Designation: D 1779 – 98 (Reapproved 2004)

Standard Specification for Adhesive for Acoustical Materials[1]

This standard is issued under the fixed designation D 1779; 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 Department of Defense.

1. Scope

1.1 This specification covers an adhesive for bonding prefabricated acoustical materials to the inside walls and ceilings of rooms in buildings. This adhesive is required to maintain a tensile adhesion (bond strength) of not less than 3.45×10^4 dynes/cm^2 (½ lb/in.^{2}) for a long period of time under the temperature and moisture conditions likely to be encountered and to maintain sufficient plasticity to allow for movement of parts of the building as it ages.

NOTE 1—*Cleanliness of Surface*—The surface to which the acoustical material is applied with the adhesive should be clean, sound, and dry. Surface coatings should be removed if their nature indicates an unsatisfactory installation, so that the adhesive can be applied to the base. When the adhesive is to be applied on a painted surface, test tile should be applied for 48 h to determine suitable adherence of the coating by examination. Acoustical adhesives are not intended to be applied to surfaces that are moist and that have an alkaline reaction, or that may later become moist or alkaline. Such surfaces, as concrete or plaster, should be properly dried and aged before applying the adhesive.

NOTE 2—*Load*—This adhesive is not recommended as a sole means of holding acoustical materials weighing more than 121 kg/m^2 (2½ lb/ft^2) to ceiling surfaces.

NOTE 3—*Amount and Condition of Material*—It is recommended that sufficient adhesive be used so that there is a contact surface of not less than 1.2×10^4 cm^2/m^2 (20 in.^{2}/ft^2) of acoustical material, with a minimum thickness of 0.3 cm (⅛ in.) and that the adhesive be applied in four separate nearly spherical portions of approximately equal size near the corners for a standard 30.5 by 30.5-cm (12 by 12-in.) tile. Fewer than or more than four portions for 30.5 by 30.5-cm tile are not recommended due to difficulty in leveling and in securing effective contact area on all portions. Adhesives that are hard, or do not wet the surface, or are difficult to spread should not be used.

NOTE 4—*Rigidity of Base Surfaces*—It is necessary that the material forming the base to which the adhesive is attached should be relatively smooth, firm, and rigid. If the pressure of applying tile and adhesive causes the base material to deflect excessively, tile previously applied may have their adhesive bond broken. This occurs on some types of gypsum board suspension systems.

NOTE 5—*Aging*—To date, no accelerated aging tests for adhesives have been developed to duplicate exactly aging in service. The aging tests in this specification are designed to accelerate the aging process and to test various manifestations of aging, and are intended to be satisfactory for comparing one adhesive with another; they do not necessarily reflect aging characteristics on an absolute basis. Purchasers of adhesives should receive from the manufacturer additional warranties and assurances of performance of the adhesive under normal aging.

NOTE 6—*Erection Practices*—Proper erection techniques are essential for proper performance of any acoustical adhesive. Use of a material meeting this specification will not in itself guarantee satisfactory performance. Only when tiles are applied by skilled and experienced workers following instructions from the manufacturer can the purchaser be assured of satisfactory performance of an adhesive.

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

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:* [2]

C 37 Specification for Gypsum Lath

D 618 Practice for Conditioning Plastics for Testing

D 907 Terminology of Adhesives

E 104 Practice for Maintaining Constant Relative Humidity by Means of Aqueous Solutions

2.2 *Federal Specification:*

MMM-A—00150B Interim Federal Specification for Acoustical Materials[3]

3. Terminology

3.1 *Definitions*—Many terms in this specification are defined in Terminology D 907.

4. General Requirements

4.1 *Composition*—The adhesive must be of uniform composition. It must be free from all ingredients that will affect the

[1] This specification is under the jurisdiction of ASTM Committee D14 on Adhesives and is the direct responsibility of Subcommittee D14.70 on Construction Adhesives.

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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 Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098

serviceability of the adhesive or have a deleterious effect on the acoustical material or the surface to which the acoustical material is attached.

4.2 *Toxicity*—The adhesive must not liberate toxic gases or fumes under normal conditions of use and application, nor shall it contain irritating substances. The adhesive must contain no more than 0.5 % of benzene or volatile chlorinated hydrocarbon solvent.

4.3 *Workmanship*—The ingredients and processes used must be an adhesive for acoustical materials meeting the requirements of this specification.

5. Detail Requirements

5.1 *Consistency*—The initial consistency of the adhesive must adhere to the surfaces being bonded, spread or be capable of being applied readily, and not sag from walls or drop from ceilings.

5.2 *Wetting*—The adhesive must wet completely the surfaces being bonded.

5.3 *Strength*—The tensile-adhesion specimens prepared with the adhesive must not fail under the stress conditions given in the test methods (7.1.3).

5.4 *Shrinkage*—The shrinkage in volume must not exceed 15 % when conditioned at 49 ± 2°C (120 ± 3.6°F) for 30 days.

5.5 *Cracking*—There must be no evidence of cracking at the exposed surface or at the interface of the glass plate and the acoustical adhesive when aged in air at 49 ± 2°C (120 ± 3.6°F) for 7 days. The adhesive must retain sufficient plasticity to permit indentation by a fingernail.

5.6 *Migration or Bleeding Test*—The vehicle must not pass through a medium-textured filter paper when tested and conditioned at 49 ± 2°C (120 ± 3.6°F) for 28 days.

5.7 *Storage*—The adhesive when subjected to the storage tests in 7.1.7 must not change appreciably in volume or consistency or segregate in such a manner that it cannot be restored readily by hand mixing. It must have substantially the same working qualities as another sample of the same adhesive of recent manufacture.

6. Sampling

6.1 Take a sample of not less than 0.980 kg (2 lb) from each shipment or consignment for analysis and tests. Except in special cases, the sample must be a composite taken when possible from three or more separate containers, chosen at random. Samples must also be taken from containers that appear to be nonrepresentative, and such samples must be tested separately. Place the samples immediately in airtight containers and transport them to the testing laboratory in these containers. Precautions must be taken to reduce evaporation or drying to a minimum. The adhesive in the can must be thoroughly mixed if there is a tendency for the materials to separate on standing.

7. Test Methods

7.1 Determine the properties enumerated in this specification in accordance with the following test methods:

7.1.1 *Consistency*—Determine the consistency of the adhesive as received by applying the material to plywood and gypsum board surfaces by hand tools at 20 to 30°C (68 to 86°F). The adhesive must spread readily, trowel smoothly without drag, adhere to the surfaces, and not sag from walls or drop from ceilings when applied in a thickness of approximately 0.9 cm (⅜ in.).

7.1.2 *Wetting*—Place a fresh portion of the adhesive approximately 2.54 cm (1 in.) thick at a temperature of 20 to 30°C (68 to 86°F) on clean surfaces of plywood and of gypsum board. Press the adhesive immediately with a flat hand tool such as a trowel or putty knife to a thickness of about 0.6 cm (¼ in.). Immediately thereafter withdraw the hand tool vertically without sliding; on withdrawal the area that was under the hand tool shall be completely coated with adhesive.

7.1.3 *Strength*—Determine the strength with a tensile-adhesion specimen subjected to the dead-weight loads under controlled ambient temperatures and relative humidities that are specified in Table 1. The adherends must be 7 ± 0.08-cm (2¾ ± 1/32-in.) disks of gypsum lath, 0.9 cm (⅜ in.) thick, conforming to Specification C 37. Prepare tensile-adhesion test specimens having adhesive layers of 0.5 and 0.9 cm (3/16 and ⅜ in.) at 20 to 30°C (68 to 86°F) and 50 ± 5 % relative humidity by applying the adhesive to the upper gypsum lath disk and pressing the lower disk until the desired adhesive layer thickness is obtained. Attach a cup hook or similar device to each face of the specimen, the top one to suspend the specimen and the lower one from which to hang the weight. Prepare a minimum of three specimens with each adhesive thickness for each temperature. Subject the specimens for each test to the conditions of test within 5 min after preparation in the order listed in Table 1.

TABLE 1 Strength Test Requirements

Test	Adhesive Thickness, cm (in.)	Temperature, °C	Load, N (lbf)	Relative Humidity, %[A]	Duration, h
1	0.5 (3/16)	21 to 27	10.01 (2¼)	50± 5	72
		21 to 27	(2¼)	80 to 85	72
2	0.5 (3/16)	21 to 27	0 (0)	50 ± 5	24
		49	7.78 (1¾)	<10	72
3	0.9 (⅜)	21 to 27	5.56 (1¼)	50± 5	72
		21 to 27	(1¼)	80 to 85	72
4	0.9 (⅜)	21 to 27	0 (0)	50 ± 5	24
		49	3.34 (¾)	<10	72

[A] Saturated salt solutions for maintaining constant relative humidity are given in Practice E 104.

7.1.4 *Shrinkage*—Determine the shrinkage by measuring the change in volume of an adhesive conditioned at 49 ± 2°C (120 ± 3.6°F) for 30 days. Place a brass ring 7 cm (2¾ in.) in inside diameter and 0.5 cm (3/16 in.) deep on a block of solid carbon dioxide and fill with the acoustical adhesive. Level the top surface of the adhesive with a straightedge. Remove the ring containing the adhesive from the solid carbon dioxide and condition in a vertical position at 23 ± 1°C (73.4 ± 1.8°F) to equilibrium. Weigh the specimen in air and then in water containing about 1 % of an alkyl aryl sulfonate wetting agent,[4] and determine the volume of the adhesive from the differences in weight. Place the specimen in a vertical position and

[4] Santomerse S manufactured by Monsanto Co. is an example of this type.

condition it for 30 days at 49 ± 2°C (120 ± 3.6°F). During the first 14 days rotate the specimen through 90 deg each day. Measure the volume of the adhesive again and calculate the percent shrinkage as follows:

$$S = [(V_1 - V_2)/V_1] \times 100 \quad (1)$$

where:

S = percent shrinkage,
V_1 = volume of the adhesive after 24 h at room temperature, 20 to 30°C (68 to 86°F), and
V_2 = volume of the adhesive after 30 days at 49 ± 2°C (120 ± 3.6°F).

7.1.5 *Cracking*—Spread a 0.3-cm (⅛-in.) thick layer of the adhesive on a glass plate, 10.16 by 10.16 cm (4 by 4 in.), and place immediately in an oven at 49 ± 2°C (120 ± 3.6°F) for a period of 7 days. After the specimen has cooled to 23 ± 1°C (73.4 ± 1.8°F), examine visually for cracking.

7.1.6 *Migration or Bleeding Test*—Place 10 ± 0.1 g of the adhesive between two pieces of medium-textured filter paper. Press the assembly between flat plates to a thickness of 0.5 cm (3⁄16 in.). Place the pad of adhesive containing the two filter papers on a flat glass plate and condition at 49 ± 2°C (120 ± 3.6°F) for 28 days. At the end of the 28-day period, examine the glass surface for indication of passage of the vehicle through the filter paper.

7.1.7 *Storage*—The storage conditions (Note 7) shall be prescribed by the purchaser. If none are given they shall be as follows: Store specimens of the adhesive at (*1*) 50 ± 2°C (122 ± 3.6°F) for 4 weeks, and (*2*) –18± 2°C (0 ± 3.6°F) for 3 days in tightly sealed 0.9-L (1-qt) metal cans with friction seals (preferably the original containers). Fill the cans with adhesive. Allow the cans and their contents to come to room temperature, 20 to 30°C (68 to 86°F), open them, and examine the adhesive specimens for changes in volume and consistency, segregation, ability to be reconstituted by hand mixing, and working qualities as compared with a fresh sample of the same adhesive.

NOTE 7—It is recommended that the conditions be selected from Practice D 618 to achieve standardization.

8. Packaging and Package Marking

8.1 *Packaging*—The adhesive must be packaged in standard commercial containers of approximately 3.78 and 18.92-L (1 and 5-gal) capacity. The containers must be constructed to ensure acceptance by common or other carriers for safe transportation at the lowest rate to the point of delivery, unless otherwise specified in the contract or order.

8.2 *Marking*—Shipping containers must be marked with the name of the adhesive, the quantity contained therein, the name of the manufacturer, and the batch number.

9. Keywords

9.1 acoustical; adhesive; specification