Designation: E 1123 – 86 (Reapproved 1998)

Standard Practices for Mounting Test Specimens for Sound Transmission Loss Testing of Naval and Marine Ship Bulkhead Treatment Materials[1]

This standard is issued under the fixed designation E 1123; 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 These practices describe test specimen mountings to be used for naval and marine ship applications during sound transmission loss tests performed in accordance with Test Method E 90.

1.2 The structure specified in these practices is intended for mounting of single-layer treatments or composite treatments consisting of various materials and configurations. Acoustical treatment materials may be combinations of acoustical absorbent materials, limp mass septums, and insulation materials.

1.3 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

1.4 *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:*

C 634 Terminology Relating to Environmental Acoustics[2]

E 90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions[2]

3. Significance and Use

3.1 The sound transmission loss provided by a material that covers a flat surface depends not only on the physical properties of the material but also on the type of structure to which it is mounted and the mounting method used.

3.2 Naval and marine architects and design engineers require specific transmission loss characteristics of acoustical treatment materials as they would exhibit installed on a ship's structure. The mounting structure and procedures specified in these practices are intended to simulate such a shipboard environment.

3.3 Test reports may refer to this mounting by Practices E 1123 instead of providing a detailed description of the mounting used.

4. Mounting Structure and Methods

4.1 The mounting structure consists of a fabricated aluminum bulkhead. This bulkhead is designed to fit within a 2.44-m (8-ft) opening in the filler walls between the reverberation rooms of a test facility. Test result measurements due to the effects of the filler walls may be accounted for as specified in Test Method E 90. A larger mounting structure may be used if it can be demonstrated that this structure yields results comparable to the 2.44 by 2.44-m (8 by 8-ft) mounting structure.

4.1.1 The bulkhead is fabricated in two sections, 1.22 by 2.44 m (4 by 8 ft) and is fastened together by a 10.2 by 10.2 by 10.2-cm (4 by 4 by 4-in.) aluminum I-beam.

4.1.2 The coupling is accomplished by using 8-mm (5⁄16-in.) SAE grade B steel stove bolts, torqued to 3.33 m/kg (25 ft/lb).

4.1.3 The 6.4-mm (¼-in.) sheet aluminum panels, 1.22 by 2.44 m (4 by 8 ft), are supported with 10.2 by 10.2 cm (4 by 4 in.), 2.976-kg per linear metre (2-lb per linear ft) tee beams.

4.1.3.1 The tee beams are welded to the 6.4-mm (¼-in.) aluminum sheets with welds on either side of the center member of the tee at 53.3-cm (21-in.) intervals.

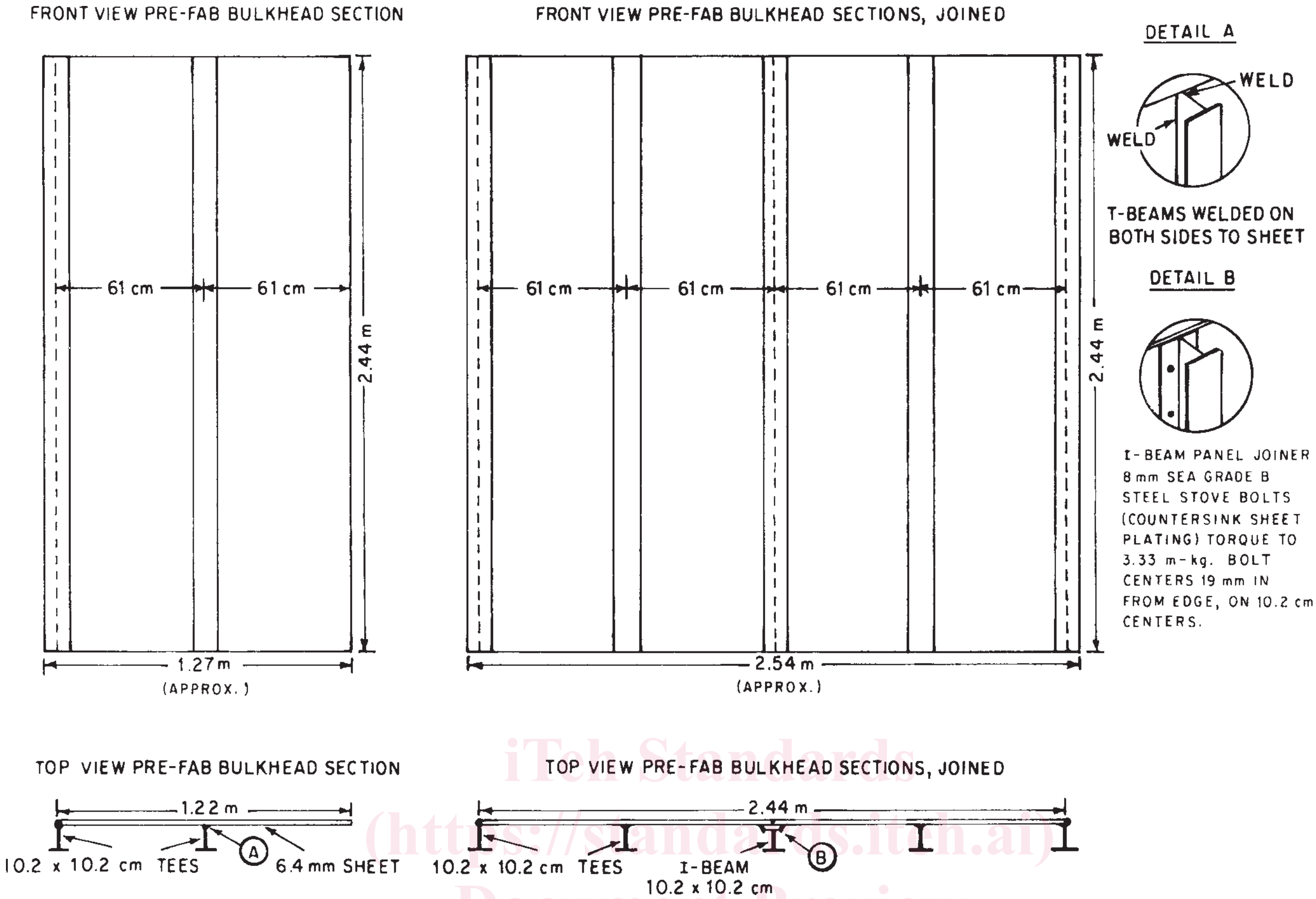
4.1.3.2 Weld areas should be approximately 7.6 cm (3 in.) long. Welding in excess of these intervals may cause severe warpage of the bulkhead. The tee beams are positioned on the aluminum sheets to obtain a distance of 61 cm (2 ft) between tee beam centers with the I-beam serving as the bulkhead center support.

4.1.4 Fig. 1 illustrates the construction details. The bulkhead shall be installed with the smooth side facing the acoustical source room and fastened in the filler wall opening by any means which will provide a secure, rigid structure. Tapered wooden wedges driven between the filler wall at each tee beam support will provide the necessary rigidity. Acoustical sealant shall be applied around the bulkhead edges, between the filler wall and the bulkhead and the I-beam panel connector to ensure an airtight seal. This seal should be confirmed by energizing the acoustical source and listening for spurious

[1] These practices are under the jurisdiction of ASTM Committee E-33 on Environmental Acoustics and are the direct responsibility of Subcommittee E33.03 on Sound Transmission.

Current edition approved Aug. 29, 1986. Published January 1987. Originally published as E1123–86. Last previous edition E1123–86 (1994)ε1.

[2] *Annual Book of ASTM Standards*, Vol 04.06.


FRONT VIEW PRE-FAB BULKHEAD SECTION
FRONT VIEW PRE-FAB BULKHEAD SECTIONS, JOINED
DETAIL A
WELD
WELD
T-BEAMS WELDED ON BOTH SIDES TO SHEET
DETAIL B
I-BEAM PANEL JOINER 8 mm SEA GRADE B STEEL STOVE BOLTS (COUNTERSINK SHEET PLATING) TORQUE TO 3.33 m-kg. BOLT CENTERS 19 mm IN FROM EDGE, ON 10.2 cm CENTERS.
61 cm
61 cm
2.44 m
1.27 m (APPROX.)
2.54 m (APPROX.)
TOP VIEW PRE-FAB BULKHEAD SECTION
TOP VIEW PRE-FAB BULKHEAD SECTIONS, JOINED
1.22 m
2.44 m
10.2 x 10.2 cm TEES
6.4 mm SHEET
I-BEAM 10.2 x 10.2 cm

NOTE 1—6.4-mm sheet plate.
NOTE 2—10.2 by 10.2-cm tees, 2.976 kg per linear metre.
NOTE 3—Two 1.22 by 2.44-m bulkhead sections joined with I-beam using 8-mm bolts.
NOTE 4—Bulkhead sections delivered unassembled.

FIG. 1 Aluminum Bulkhead Details

noise transmission around the sealed perimeter crevices with a stethoscope on the receiver room side.

4.2 Self-adhesive insulation anchors (stud pins) with 5.1 by 5.1-cm (2 by 2-in.) galvanized steel plates and 12 gage spindles (minimum) shall be installed on the smooth side of the bulkhead (source room side) and shall have the following dimensions:

4.2.1 Stud pins shall be placed on centers not exceeding 30.5 cm (12 in.).

4.2.2 Stud pins shall not be more than 15.2 cm (6 in.) from the edge of the treatment material except for center panel support when a 5-point anchor pattern is used on a 61 by 91.4-cm (2 by 3-ft) panel.

4.2.3 Stud pin length shall be sufficient to accommodate mounting of the maximum thickness of the specimen materials to be tested.

4.2.4 A typical stud pin pattern is shown in Fig. 2.

4.3 Acoustical treatment material shall be secured on the stud pins using self-locking galvanized steel washers, 3.8 cm (1½ in.) in diameter. Self-locking washers shall be used only where required to hold treatment materials securely against the bulkhead. Lightweight backing materials used in multiple-layer treatments generally will not require self-locking washers.

4.4 Acoustical treatment materials shall be installed on the aluminum bulkhead as they would be applied on a ship. Butt joints of the acoustical material panels shall be as tight and as evenly aligned as possible.

4.5 When limp mass septums are applied, the following procedures shall be followed:

4.5.1 A 5.1-cm (2-in.) overlap (minimum) shall be provided on all limp mass material seams.

4.5.2 Duct tape or an adhesive tape shall be used to tape over seam areas ensuring the limp mass material is smooth and conforms to the surface of material mounted under the limp mass septum (if installed).

4.5.3 For lead-faced fibrous glass panels, a 10.2-cm (4-in.) strip of sheet lead material shall be taped over the butt joint seams.