Designation: E 1978 – 01

Standard Specification for Shelter, Tactical, Expandable, Two-Side[1]

This standard is issued under the fixed designation E 1978; 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.

1. Scope

1.1 This specification covers a rigid wall, two-side expandable shelter constructed of aluminum-faced, nonmetallic honeycomb sandwich panels and meeting the International Organization for Standardization (ISO) cargo container specification in the transport mode. Nominal dimensions when closed (container mode) are: height 8 ft, width 8 ft, and length 20 ft (2.4 by 2.4 by 6.1 m). Approximate dimensions when expanded (shelter mode) are: height 8 ft, width 22 ft, and length 20 ft (2.4 by 6.7 by 6.1 m).

1.2 The values stated in SI units are to be regarded as the standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this 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:*

E 864 Practice for Surface Preparation of Aluminum Alloys to Be Adhesively Bonded in Honeycomb Shelter Panels[2]

E 865 Specification for Structural Film Adhesives for Honeycomb Sandwich Panels[2]

E 866 Specification for Corrosion-Inhibiting Adhesive Primer for Aluminum Alloys to Be Adhesively Bonded in Honeycomb Shelter Panels[2]

E 874 Practice for Adhesive Bonding of Aluminum Facings to Nonmetallic Honeycomb Core for Shelter Panels[2]

E 990 Specification for Core-Splice Adhesive for Honeycomb Sandwich Shelter Panels[2]

E 1091 Specification for Nonmetallic Honeycomb Core for Use in Shelter Panels[2]

E 1749 Terminology Relating to Rigid Wall Relocatable Shelters[2]

E 1773 Practice for Sealing Rigid Wall Tactical Shelters with Polysulfide Based Sealants[2]

E 1826 Specification for Low Volatile Organic (VOC) Corrosion-Inhibiting Adhesive Primer for Aluminum Alloys to Be Adhesively Bonded[2]

E 1925 Specification for Engineering and Design Criteria for Rigid Wall Relocatable Structures[2]

2.2 *ISO Standards:*

ISO 1161-1980 Series 1-Freight Containers-Corner Fittings, Specification[3]

ISO 1496/I Series 1-Freight Containers-Specification and Testing Part[3]

2.3 *Military Standards:*

2.3.1 *General Cargo Containers*

MIL-Q-9858 Quality Program Requirements[4]

MIL-STD-810 Environmental Engineering Considerations and Laboratory Tests[4]

MIL-STD-1595 Qualification of Aircraft, Missile and Aerospace Fusion[4]

2.3.2 *Welders:*

MIL-STD-2219 Fusion Welding for Aerospace Appliances[4]

ANSI/ASQC Standard:

ANSI/ASQC Z1.4-1993 Sampling Procedures and Tables for Inspection by Attributes[5]

2.4 *Drawings:*

5-4-3118 Shelter, Assembly, Two-Side Expandable-60 amp[6]

5-4-3201 Shelter, Assembly, Two-Side Expandable-100 amp[6]

3. General Requirements

3.1 *Alternate Components*—When this specification or the referenced drawings specify use of a specific component "or equal," the contractor may substitute a component equal to the specified component provided that the contractor complies with the following requirements. Prior to manufacture of the first article or, if none is required, prior to commencing production, the contractor shall submit for the purchaser's approval, a list identifying each proposed "or equal" component together with proof that each listed component is functionally equal to the specified component and is compatible with the end item covered by this specification. The purchaser,

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[2] *Annual Book of ASTM Standards*, Vol 04.11.

[3] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

[4] Available from Standardization Documents Order Desk, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111–5094. Attn: NPODS.

[5] Available from American Society for Quality Control, 611 East Wisconsin Avenue, Milwaukee, WI 53201.

[6] Copies of drawings are available from the U.S. Army Natick Research, Development, and Engineering Center, Attn: SSCNC-WST, Natick, MA 07160–5018.

at his/her option, may require a physical sample of any "or equal" component. Approval of the submitted listing and supporting data authorizes the commencement of fabrication of the first article or of production, as applicable, but does not relieve the contractor of the responsibility that the "or equal" components perform in accordance with specified requirements when incorporated into the end item.

3.2 *Materials and Components*—Materials and components shall conform to the documents listed in Section 2 and as specified herein. Any change to the proposed materials or processes must be approved by the purchaser. It is encouraged that recycled material be used when practical as long as it meets the requirements of this specification.

3.3 *Workmanship*—The shelter, including all parts and accessories, shall be constructed and finished in a workmanlike manner with particular attention given to removal of burrs and sharp edges, accuracy of dimensions, thoroughness of soldering, welding, painting, alignment of parts and assemblies, and the tightness of screws, bolts, and so forth. Gaskets shall not be torn or split and shall be free of finish. Cloth components shall be clean and free of holes, cuts, or tears. All latches utilized for erection and closing of the shelter shall be properly adjusted before the shelter is prepared for delivery to the purchaser.

3.4 *Riveting*—Riveting joints shall be tight. The joined parts shall be undamaged, and the rivet heads shall be properly seated and tight against the bearing surfaces. All the rivets, except those used in panel bonding, shall be dipped in polysulfide sealant just prior to insertion; however, a dab of polysulfide sealant shall be applied to the head of each rivet.

3.5 *Cleaning*—After fabrication, parts shall be cleaned in accordance with the drawings.

3.6 *Welding*—Welded joints shall be such that grinding of the finished weld shall not be a requirement, except when specified on the drawing. Spot, stitch, and seam welds shall be as indicated on the drawings. All surfaces to be welded shall be cleaned and free from scale, paint, grease, and other foreign materials. Welds shall have thorough penetration, good fusion, and shall be free from scabs, blisters, abnormal pock marks, cracks, voids, slag inclusions, and other harmful defects. Welded assemblies shall be cleaned to remove any scale, oxidation products, and excess flux. Any acid used in cleaning shall be completely neutralized and removed. Welders shall be certified in accordance with MIL-STD-1595. Welding equipment and procedures shall conform to MIL-STD-2219.

3.7 *Finish*—Coatings shall level out to an adherent, continuous, and uniform film without runs, wrinkles, streaks, or areas of no film. Any coating damaged during assembly or examination shall be touched up. There shall be no areas of rust. Finish shall be free from blistering, peeling, and chipping.

3.7.1 *Adhesion of Paint*—The shelter shall be capable of withstanding, without degradation to the finish, the tests as specified in 11.37.

NOTE 1—After top coat application, the shelter in the deployed mode shall be stored for a minimum of 168 h at a minimum of 70°F (21°C) prior to performing this test.

3.7.2 *Color*—The color of the paint film shall be compared with an appropriate color chip for the paint specified.

3.7.3 *Thickness*—Thickness of the paint film shall be checked as specified in 11.39.

3.8 *Finish and Color*—Surfaces shall be of the color, treatment, and finish as shown on the drawings. Top coat painting shall be performed on the fully assembled shelter so as to prevent mismatch of color shading, unless other control techniques are approved by the purchaser. After top-coat application, the shelter in the deployed mode (that is, expanded) shall be stored in a 70°F (21°C) minimum temperature indoor facility for a minimum of 36 h to ensure adequate coating(s) cure. During this storage period, the shelter doors and vents shall be opened to permit air circulation within the shelter.

3.9 *Manuals*—Unless otherwise specified (see 13.2), technical manuals shall be provided with each shelter. Stowage provision for the manuals shall be located as shown on the applicable drawings.

3.10 Terminology related to this specification is defined in Terminology E 1749.

4. Design and Construction Requirements

4.1 *Design and Construction*—Design and construction of the expandable shelter shall conform to the requirements specified on the drawings, all subsidiary drawings and parts lists, and hereinafter. The shelter shall be free of panel delaminations and shall meet all physical and environmental requirements specified herein.

4.2 *Container Mode*—The shelter in the closed or transport mode shall be referred to as a container, hereinafter, for the purpose of definition. The shelter, in the container mode, shall be an article of transport equipment meeting ISO freight container requirements related to cargo containers. The shelter shall not show structural damage when tested as specified in 11.20, 11.22, 11.23, 11.28-11.35, and shall not show leakage when tested as specified in 11.24, and 11.24.1-11.24.3. The contractor shall ensure that the shelter receives Coast Guard Certification for ISO containers. The container's overall dimensions shall be in accordance with ISO freight container designated IC and are as shown in Table 1.

4.3 *Panels*—The panels used as structural members in the container configuration shall structurally meet all transportation and environmental requirements specified herein. Each panel shall be fabricated as a net panel with aluminum extrusions bonded about the panel perimeter during panel bonding. The inner and outer skins on all joints shall be sealed to provide a water barrier against the entrance of moisture to the core material and to the interior of the shelter. The water barrier is to be maintained intact at all panel cross-sectional openings. All joints and edges shall be assembled and sealed in

TABLE 1 Container Dimensions

	Height				Width				Length			
Type	ft	in.	tol.	in.	ft	in.	tol.	in.	ft	in.	tol.	in.
IC	8	0	+0	−0.1875	8	0	+0	−0.1875	19	10.5	+0	−0.25
	(2.438 m		+0	−5 mm)	(2.438 m		+0	−5 mm)	(6.058 m		+0	−6 mm)