



Designation: D1669/D1669M – 07 (Reapproved 2023)

Standard Practice for Preparation of Test Panels for Accelerated and Outdoor Weathering of Bituminous Coatings¹

This standard is issued under the fixed designation D1669/D1669M; 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 practice covers a procedure for the preparation of accelerated and outdoor weathering test panels of bituminous coatings. It is considered suitable for the preparation of film thicknesses in the range from 0.25 to 2.54 mm [0.010 to 0.100 in.].

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* (**Warning**—Mercury has been designated by EPA and many state agencies as a hazardous material that can cause central nervous system, kidney, and liver damage. Mercury, or its vapor, may be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury-containing products. See the applicable product Material Safety Data Sheet (MSDS) for details and EPA's website, <http://www.epa.gov/mercury/faq.htm>, for additional information. Users should be aware that selling mercury or mercury-containing products, or both, in your state may be prohibited by state law.)

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This practice is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.02 on Steep Roofing Products and Assemblies.

Current edition approved July 1, 2023. Published July 2023. Originally approved in 1959. Last previous edition approved in 2019 as D1669/D1669M – 07 (2019). DOI: 10.1520/D1669_D1669M-07R23.

2. Referenced Documents

2.1 ASTM Standards:²

B209/B209M Specification for Aluminum and Aluminum-Alloy Sheet and Plate

D5/D5M Test Method for Penetration of Bituminous Materials

E1 Specification for ASTM Liquid-in-Glass Thermometers

3. Summary of Practice

3.1 Heated bituminous material is poured onto a clean, heated, and masked aluminum panel. Care is taken to remove air bubbles. The bitumen is leveled in a press before solidifying, and the coated panel is then cooled, cleaned, and measured for uniform thickness.

4. Significance and Use

4.1 This practice for preparation of test panels greatly increases the likelihood of achieving reproducible results in subsequent testing.

5. Apparatus

5.1 *Panel*—A supporting metal panel on which the bituminous coating is applied. It shall meet the following requirements:

5.1.1 *Metal, Aluminum or Aluminum Alloy*, as described in Table 2 of Specification B209/B209M under Alloy 3003-H14.³

5.1.2 *Finish*—Mill finish and process cleaned.

5.1.3 *Dimensions*:

5.1.3.1 *Thickness*—0.64 to 1.90 mm [0.025 to 0.075 in.].

5.1.3.2 *Width and Length*—70 by 150 mm [$2\frac{3}{4}$ by $5\frac{7}{8}$ in.] or of a size that will allow a minimum bitumen film area of 50 by 130 mm [2 by $5\frac{1}{8}$ in.].

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 The sole sources of supply of the apparatus (panels) known to the committee at this time are The Q-Panel Company, 26200 First St., Cleveland OH 44145; Atlas Electric Devices Co., 4114 N. Ravenswood Ave., Chicago, IL 60613; Advanced Coating Technologies Inc., 273 Industrial Dr. (PO Box 401), Hillsdale MI 49242. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

5.1.4 Flatness—The maximum deviation from a true flat surface for either length or width shall not exceed 0.0005 times the dimension. Flatness shall be measured on a true flat surface employing a curling gauge equipped with a dial which reads in 0.025 mm [0.001 in.] and having a foot loading of approximately 100 g.⁴

5.1.5 Edges—The edges of the panels shall be free of burrs.

5.1.6 Storage—Panels shall be stored in a dry, well-ventilated place to prevent condensation and possible staining or corrosion.

5.2 Press—The press shall be capable of delivering a 4500 kg [10 000 lb] thrust and be equipped for using platens 152 by 152 mm [6 by 6 in.] or larger platens.⁵

5.3 Platens—The platens shall be 152 by 152 mm [6 by 6 in.] or larger in size and suitable for use with the press. (Platens can be purchased with the press.) It is preferable that both platens have thermostatically controlled units capable of heating them to temperatures up to 260 °C [500 °F].

5.4 Metal Spacers—The metal spacers shall be 13 mm [$\frac{1}{2}$ in.] wide and at least 152 mm [6 in.] long and of suitable thickness so that the proper thicknesses of bitumen films can be applied.⁶ To cover the range from 0.254 to 2.54 mm [0.010 to 0.100 in.], the following supply of metal spacers is adequate:

- 4–0.038 mm [0.0015 in.]
- 4–0.051 mm [0.002 in.]
- 4–0.076 mm [0.003 in.]
- 4–0.127 mm [0.005 in.]
- 4–0.229 mm [0.009 in.]
- 4–0.254 mm [0.010 in.]
- 4–0.305 mm [0.012 in.]
- 4–0.330 mm [0.013 in.]
- 4–0.081 mm [0.015 in.]

5.5 Kraft Paper—The kraft paper shall be from 64 to 191 μ m [0.0025 to 0.0075 in.] in thickness.

5.6 Release Paper—Silicone- or TFE-fluorocarbon-coated release paper shall be cut to a size large enough to cover the platens of the press. It must be easily removed at room temperature without damaging the bitumen film. (See **Note 1**.)

NOTE 1—Dextrin-coated paper is also allowed to be used as a release paper. It must not leave a residue that cannot be removed by water. A small tank through which lukewarm water (below 27 °C [80 °F]) is running

shall be used for removing dextrin-coated paper from finished panels.

5.7 Heating Equipment:

5.7.1 One gas or electrically heated oven capable of warming the uncoated panels, thermostatically controlled so a temperature range from 93 to 204 °C [200 to 400 °F] can be maintained. A hot plate or any suitable plate-type heating unit capable of thermostatically controlling the temperature between 93 to 204 °C [200 and 400 °F] would be adequate.

5.7.2 One gas or electrically heated hot plate or oven for heating the bitumen, controlled so that container temperatures will not exceed 316 °C [600 °F].

5.8 Melting Container—A 17 kg [6 oz.] min. container of suitable size in which the bitumen can be melted, similar in type to that specified in Test Method **D5/D5M**.

5.9 Thermometers:

5.9.1 One ASTM partial immersion thermometer, having a range from –7 to 304 °C [20 to 580 °F] and conforming to the requirements for Thermometer 2C as prescribed in Specification **E1**, shall be used to determine the temperature of the oven used to warm the uncoated panel.

5.9.2 Two ASTM partial immersion thermometers, having a range from –7 to 304 °C [20 to 580 °F] and conforming to the requirements for Thermometer 3C as prescribed in Specification **E1**. One shall be used to determine the temperature of the bitumen sample. The other shall be used to determine the temperature of the oven or oil bath, if either of these is used.

5.9.3 As an alternative, any other thermometric device used shall be at least: (1) of equal accuracy to that of the thermometer specified in Specification **E1**, (2) capable of indicating temperature to within 1 °C [2 °F], and (3) stable to within 1 °C [2 °F] for the duration of the exposure.

5.10 Water Bath—A small tank through which lukewarm water is running shall be used for removing the dextrin-coated paper from finished panels when the bitumen has a softening point over 93 °C [200 °F]. For bitumens with lower softening points, the temperature of the water shall be below 27 °C [80 °F].

5.11 Thickness Gauge—A suitable hand micrometer, caliper, or dial-type thickness gauge reading in 25 μ m [0.001 in.] and having a foot of approximately 645 mm² [1 in.²] in area shall be used for caliper the panels.

5.12 Masking Tape—Pressure-sensitive paper or cloth tape, 13 to 25 mm [$\frac{1}{2}$ to 1 in.] in width.

6. Preparation of Metal Panels

6.1 Handling—Handle the panel by the edges only and do not allow fingers to contact the face to be coated. Do not unwrap the panels until the day on which they are to be coated. This is to prevent oxidation and contamination of the face. Do not reuse the test panels.

6.2 Precalibration and Classification—Measure the thickness of all panels at six representative points and classify them into groups of identical thickness.

6.3 Marking—Mark or drill the panels before or after coating, preferably afterwards. If marked or drilled before coating, take care to see that these operations do not alter the

⁴ The sole source of supply of the apparatus (Model B-81) known to the committee at this time is Federal Products Corp., 1112 Eddy St., Providence, RI 02901. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁵ The sole source of supply of the apparatus (Laboratory Model Carver Press having a working range from 0 to 9000 kg [0 to 20 000 lb]) known to the committee at this time is Fred S. Carver, Inc., 1 Chatham Rd., Summit, NJ 07901. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁶ The sole source of supply of the apparatus (suitable spacers known as “shim” or “feeler” stock) known to the committee at this time is U.S. Gasket & Shim Co., 2743 Second St. (P.O. Box 360 A), Cuyahoga Falls, OH 44222. Suitable spacers are also available from many machine shops. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.