with such light installed.

4.12 Shelter electrical grounding. The shelter electrical system shall be grounded through electrical input cable back to the power source ground. The application of shelter ground is the responsibility of the systems engineer.

4.13 Input-output panels and openings. The input-output panels and openings criteria may be provided by the systems engineer and installed by the shelter manufacturer per instructions specified in the shelter procurement package. If input-output panels and openings are installed as part of the basic shelter, all shelter tests shall be conducted with the panels and openings installed.

4.14 Electrical power connector. When an electrical power connector is provided as part of the basic design of a non-expandable or expandable shelter, that connector shall be a class L connector in accordance with MIL-C-22992.

4.15 Ice. Shelter design shall not permit water accumulation in pockets, creases, fissures, etc., which could cause structural damage upon freezing. The operation of moveable shelter components shall not be unduly impaired by the formation of ice anywhere on the shelter structure. This parameter shall be validated by analysis.

4.16 Wind velocities (load). The shelter, when tied down, shall be operational in winds up to 100 mph (161 km/h) steady state, with gusts up to 120 mph (193 km/hr). This parameter shall be validated by analysis.

4.17 Corrosion. All shelter components shall be adequately protected against corrosion per MIL-F-14072. The use of dissimilar metal combinations shall be avoided whenever possible. Selection of permissible couples shall be in accordance with the compatible couples table of MIL-F-14072. If, due to special conditions of service or design, the contractor considers that finishes, processes or materials other than those specified herein are necessary or more suitable, such finishes, processes, or materials shall be used only upon receipt of prior approval from the contracting officer. At the discretion of the contracting officer, samples may be required to demonstrate the suitability of proposed substitutes.

4.18 Human engineering/safety. Provisions of MIL-STD-1472 applicable to shelters shall be implemented.

4.19 Lightning protection. A separate grounding system for lightning protection shall be designed by the system engineer for the shelter.

4.20 Altitude (low pressure). The shelters shall employ devices permitting air passage and allowing pressure equalization to preclude damage to the shelter. At least a total of 12 square inches (77 cm^2) of vent area for each 10 feet (305 cm) length, or fraction thereof, of container shall be provided.

4.21 Toxicity. Materials (in their cured state) used shall cause no skin irritations or other injury to personnel handling the material during transportation, operation, or maintenance of the equipment. Exposure of personnel to toxic substances shall not be in excess of the threshold values contained in the American Conference of Government Industrial Hygienists Threshold Limit Values.

4.22 Testing requirements. Within the specific requirements outlined in the following detailed requirements, testing to satisfy the criteria may be required at several stages: development, first article, and production. Table II defines the stages where testing for each criteria shall be required. Production tests shall be done on a sampling basis in accordance with MIL-STD-105 and, or the contracting officer's instructions.

TABLE III. Schedule of required testing

PARAGRAPH	TEST	Development TEST	and/or first article TEST	production TEST
5.1.1	ISO requirements	X		X1/ 4/
5.1.2	Air transportability	X		
5.1.3	Ground mobility	X		
5.1.4	Rail transportability	X		
5.1.5	Forklift handling	X		
5.1.6	Erection and striking	X		X
5.2.1	Weather seals	X		X2/
5.2.2	Airtightness	X		X
5.2.3	Blackout	X		X
5.2.4	Humidity resistance	X		X2/
5.2.5	Marine atmosphere (sea-salt fallout)	X		X2/
5.2.6	Temperature range	X		
5.2.7	Temperature shock	X		X2/
5.2.8	Heat transfer	X		X2/
5.2.9	Blowing sand	X		X2/
5.2.10	Sunshine (ultra-violet effects)	X		X2/

TABLE III. Schedule of required testing (cont'd)

PARAGRAPH	TEST	Development TEST	and/or first article production TEST	TEST
5.2.11	Solar load	X		X2/ 5/
5.3.1	Fire resistance	X		X2/
5.3.2	Fungus	X		X2/
5.3.3	Shelter squareness	X		X
5.3.4	Panel flatness	X		X
5.3.5	Roof loads	X		4/
5.3.6	Floor loads	X		4/
5.3.7	Door loads	X		X2/ 4/
5.3.8	Panel attachment points	X		
5.3.9	Leveling devices	X		X
5.3.10	Lifting and towing eye strength	X		X2/
5.3.11	Tow/dragging simulation (for shelters with skids)	X		X2/
5.3.12	Drop shock (non-ISO shelter with skids)	X		X3/
5.3.13	Drop shock (ISO shelters, without skids)	X		X2/
5.3.14	Impact resistance	X		X2/
5.3.15	EMI provisions	X		X
5.3.16	Watertightness	X		X
5.3.17	Helicopter lift, 3-G	X		X

1/ Time limit will not apply by calculating and testing.

2/ Development test repeated if any materials, finished, etc., changes from original.

3/ Test measuring instruments will not be necessary.

4/ Verification of acceptability of structural design changes.

5/ Mandatory for honeycomb shelters.

5. DETAILED REQUIREMENTS

5.1 Operational requirements.

5.1.1 ISO requirements. Shelters designated ISO shelters must meet the requirements for all modes of transport (marine, highway, rail and rotary wing); stacking requirements of marine nods, dimensional requirements, and be

specified on the shelter procedure ... shelter manufacturer per instructions ...

provided with four forklift pockets. ISO standard payload ratings do not apply to tactical shelters.

5.1.1.1 ISO requirements test. Performance shall be judged according to the following specifications:

ISO 668-1976(E), Dimensions and ratings;
ISO 1161-1980(E), Corner fittings;
ISO 1496/I-1978(E), Specification and test document;
ISO 1496/VII-1974(E), Air mode, Annex B;

5.1.2 Air transportability. All shelters shall comply with MIL-A-8421 for the following:

Equipment restraint criteria, including
Accompanying loads
Transported Equipment

Attachments, including
Attachment devices
Location of attachments
Number of attachments
Attachment size
Attachment utilization
Tiedown pattern

463L compatibility, only including
Pallet and integral base design

Markings, including

Equipment

Tiedown fittings
Shipping weight and center of gravity location
Hoisting fittings
Other markings

Special tools and transportability equipment

5.1.2.1 Air transportability test. The prototype shelter of each size and type shall be tested according to the paragraph entitled Analytical equipment restraint proof of MIL-A-8421. The shelter developer may require the application of alternate equipment restraint test instead of the analytical equipment restraint proof.

5.1.2.2 Requirement conflicts. In case of conflict between MIL-A-8421 and any other requirement, MIL-A-8421 shall take precedence if it is more specifically restrictive.

5.1.3 Ground mobility. The shelters shall be capable of withstanding the shocks and vibrations induced by ground transport equipment without the use of air-ride equipment over unimproved cross country terrain.

5.1.3.1 Ground mobility test. The shelter using the appropriate mobilizer (dolly set) as the transport means shall be tested as prescribed in MIL-M-8090, Type V Mobility.

5.1.4 Rail transportability. The shelter shall be capable of withstanding, without damage, the shocks normally induced by rail transport.

5.1.4.1 Rail transportability test. The shelter will be tested in accordance with Method 516.2, procedure VI of MIL-STD-810 with payload distributed to simulate the weight, center of gravity, and mounting profile of mounted equipment. If the shelter can be shipped in two orientations, it shall be impacted one in each direction with each orientation (total of four impacts) at a speed of 9 miles per hour (mph) (15 km/h) to 10 mph (16 km/h). If the shelter can be shipped in only one orientation, it shall be impacted twice in each direction (total of four impacts) at a speed of 9 mph (15 km/h) to 10 mph (16 km/h).

5.1.4.2 Test apparatus. The following equipment will be necessary to perform the above test.

a. Three ordinary railroad cars with standard draft gear couplings, two of which shall act as buffer cars, both with airbrakes set in emergency application position.

b. A prime mover for the moving cars.

c. Calibrated means to ensure the speed at impact is 9 mph (15 km/h) to 10 mph (16 km/h).

d. Accelerometers and associated circuitry to measure impact shock and equipment response, if specified.

5.1.5 Forklift handling. With or without forklift pockets, the shelters shall be capable of withstanding the stresses of forklift movements. Except for minor abrasions from the forklift tines, there shall be no permanent deformation, delamination, or sealer separation within or without the shelter structure.

5.1.5.1 Forklift handling test. Loaded with payload distributed to simulate the weight, center of gravity, and mounting profile; the shelter shall be picked up, be transported over a paved surface for 500 yards at 8 ± 1 mph, complete two 90° right turns and two 90° left turns at a reduced safe speed (approximately 5 ± 1 mph), and then be lowered to the ground. Tiedown cables or chains shall be required to secure shelters without forklift pockets. The test shall be performed using a forklift capable of lifting a fully loaded

shelter and shall be performed once for each insertion point on the shelter. During the test procedure, the forklift tines shall be inserted completely under the shelter and into the forklift pockets, if applicable, and the shelter shall be raised off the ground upon contact with the tip of the forklift tines.

5.1.6 Erection and striking. The functional design goal for erecting and striking expandable and non-expandable shelters shall be 2 man-hours per 150 square feet (ft^2) (13.9 m^2) of floor space. The shelter shall be erected and struck on a surface that has a 24-inch (610 mm) differential in grade to the diagonal dimension of the shelter floor.

5.1.6.1 Erection and striking test. The shelter under test shall be placed on a surface that has a 24-inch differential in grade across the diagonal dimension of the floor of the erected shelter (by using blocks, etc.). The shelter shall be leveled and expanded, if appropriate, and made ready for use within a period equal to 2 manhours for each 150 ft^2 of erected shelter floor space. Striking shall be accomplished in a similar or shorter period of time. Consideration must be given in shelter design to allow for erection and striking in winds up to 30 mph (48 km/h).

5.2 Environmental requirements.

5.2.1 Weather seals. Weather seals shall be an integral part of the shelter and shall be designed for ready replacement in the field by the user.

5.2.1.1 Weather seals test. The following environmental requirement tests will verify airtightness, blackout, weatherproofness, ultraviolet degradation resistance and low temperature operability. The expected service life of the seal must be specified if the contractor cannot verify the survivability of the seal in the defined environment for the service lift of the shelter.

5.2.2 Airtightness. The shelter shall not permit air leakage beyond specified limits in either shipping or operational configuration as specified.

5.2.2.1 Airtightness test for expandable shelters.

a. Shipping configuration - The maximum internal air leakage of 200 standard cubic feet per minute (scfm) at 0.3 inches of H_2O. Test: An air supply to the shelter (with all openings closed) and an internal pressure of 0.3 inches of H_2O (water gauge) shall be obtained and maintained. The air pressure and air flow shall be stabilized. Any additional air supplied to maintain specified internal pressure shall be recorded to determine compliance with above.

b. Operational configuration - The maximum internal air leakage of 100 sets at 0.3 inches of S_2O. Test: same as 5.2.2.1.a.

5.2.2.2 Airtightness test for non-expandable shelters (shipping and operational configurations). The maximum air leakage of 200 scfm at 1.2 inches of H_2O. Test: An air supply to the shelter (with all appropriate openings closed) and an internal pressure of 1.2 inches of H_2O (water gauge) shall be obtained and maintained in both the shipping and operational configurations. The air pressure and air flow shall be stabilized. Any additional air supplied to maintain specified internal pressure shall be recorded to determine compliance with above.

5.2.3 Blackout. In operational mode, the shelter shall not permit light emission with doors closed.

5.2.3.1 Blackout test. In operational mode, the shelter shall be tested for light tightness with a bare 100 watt incandescent lamp operating at rated voltage and held anywhere in a plane 1 foot from the outside wall and roof surfaces. No rays of light shall be seen by an observer stationed inside the darkened closed shelter as the lamp is moved outside.

5.2.4 Humidity resistance. The shelter shall withstand daily exposure of up to 97 percent relative humidity for 20 hours and exposure of 100 percent relative humidity (with condensation) for 4 hours.

5.2.4.1 Humidity resistance test. With doors open, the shelter shall be subjected to MIL-STD-810, Moisture Resistance Test, Method 507.1, procedure II, excluding steps 2, 3, 4, 7, and 8. After cycling has been completed, there shall be no evidence of delamination, cracking, corrosion, or deterioration of any part of the shelter.

5.2.5 Marine atmosphere (sea-salt fallout). The shelter shall be fully serviceable when exposed to this environment, equivalent 25 pounds per acre per year (2.0 $g/m^2/yr$). All fasteners, jacks, seals, or other hardware shall show no evidence of corrosion or degradation when tested as specified.

5.2.5.1 Marine atmosphere test. One representative sample of all fasteners, jacks, seals, and other hardware which will be exposed to the atmosphere in the operational or storage mode and finished in accordance with the specification shall be tested in accordance with MIL-STD-810, Method 509.1 except that the salt solution shall have a concentration of 10 percent and the exposure period shall be 96 hours. The test items shall show no evidence of corrosion or degradation upon completion of the test.

5.2.6 Temperature range. In storage, the shelters shall be capable of withstanding exposure to temperatures of -70°F (-57°C) to 160°F (71°C). In transit, the shelters shall be capable of withstanding exposure to temperatures of -65°F (-54°C) to 160°F (71°C) with personnel access at low end of range. Operational temperature of shelter shall be -65°F (54°C) to 125°F (52°C) plus solar load (see solar load requirement 5.2.11).

5.2.6.1 Temperature range test - low temperature test. The shelter shall be cold soaked in a mechanically refrigerated cold chamber of -70°F (-57°C) prior to initiation test. The shelter shall be tested at -65°F (-54°C). The shelter will be expanded and all doors and openings operated and inspected internally and externally for material degradation. Perform inspection and close shelter for shipment. There shall be no damage to seals or other components and all hardware shall operate during and after completion of the low temperature test.

5.2.7 Temperature shock. Shelter panels, windows, and other components shall withstand a temperature shock from 160°F (71°C) to -70°F (-57°C) to 160°F (71°C) without separation, delamination, cracks, or degradation.

5.2.7.1 Temperature shock test. A representative shelter panel specimen measuring 4 feet by 8 feet shall be tested in accordance with MIL-STD-810, Method 503.1. The sample will be checked for evidence of degradation of physical properties. Windows and other components shall also be tested.

5.2.8 Heat transfer. The shelter in operational configuration shall have an overall heat transfer coefficient less than or equal to 0.35 (BTU/hr) ft^2 x °F.

5.2.8.1 Heat transfer test. The shelter shall be erected inside a mechanically refrigerated chamber with an automatic control system for maintaining a constant minimum temperature of -25°F (-32°C) when the temperature inside the shelter is maintained at 75°F (23°C). The volume of the test chamber shall be such that the bulk of the shelter will not interfere with the generation and maintenance of test conditions. Minimum distance from any shelter panel to adjacent chamber wall shall be 24 inches. The conditioned air flow shall be suitably baffled to provide free circulation between the shelter and the chamber walls and ceiling and to provide uniform air flow around the shelter with the maximum velocity on the shelter surface of 5 mph. All instrumentation must meet the requirements of MIL-STD-45662. Chamber temperature shall be measured by: placing one thermocouple 6 inches away from each corner fitting, and one thermocouple centrally located 6 inches away from each wall and ceiling panel. Internal shelter temperature shall be measured with a total of 17 thermocouples each located 6 inches away from the panel surface, each shielded from the heat source and positioned as shown in figure 1. An electrical resistance heat source, with sufficient power to maintain a stabilized temperature of not less than 100°F (56°C) above the outside temperature, shall be used. A heater providing air discharge radially in a 360° pattern, with adjustable louvers around the circumference and with discharge louvers in the top, is the preferred item for providing uniform heat. Additional fans may be used to ensure that the difference between any two thermocouples is a maximum of 5°F, thereby providing uniform temperature within the shelter. Also, the heater resistance elements shall be totally shielded from any interior shelter surfaces. Temperature conditions shall be considered stable when, for 30 minutes, internal thermocouple readings remain within 5°F of one another while the average external temperature remains at -25° ± 5°F and the average internal temperature remains a minimum of 100°F above the average external temperature. Thermocouple readings shall be

d maintained. The air ... inches of H2O (water gauge) shall be obtained a

recorded every 15 minutes. After the temperature conditions have stabilized and while maintaining stability, the electrical power to the internal apparatus shall also be recorded every 15 minutes during which time the power shall not be changed and all apparatus shall operate continuously. Four sets of power readings shall be recorded with allowable variation of 5 percent. The overall coefficient of heat transfer shall be calculated using the average internal and external temperatures, the amount of electrical power consumed, and the nominal internal surface area.

$$U = \frac{\text{Total power consumed (BTU/hr)}}{\text{Nominal inside surface area } (ft^2) \times \text{Temperature difference } (^oF)}$$

The calculated values of overall heat transfer coefficient shall then be averaged to determine the final average value for the overall heat transfer coefficient.

5.2.9 Blowing sand. The external moving parts of the shelter in transport or operational mode shall be designed to resist the effects of blowing sand. External moving parts shall be designed to operate and withstand particle concentrations of 1.32×10^{-4} lb/ft^3 (2.19 g/m^3) with a wind velocity of 1750 $\pm$ 250 ft/min (533 $\pm$ 76.2 m/min) without degradation. Such particles shall range in size from 150 microns (5.91×10^{-3} in) to 1000 microns (3.94×10^{-2} in). Relative humidity shall be less than 23%.

5.2.9.1 Blowing sand test. The external moving components of the shelter shall be installed in the sand test chamber. The air velocity and performance shall be as described in MIL-STD-810, Method 510.1, procedure I except the sand particle size shall be:

1000 microns	100% passing mesh screen
500 microns	98% $\pm$ 2% passing mesh screen
150 microns	90% $\pm$ 2% passing mesh screen

The second 6-hour test (step 3) at 145°F (63°C) shall be performed immediately after reaching stabilization in step 2 of procedure 1.

5.2.10 Sunshine (ultraviolet effects). Ultraviolet effects shall neither significantly degrade nor affect serviceability of shelter components or materials for the service life of the shelter.

5.2.10.1 Sunshine (ultraviolet effects) test. Testing, in accordance with MIL-STD-801, Method 505.1, procedure 1, shall be conducted on all external components subject to solar degradation, such as gaskets, seals, windows, etc.

5.2.11 Solar load. The shelter roof shall withstand an outer skin temperature of at least 205°F (96°C) without any evidence of delamination or permanent deformation.

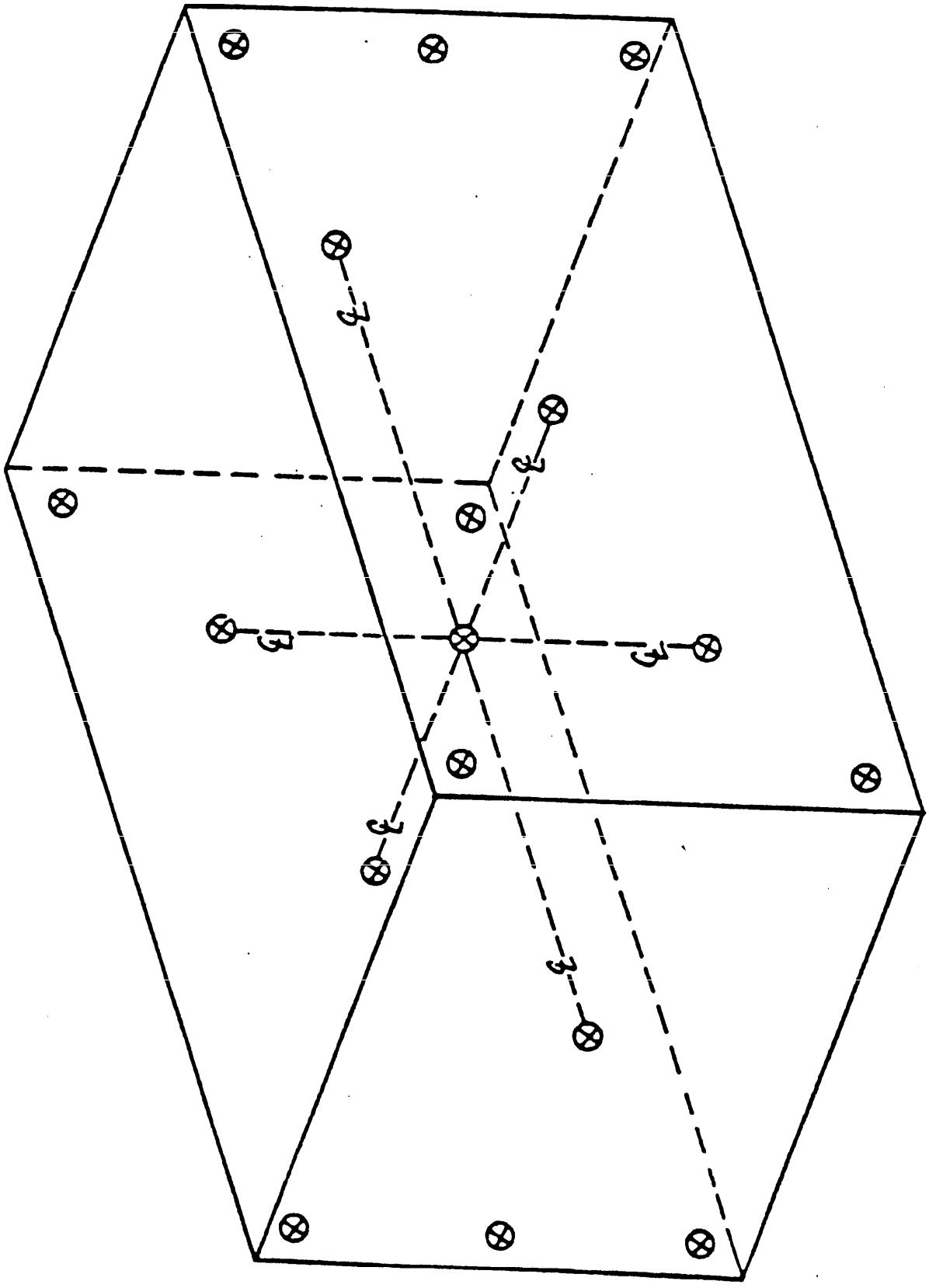


Figure 1. Thermocouple Location

5.2.11.1 Solar load test - assembled shelter. With the shelter in operational mode, a simulated solar load sufficient to raise the outer skin temperature to 205°F (96°C) shall be applied uniformly to the fixed roof and one folding or expanded roof. A uniform solar load temperature should be gradually attained within 4 hours and shall be maintained for an additional 4 hours. As a minimum, one thermocouple per 10 square feet of roof shall be uniformly distributed on the entire area of the roof. All of the thermocouples should read 205° ± 15°F (96° ± 8.3°C) throughout the 4-hour period that the solar load shall be maintained. During this test, the ambient temperature within the shelter will be maintained at a maximum of 85°F (29°C). Upon completion of the solar load test, the roof panels shall be examined and any evidence of delamination or deformation will constitute failure of this test.

5.3 Technical requirements.

5.3.1 Fire resistance. The tactical shelter shall be designed to be fire resistant.

5.3.1.1 Fire resistance test. Two specimens of a production sandwich panel 12 inches by 12 inches will be tested for flammability. The specimens will be prepared and tested in the following manner:

a. Drill a 1/4-inch diameter hole in the center of the panel through both skins.

b. Using a 1-inch diameter hole saw with a 1/4-inch pilot, remove the skin only on each side within a 1-inch diameter area.

c. Mount the panel in any appropriate holding fixture in a horizontal position.

d. Adjust the height of the panel so that the lower skin is approximately 2-1/2 inches above the top of a standard barrel Bunsen burner.

e. Adjust the flame height to approximately 5 inches with an inner core of approximately 3 inches.

f. Apply the flame to the center of the hole in the skin, impinging on the core, for 30 seconds.

g. At the end of the 30-second period, remove the flame and record the time, in seconds, for burning or glowing to cease, if ignition occurs. The specimen shall be non-burning or self-extinguishing within 30 seconds and shall show no degradation (charring) of material outside a 1.25-inch radius from the center point of the drilled hole.

NOTE

When panel cross-section is not symmetrical, tests shall be conducted from each side of the panel.

5.3.2 Fungus. There shall be no degradation of shelter components due to fungus growth. Materials shall be selected to maximize inhibition of fungus growth.

5.3.2.1 Fungus test. All material components shall be certified for resistance to fungi. Where certification does not exist, the material shall be furnished to United States Army Natick Research and Development Center, Attn: Environmental Protection Group, STRNC-YEP, Natick, MA 01760-5020 for recommendation of testing method, (i.e., MIL-STD-810, burial, or plate test per ASTM G 21-70), to verify fungus resistance.

5.3.3 Shelter squareness. In any two intersecting fixed shelter wall, floor, or roof panels, the inside panel surface in one panel shall be mutually perpendicular to the inside surface of the adjacent panel within 1/16 inch when measured with a 36-inch square whose two edges are perpendicular to each other within 0.005 inch.

5.3.3.1 Shelter squareness test. Measurements shall be taken at the top, middle, and bottom of each of the four vertical corners. For intersecting shelter wall, floor, and roof panels containing mounting members, measurements shall be taken at the mounting members or at 24-inch intervals. Ten or more gaps, in the lot of measurements taken, in excess of 1/16 inch shall be cause for rejection of the unit.

5.3.4 Panel flatness. Panel surfaces shall not be cupped or bowed in excess of 0.125 inch when measured with a 48-inch long straight edge.

5.3.4.1 Panel flatness test. The flatness of the panel shall be inspected using a 48-inch long straight edge which is flat within 0.005 inches total. Two 1/16-inch shims shall be used along the straight edge, located at the extremes of the edge. Measurements will be taken in both the horizontal and vertical directions on the shelter walls. Panels found to be bowed or cupped, greater than 0.125 inch per each 4 foot length measured across the shelter walls both horizontally and vertically shall be rejected.

5.3.5 Roof loads. The roof assembly of the shelter shall withstand a snow load of 40 pounds per square foot (lb/ft^2) and a personnel load of 660 pounds static over 2 ft^2.

5.3.5.1 Roof loads test. Subject the shelter to a uniform loading of 40 lb/ft^2 over the fixed and folding roof surface. After removal of the uniform load, place a 660-pound load over 2 ft^2 at the weakest area of the fixed roof

and an identical load on the folding roof. Each test shall be for a duration of 5 minutes. The shelter will be visually inspected for any evidence of structural damage, delamination, permanent popped seals, panel separation, etc., both during and subsequent to removal of the load.

5.3.6 Floor loads. The shelter floor shall be capable of supporting a uniform load of 65 pounds per square foot (lb/ft^2). The shelter floor shall be capable of supporting a concentrated load of 2,000 pounds over a 4-ft^2 area at the center of the floor. The floor shall also be capable of supporting a point load of 125 lb/in^2. Loads shall not cause any permanent deformation of the floors or cause any deflection that interferes with proper shelter operation.

5.3.6.1 Floor loads test - static load. With shelter in operational configuration, the expanded floor shall be uniformly loaded to 65 lb/ft^2 and left in position for 30 minutes. Prior to removal of the uniform load, all movable parts shall be operated to ensure no interference exists between components. After completion of above test, the uniform load shall be removed and a concentrated 2,000-pound load shall be applied over a 4-ft^2 area centered on the floor and left in position for 30 minutes. Prior to removal of the concentrated load, all movable parts shall be operated to ensure no interference exists between components. After completing both of the above tests, the concentrated load shall be removed and a point load of 125 pounds per square inch balanced atop a 1 square inch block, shall be applied for 5 minutes to the center of the fixed and expanded floor. A thorough inspection shall be made after each test to observe that there is no evidence of structural damage, delamination or permanent deformation.

NOTE

The above test reflects minimum design criteria. Individual types of shelters may have floor load capacities which significantly exceed the aforementioned values.

5.3.7 Door loads. Doors shall be tested to withstand the following loads without deformation or impairment of function:

a. Static door (hinge) load: The doors, frames, and hardware shall be capable of supporting 200 pounds applied to the door at the edge opposite the hinge pivot line with the door open to approximately 90°.

b. Wind gust door (stop) load: The doors, frames, and hardware shall withstand a wind gust of 60 mph in any direction when the door is secured in its open position(s) by its door stop device(s).

5.3.7.1 Door loads test - static load. Each door shall have a vertical 200-pound load applied at the edge opposite from the hinge pivot as applicable with door open to 90°. After 30 minutes the load shall be removed and the door

examined. Any evidence of unbonded components, damage to hardware, or improper door operation shall constitute failure of this test.

5.3.7.2 Wind gust door load test. This test shall be performed with the door in the open position(s), held by the door stop device(s). A fixture shall be attached to the midpoint of the locking edge of the door which shall permit the application of the following horizontal forces, using free running pulleys to transmit the forces from weights and a 1/4-inch diameter steel cable (shelters and pulley frames shall be rigidly held in place):

a. A static load of 10 lb/ft^2 times door area in ft^2.

b. A dynamic load of 50 pounds.

The weight shall be dropped five times from a height of 12 inches. This test shall be performed from both sides of the open door. After the test, the door and its associated shelter mountings and parts shall show no evidence of deformation.

5.3.8 Panel attachment points. Panel attachment points shall have a minimum torque of 100 inch-pounds (in-lbs) and a minimum pull-out resistance (tension) of 2,000 pounds for panel thickness equal to or greater than 2 inches and 1,000 pounds for panel thickness under 2 inches.

5.3.8.1 Panel attachment points test. A tensile load which is panel thickness dependent shall be applied to panel attachment points as follows: 2,000 pounds for panel thickness equal to or greater than 2 inches and 1,000 pounds for panels less than 2 inches thick.

a. For panel designs containing mounting members, a 5/16-13 threaded insert (B.F. Goodrich Rivnut or equivalent) shall be used.

b. For panel designs not containing mounting members, a 1/4-28 potted insert (Shur-loc SL601-4-11-C or equivalent) shall be used.

This should be followed by a torque load of 100 inch-pounds (in/lbs) applied to the insert. After the loads have been removed, there shall be no distortion of the panel, mounting member if contained, or insert and the insert shall not have rotated from its original position.

5.3.9 Leveling device. All shelters shall have leveling capabilities of at least 24 inches over uneven terrain, without use of shims.

5.3.9.1 Leveling devices test. Shelters with leveling devices (jacks) shall be subjected to the following test:

The device, while carrying no vertical load, shall be attached to the shelter, and four successive 2,000-pound pulls shall be applied to the same device, with the shelter securely fixed, at a given distance from the lower attachment point. This distance is defined as the maximum height the leveling devices must be raised under the different modes of operation, with a minimum distance of 24 inches. The four pulls shall be perpendicular to the device and 90° apart in line with the wall and ends. The leveling device attachment provisions for the shelters and the shelter itself shall sustain no damages as a result of the above test.

5.3.10 Lifting and towing eye strength. All lifting and towing eyes shall withstand a tensile load of 2.26 times the gross weight of the shelter.

5.3.10.1 Lifting and towing eye strength test. Each lifting and towing eye on the shelter shall be subjected to a tensile load applied in each of three mutually perpendicular directions which are described by the line of intersection of two adjacent panels. The test shall be performed by outward pulls between each adjacent pair of eyes. All pulls shall be equal to 2.26 times the gross weight of the shelter. The lifting and towing eye assemblies shall be subjected to a tensile load equal to 2.26 times the gross weight of the shelter applied in each of the three mutually perpendicular directions described above while the assembly is secured to a fixture other than the shelter.

NOTE

Each lifting and towing eye assembly installed on the shelter shall be capable of withstanding the above specified loads with no cracking or permanent deformation to the eye assembly or shelter and no sealer separation or cracking around the assembly. The above parameter is derived from MIL-STD-209.

5.3.11 Tow/dragging simulation (for shelters with skids). The shelter with attached skids shall be capable of withstanding a towing/dragging force applied to the plane of the skid attachment equal to one-half the shelter gross weight without damage to any part of the shelter, skid assemblies, or skid mounting brackets.

5.3.11.1 Two/dragging simulation (for shelters with skids) test. The shelter, with attached skids and with the maximum payload, shall be placed so that the outer face of the roadside skid is flush against a rigidly secured restraining beam which runs the full length of the skid. A force equal to one-half the shelter gross weight shall be applied separately to each roadside towing eye, in a direction parallel to the ground and perpendicular to the side of the shelter. The skid restraining beam shall be of a height which prevents the shelter from moving under the applied force and which will allow loads to be

imparted through all components of the skid assembly and skid mounting bracket. The test shall be repeated on the curbside skid and towing eyes. In all cases, the shelter shall be supported to prevent sliding.

5.3.12 Drop shock (non-ISO shelter with skids). Non-ISO shelters with skids shall be capable of withstanding without damage the shocks incurred during transport and handling. After each test there shall be no permanent deformation, buckling, delamination, sealer separation, or structural failures of any part of the shelter, and the doors and covers shall open and close to their full extent without binding.

5.3.12.1 Drop shock (non-ISO shelter with skids) test. For the following tests, the shelter floor shall be loaded with a simulated payload to the shelter design gross weight. For these tests the shelter shall be instrumented per MIL-STD-810, Method 516.2, and shall use a minimum of 14 accelerometers. The Government will approve location of the instruments and capability of the recording equipment. Test results will be given to the Government and used by systems engineers.

5.3.12.2 Flat drop test. The shelter shall be lifted 18 $\pm$ 1/4 inches from the ground, as measured from the bottom of the skids, and allowed to free fall with the skids impacting onto a flat concrete surface. While in the raised position, prior to dropping, the shelter shall exhibit no longitudinal or transverse swing in excess of 0.5 inch. This test shall be performed once.

5.3.12.3 Rotational drop test. A 4-inch high (nominal) board shall be placed under the skid(s) at one edge of the shelter. The opposite edge of the shelter shall be raised 18 $\pm$ 24 inches from the ground at the two raised corners, as measured at the bottom of the skids, and allowed to fall freely so that the skid(s) impact(s) onto the concrete surface. This test shall be performed on each bottom edge of the shelter.

NOTE

When shock attenuation is required, the existing skids shall be replaced with skids that shall limit acceleration in the floor to a maximum of 25 G using 100 - 200 Hz filter.

5.3.13 Drop shock (ISO shelters, without skids). ISO configured shelters without shock skids should be capable of withstanding flat, and rotational drops of 12 inches onto concrete. After each test there shall be no permanent deformation, buckling, delamination, sealer separation, or structural failures of any part of the shelter, and the doors and covers shall open and close to their full without binding.

5.3.13.1 Drop shock (ISO shelters, without skids) test. The shelter with its maximum payload uniformly distributed over the entire usable floor space of the shelter in the shipping configuration shall withstand drops of 12 inches onto a

level concrete surface. Doors and panels shall operate properly. For this test the shelter shall be instrumented per MIL-STD-810, Method 516.2 and shall use a minimum of 14 accelerometers. The Government will approve location of the instruments and capability of the recording equipment. Test results will be given to the Government and used by systems engineers.

5.3.13.2 Flat drop test. The test unit loaded with its maximum payload as specified above shall be lifted 12 inches from the ground and allowed to free fall with the bottom impacting onto a concrete surface. Only one drop shall be performed.

5.3.13.3 Rotational drop test. With the shelter loaded with its maximum payload, place one edge of the shelter on a nominal 4-inch high block. Raise the opposite edge of the shelter 12 inches and then allow the unit to fall freely onto a concrete surface using the 4-inch block as a pivot. Perform this test once on each of the four bottom edges of the shelter.

5.3.14 Impact resistance. A 24-inch sample of all floor and roof shelter panels shall withstand a blow from a 70-pound steel cylinder (3 inches in diameter with a hemispherical end), dropped from a height of 30 inches. Samples of all other exterior panels shall withstand a blow from the same steel cylinder dropped from a height of 16 inches. Impact shall not result in rupture to either skin. No delamination between skins and core or crushing of core is allowed outside a 3 inch radius from the center of impact.

5.3.14.1 Impact resistance test. All panel surfaces which are exterior surfaces in the shelter's transportation mode or floor or roof surfaces in the shelter's operational mode shall be impact resistance tested. A specimen of a panel requiring testing shall receive a blow from a 70-pound steel cylinder dropped from a specified height onto the appropriate panel surface. Floor and roof surfaces shall be tested at a drop height of 30 inches. Panel surfaces which are exterior surfaces in the shelter's transportation mode shall be tested at a drop height of 16 inches. If a panel surface fits both categories then the 30 inch drop height test will be applied. If a panel bears a floor or roof surface on one side and an exterior surface on the other side then a specimen shall receive a floor/roof-side impact from 30 inches and a second specimen shall receive an impact to the opposite side from 16 inches. The impact resistance specimen shall be fabricated in accordance with figure 2. The specimen shall contain only one continuous piece of core material (without structural members or core splices) bonded with the same adhesive as used in the shelter panel (without voids or delaminations to the facings). The specimen shall be supported along its four edges by a framework backed by concrete. The framework shall be made of four pieces of 2 inch by 4 inch (nominal) softwood lumber. The frame shall be rigidly bolted together to form a square 24 inches on a side (outside dimensions) and 4 inches (nominal) high. The frame shall rest on the 24 inch (nominal) wide face. The specimen shall be bolted to the frame with two 1/4 inch diameter blots per edge. Care should be taken that the appropriate surface of the specimen faces the impact. The bolts shall be tightened against the

specimen and then backed off so that there is a gap of 0.010 inch (nominal) between the bolt head and the panel. The specimen shall be impacted with a steel cylinder 3 inches in diameter and hemispherical at one end. The cylinder shall be oriented and dropped vertically so that the center of the hemispherical end of the cylinder strikes the center of the specimen on a horizontal plane. The cylinder shall not be permitted to re-impact the specimen after the first impact. The test specimen shall be cross-sectioned through the impact area and visually examined for conformance with the specified requirements.

5.3.15 EMI provisions. Shelters requiring EMI shielding shall provide a minimum of 60-db attenuation of radiated and induced EMI in the frequency range of 150 kHz to 10 GHz. Requirements exceeding 60-db attenuation shall be so identified.

5.3.15.1 EMI provisions test. The shelter shall be tested in accordance with MIL-STD-285, except that the measurements shall be made at the following frequencies and test point locations:

Frequencies: H-Field: 150 kHz
E-Field: 200 kHz, 1.0 MHz, 18 MHz, 300 MHz
Plane Wave: 400 MHz, 1 GHz, 10 GHz

Test point locations: (Transmitting and receiving antennas to be positioned opposite each other in accordance with MIL-STD-285)

Mid-panels (one location per panel)
Vertical Corners (one location per corner)

In addition, for each mid-panel test point, the receiving antenna shall be used to probe the inside seams, openings, and doors of that panel while maintaining the required distance from the inside skin. For each vertical corner test point, the receiving antenna shall be used to probe the inside seams and openings of both adjacent panels while maintaining the required distance from the inside skin. The worst case reading shall be recorded as the position attenuation.

NOTE

A matrix shall be formed for each selected test point type, by performing the measurements at listed frequencies above, at the test location. A copy of this matrix will be delivered with the shelter. The production test shall be the same as above.

5.3.16 Watertightness. The shelter, without the use of any external sealing, caulking, taping, etc., shall be subjected to the following two-part test.

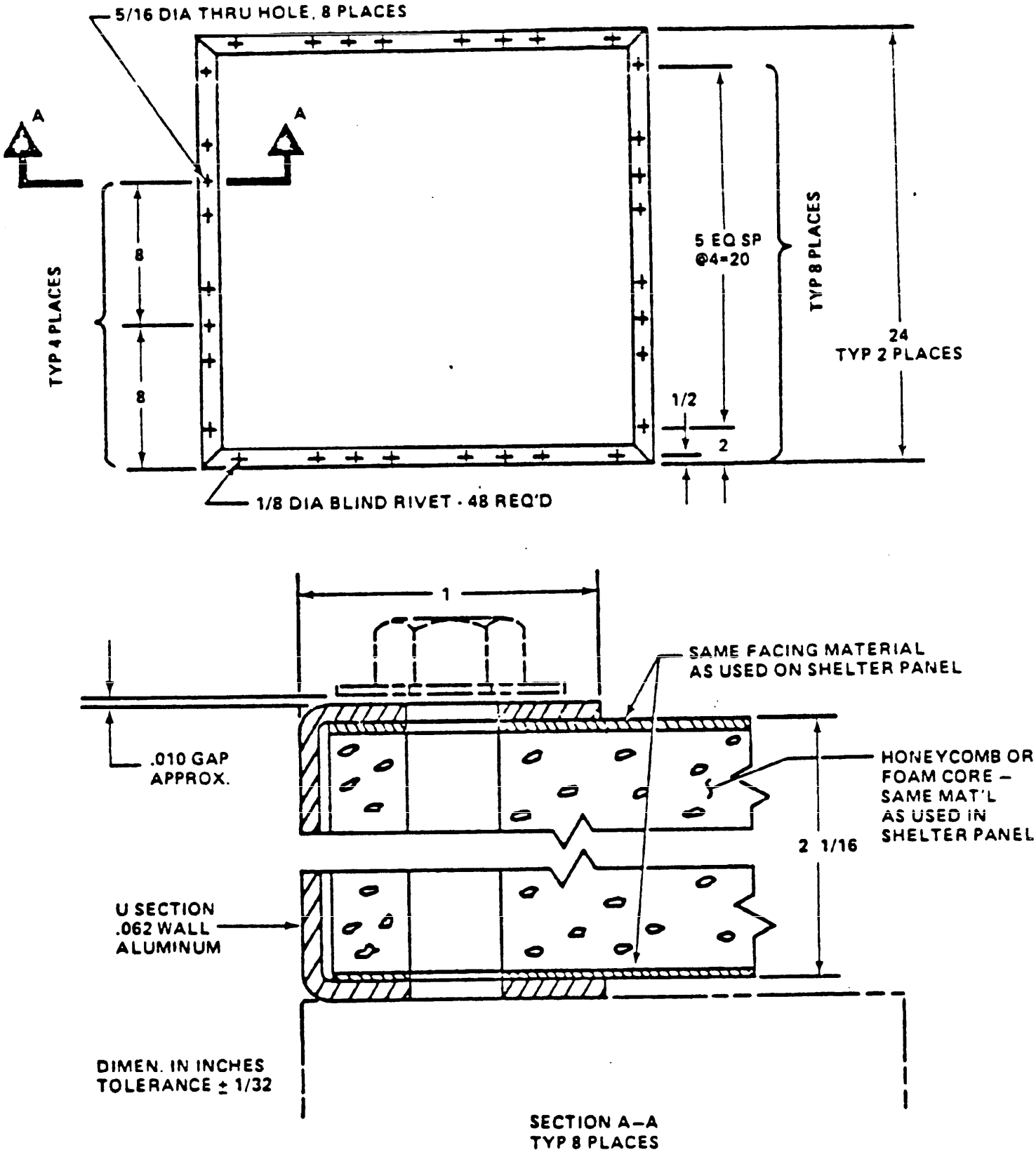


Figure 2. Impact Resistance Specimen

5.3.16.1 Watertightness test (panels). Each exposed surface of the shelter, with doors and covers closed, shall be sprayed with water from nozzles, model G29SQ (or GG29SQ) as made by Spraying Systems Company, Bellwood, IL, or equal. Nozzles shall be symetrically distributed across each side, roof, and end panel tested. Side and end panels shall be tested using one nozzle per 6 ft^2 (0.56 m^2) surface area. Nozzles shall be located perpendicular to and 19 inches from the panel surface. Roof panels shall be tested using one nozzle per 14 ft^2 (1.3 m^2) surface area. Nozzles shall be located perpendicular to and 32 inches from the panel surface. In all cases, panels shall be sprayed continuously for a period of 40 minutes and nozzle input pressure shall be 40 psig. Prior to the performance of the spraying, the door of the shelter shall be fully opened and closed so that the latching mechanism is completely engaged for a total of ten operations. There shall be no evidence of leakage into the shelter.

5.3.16.2 Watertightness test (louvers). The inlet louver shall be tested with the door closed and the louver cover fully open, by spraying water at the door end panel. Five nozzles, as used above, shall be used; they shall be located in accordance with figure 3. Each nozzle shall operate at a pressure of 15 psig at the nozzle. The panel shall be sprayed continuously for a period of 20 minutes. After both parts of this test, there shall be no evidence of leakage into the shelter or into the walls, floor, roof, or door. For all shelters except honeycomb type, to determine that no water has entered space between the skins, holes shall be made (not less than four, nor more than ten) at points to be determined by the Government at the time of testing and the shelter tilted to allow the water to run towards the holes. There shall be no evidence of water. After this determination, the holes shall be sealed with rivets and sealer.

5.3.17 Helicopter lift, 3-G. The shelter shall incur no structural damage when subjected to 3-G helicopter lift.

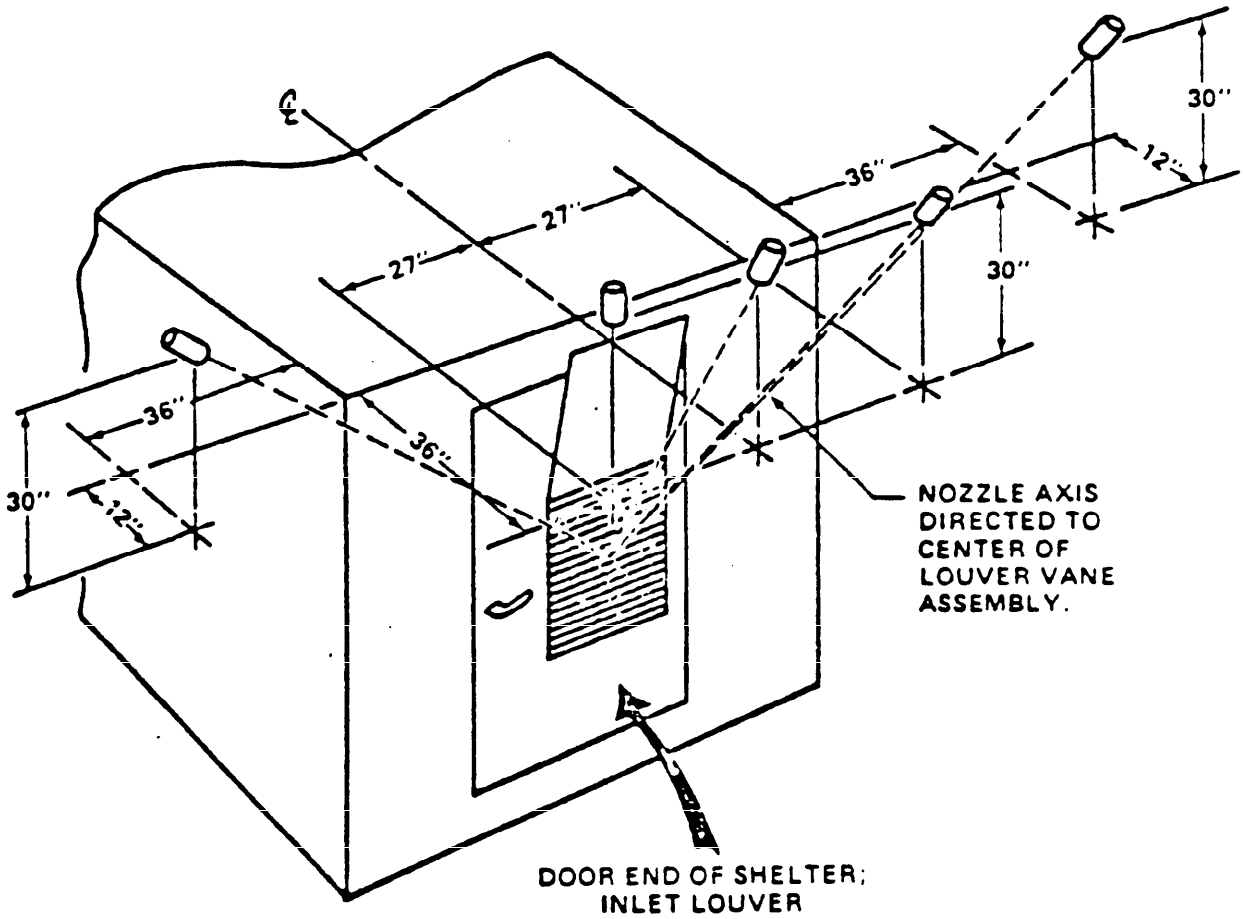
5.3.17.1 Helicopter lift test, 3-G (ISO Shelter). The shelter shall be prepared and tested in the following manner:

a. Prepare the shelter for lifting test by installing a payload (equal to three times gross weight minus shelter tare weight) on the shelter fixed floor. The payload may be in any convenient form which may be uniformly distributed over the floor. If solid weights are used, the floor will be protected from sharp objects by 1/2 to 3/4-inch thick plywood covering the floor. (The shelter must be located on a flat, solid surface while loads are installed.)

b. Close all doors and panels securely.

c. Connect a four legged sling to the upper ISO fittings maintaining a 60° minimum angle with the roof (see figure 4).

d. Applying minimal acceleration forces, raise the shelter from the ground and allow to remain suspended for 5 minutes.



NOTES:

1. GAGES SHALL BE PERMANENTLY INSTALLED TO INDICATE PRESSURE AT REMOTE NOZZLES.
2. AIR INLET COVER SHALL BE FULLY OPEN.

Figure 3. Nozzle Locations for Watertightness Test (Louvers)

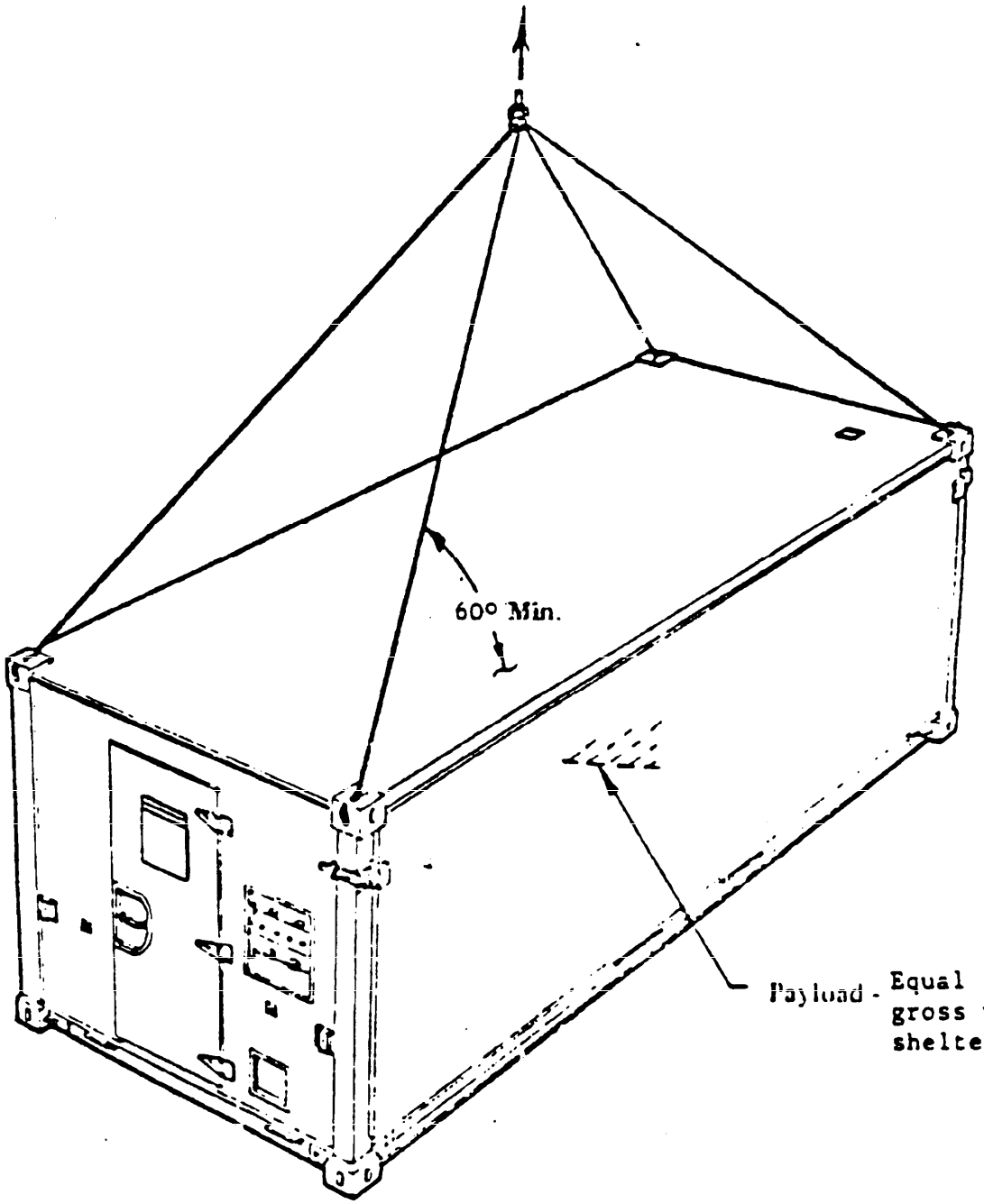
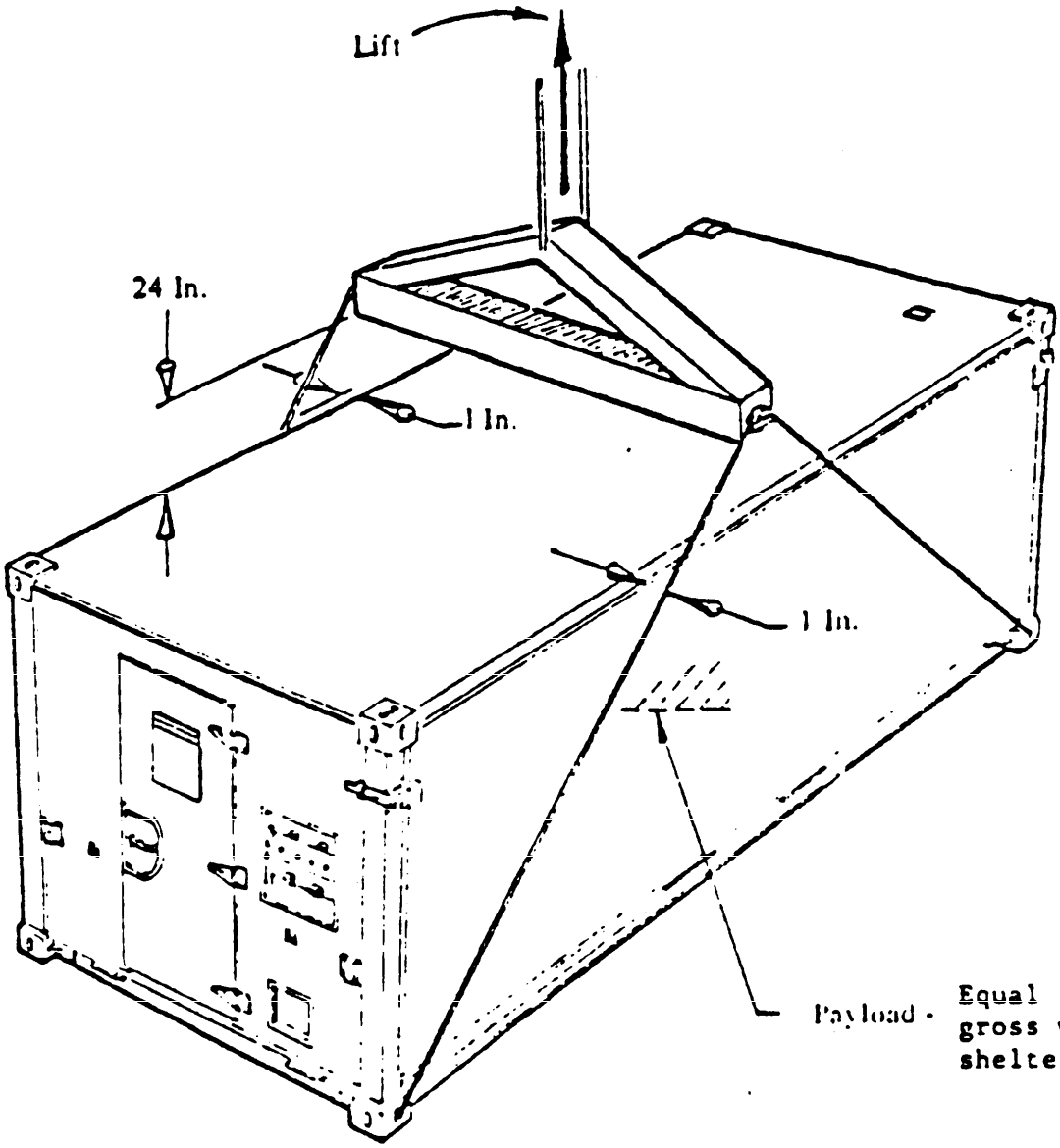


FIGURE 4. LIFTING - UPPER FITTINGS



LIFTING FROM BOTTOM

Figure 5.

e. Slowly lower the shelter to the ground and inspect for signs of damage.

f. Repeat the test by lifting the shelter from the lower ISO fittings as shown in figure 5.

g. Remove the payload.

h. Erect the shelter and thoroughly inspect the shelter for damage. Any evidence of permanent deformation, cracking, unbonded components or loosening of structural components shall constitute failure of this test.

5.3.17.2 Helicopter lift test, 3-G (non-ISO shelter). The shelter shall be prepared and tested in the following manner:

a. Prepare the shelter for lifting test by installing a payload (equal to three times gross weight minus shelter tare weight) on the shelter fixed floor. The payload may be in any convenient form which may be uniformly distributed over the floor. If solid weights are used, the floor will be protected from sharp objects by 1/2 to 3/4-inch thick plywood covering the floor. (The shelter must be located on a flat solid surface while loads are installed,)

b. Close all doors and panels securely.

c. Connect a combination lift and tie down device if specified for and normally shipped with this perpendicular shelter or a four legged sling to each shelter lifting eye and to the hook of the hoist.

d. Applying minimal acceleration forces, raise the shelter from the ground and allow to remain suspended for 5 minutes.

e. Slowly lower the shelter to the ground and inspect for signs of damage.

f. Remove the payload.

g. Erect the shelter and thoroughly inspect the shelter for damage. Particular attention shall be given to the area around the four lifting eyes. Any evidence of permanent deformation, cracking, unbonded components, or loosening of structural components shall constitute failure of this test.

Custodians:

Army - GL
Navy - MC
Air Force - 99

Review activity:

Air Force - 84

Preparing activity:

Army - GL

Project No. 5411-0028

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-STD-907B	Engineering and Design Criteria for Shelters, Expandable and Non-Expandable.

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
	☐ USER
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ MANUFACTURER
	☐ OTHER *(Specify)*: _____

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	7b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
7c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

DD FORM 82 MAR 1426 PREVIOUS EDITION IS OBSOLETE.

NATICK OP, 20 Nov 84

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