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Standard Specification for Shelter, Electrical, Equipment S-280/G¹

This standard is issued under the fixed designation E1975; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers one type of lightweight field and mobile shelter designed for transport by cargo truck, fixed or rotary winged aircraft, by rail, and ship, as Shelter, Electrical Equipment S-280/G (see 15.5).

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only. mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 The following safety hazards caveat refers only to the test methods described in this specification. *This standard does not purport to address the safety concerns, if any, associated with its use. It is the responsibility of the user of the standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

~~E273~~[C273/C273M](#) Test Method for Shear Properties of Sandwich Core Materials

~~D1621~~ Test Method for Compressive Properties of Rigid Cellular Plastics

~~D4622~~[D1622/D1622M](#) Test Method for Apparent Density of Rigid Cellular Plastics

~~D2842~~ Test Method for Water Absorption of Rigid Cellular Plastics

[E631](#) Terminology of Building Constructions

[E864](#) Practice for Surface Preparation of Aluminum Alloys to Be Adhesively Bonded in Honeycomb Shelter Panels

[E1730](#) Specification for Rigid Foam for Use in Structural Sandwich Panel Cores

[E1749](#) Terminology Relating to Rigid Wall Relocatable Shelters

[E1773](#) Practice for Sealing Rigid Wall Tactical Shelters with Polysulfide Based Sealants

[E1794](#) Specification for Adhesive for Bonding Foam Cored Sandwich Panels (200°F Elevated Humidity Service), Type II Panels

[E1801](#) Practice for Adhesive Bonding of Aluminum Facings in Foam and Beam Type Shelters

[E1851](#) Test Method for Electromagnetic Shielding Effectiveness of Durable Rigid Wall Relocatable Structures

[E1925](#) Specification for Engineering and Design Criteria for Rigid Wall Relocatable Structures

2.2 Commercial Standards:³

[SAE AMS-W-6858](#) Welding, Resistance: Spot and Seam

[SAE AMS-STD-1595](#) Qualification of Aircraft, Missile, and Aerospace Fusion Welders

2.3 Federal Air Regulation (FAR):⁴

[FAR 25.853](#) Compartment Interior

2.4 Military Standards:

[MIL-F-14072](#) Finishes for Ground Electronic Equipment⁵

[MIL-DTL-55507](#) Shelter, Electrical Equipment, (With or Without Equipment), Packaging of⁵

[MIL-STD-202](#) Electronic and Electrical Component Parts⁵

¹ This specification is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.53 on Materials and Processes for Durable Rigidwall Relocatable Structures.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM Standards volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from AMS Publications, Society of Automotive Engineers, SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, http://www.sae.org.

⁴ Available from Flight Standards Service, Federal Aviation Administration (FAA), 800 Independence Ave., SW, Washington, DC 20591, http://www.faa.gov.

⁵ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5098, http://dodssp.daps.dla.mil/19111-5094, http://quicksearch.dla.mil.

MIL-STD-252 Wired Equipment, Classification of Visual and Mechanical Defects for Equipment, Electronic, Wired, and Other Devices⁵

MIL-STD-810 Environmental Engineering Considerations and Laboratory Tests⁵

MIL-STD-1916 DOD Preferred Methods for Acceptance of Product⁶

MIL-STD-2219 Fusion Welding for Aerospace Applications⁶

MIL-M-13231 Marking of Electronic Items⁵

2.5 Drawings:⁶

SC-D-36423 Hold Down Assembly

SC-D-36424 Cable Assembly

SC-C-200154 Keeper

SM-D-450462 Panel Assembly, Emergency Exit

SM-C-450466 Air Filter

SM-C-555515 Shock Mount

SM-B-563756 Sealer

SC-D-595509 Cover, Emergency Exit

SC-B-595564 Core Material-Urethane, Light

SC-B-595565 Core Material-Urethane, Heavy

SM-D-615264 Intake Louver Assembly

DL-SC-A-621051 Modification Kit, Radio Frequency Interference, MK-1079/G

SM-D-781242 Door Fixture (S-280) Construction Tightness Test

SM-D-781243 Drain Fixture (S-280) Construction Tightness Test

SM-D-781244 S-280 Construction Tightness Test

DL-SM-B-947080 Shelter, Electrical Equipment S-280C/G

SM-D-947080 Shelter, Electrical Equipment S-280C/G

SM-D-947081 Panel Assembly, Front

SM-D-947082 Panel Assembly, Rear

SM-D-947083 Panel Assembly, Roof

SM-D-947084 Panel Assembly, Floor

SM-D-947085 Panel Assembly, Side

SM-D-947141 Corner, Lifting Eye (Machining)

SM-D-947142 Corner, Towing Eye (Machining)

SM-D-947143 Casting, Lifting and Towing Eye

SM-D-947160 Door Jamb Assembly

SM-D-947166 Door Assembly

SM-B-947179 Bonding Procedure

SM-B-947180 Cleaning Procedure

SM-D-947181 Flatness and Squareness Measurements

SM-B-947184 Adhesive

SM-D-947186 Test Weight Installation

SM-C-947230 Shock Mount

SM-D-947235 Mounting Bracket, Skid

SM-C-947237 Shock Mount

SM-D-947238 Skid Assembly

17-1-3274 Shelter, Electrical Equipment, S-280C/G (Shielded)

3. Terminology

3.1 Definitions:

3.1.1 *delaminations*—for the purpose of this specification, a delamination is defined as the condition that exists within a shelter section or panel when two surfaces that once were bonded together are no longer bonded together. Delaminations may occur between any two bonded surfaces, examples include: separations between thermal barriers and members, between thermal barriers and skins, between members and core, or between skins and core. They may be the result of a poor quality bond or they could occur due to misuse or severe handling of the panels or the shelter after bonding. Test requirements of this specification shall not be construed as misuse or severe handling as these terms apply to the definition of delaminations (see 5.4).

3.1.2 *examination*—examination consists of simple, generally nondestructive determinations of compliance, without the use of special testing equipment.

⁶ Available from US Army Natick Soldier Systems Center, ATTN: AMSRD-NSC-CP-CS, Kansas Street, Natick, MA 01760-5018, <http://www.army.mil/natick>.

3.1.3 *inspection*—inspection is the examination or testing, or both, of supplies to determine compliance with the applicable requirements. Sampling is an element of inspection.

3.1.4 *testing*—testing consists of determinations of compliance, using technical means.

3.1.5 *voids*—for the purpose of this specification, a void is defined as any unauthorized separation or space within a shelter panel or section, that is, any separation or space that is in conflict with the drawings or other contractual requirements. Voids range from gaps as wide as the space created by a missing piece of core material to as thin as a break in the continuity of material. Voids may be located solely within one type of material, such as a core material separation; they may exist between adjacent materials, such as unbonded core material; or they may be located between other parts within a panel, such as where a piece of material is missing, damaged, or undersized. Voids may have been created at the time of construction, such as where a part was omitted; or may be created at a later time, such as a core separation or delaminated skin (see 5.4).

NOTE 1—All other terminology related to this specification is defined in Terminology Terminologies E631 and E1749.

4. Material Requirements

4.1 *General*—Materials used in the construction of this item shall be in accordance with the following requirements:

4.2 *Core Material*—Core material density, compressive strength, shear strength, flammability, and water absorption properties shall be in accordance with Specification E1730 and Drawings SC-B-595564 and SC-B-595565, as applicable (see 12.2.1, 10.1, Table 1, and Table 2).

4.3 *Adhesive*—The shear strength of the cured adhesive and its bond to aluminum shall be in accordance with requirements of Specification E1794 and the Drawing SM-B-947184. This requirement shall apply to the low temperature, room temperature, and high temperature conditions and after the humidity exposure and salt spray exposure conditions required by SM-B-947184 (see 12.2.2, 12.2.3, 10.2, 10.2.2, Table 1, and Table 2).

4.4 *Sealer*—The shear strength of the cured sealer and its bond to aluminum shall be in accordance with the following (see 10.2, 10.2.2, Table 1, and Table 2):

4.4.1 *Low Temperature*—200 psi (1.4 MPa) when tested at $-65 \pm 5^\circ\text{F}$ ($-54 \pm 3^\circ\text{C}$) (see 12.2.2 and Table 2),

4.4.2 *Room Temperature*—200 psi (1.4 MPa) when tested at $80 \pm 10^\circ\text{F}$ ($27 \pm 6^\circ\text{C}$) (see 12.2.3 and Table 2),

4.4.3 *High Temperature*—75 psi (75 KPa) when tested at $200 \pm 0^\circ\text{F}$ ($93 \pm 0^\circ\text{C}$) (see 12.2.2 and Table 2),

4.4.4 *Sealer Shear, Humidity Exposure*—The sealer and its bond to the aluminum shall withstand exposure to 95 % relative humidity $\pm 5\%$ at $160 \pm 5^\circ\text{F}$ ($71 \pm 3^\circ\text{C}$) for fourteen days. After exposure the sealer shall have a minimum average shear strength of 75 psi (520 KPa) when tested at $160 \pm 5^\circ\text{F}$ ($71 \pm 3^\circ\text{C}$).

4.4.5 *Sealer Shear, Salt Spray Exposure*—The sealer and its bond to the aluminum shall withstand exposure to the salt spray test. Method 509.4 of MIL-STD-810F using a 20 % NaCl solution at $95 \pm 5^\circ\text{F}$ ($35 \pm 3^\circ\text{C}$) for fourteen days. After exposure the sealer shall have a minimum average shear strength of 200 psi (1.4 MPa) when tested at $180 \pm 10^\circ\text{F}$ ($27 \pm 6^\circ\text{C}$).

4.5 *Shock Mounts*—Shelter skid shock mounts shall be in accordance with Drawing SM-C-555515, SM-C-947237, and SM-C-947230 (see 12.2.4, 10.3, 10.3.1, 10.3.2, Table 1, and Table 3).

5. Construction Requirements

5.1 *General*—The electromagnetic protected shelter shall be constructed in accordance with Drawing 17-1-3274 and all subsidiary drawings and parts lists pertaining thereto and as specified herein.

5.2 *Cleaning*—See 12.2.5, 10.4, Table 2, and Table 3.

TABLE 1 First Article Specimens

Inspection	Quantity	Requirements Subsection	Test Subsection
Core material:		4.2	10.1
Density	5 for every grade or type	4.2	10.1.1
Compressive strength	5 for every grade or type	4.2	10.1.2
Shear strength	5 for every grade or type	4.2	10.1.3
Flammability	5 for every grade or type	4.2	10.1.4
Water absorption	3 for every grade or type of urethane	4.2	10.1.5
Adhesive	50 coupons	4.3	10.2
Sealer	50 coupons	4.4	10.2
Shock mounts	SM-C-555515: 3 per -3 SM-C-947237: 3 each SM-C-947230: 3 each	4.5	10.3.1
Impact panel	1 from wall, 1 from floor	5.4.1	10.7
Hold down assembly	1 complete	9.2	10.32
Eye casting hardness	1 casting in accordance with SM-D-947143	7.5.2	10.24.2