



Standard Practice for Performing Accelerated Outdoor Weathering of Factory-Coated Embossed Hardboard Using Concentrated Natural Sunlight and a Soak-Freeze-Thaw Procedure¹

This standard is issued under the fixed designation D5722; 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 techniques to accelerate weathering effects of factory-coated embossed hardboard using Cycle 1 of Practice [G90](#) (concentrated natural sunlight with periodic surface water spray) plus a soak-freeze thaw cycle (see Section 5 of this practice).

1.2 Testing by use of the methods described in this practice may be employed in the qualitative assessment of weathering effects. The relative durability of coated hardboards may be best determined by comparison of their test results with those of control specimens derived from real time exposure test experience.

1.3 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 non-conformance with the standard.

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:*²

[D660 Test Method for Evaluating Degree of Checking of Exterior Paints](#)

[D661 Test Method for Evaluating Degree of Cracking of Exterior Paints](#)

[D662 Test Method for Evaluating Degree of Erosion of Exterior Paints](#)

[D772 Test Method for Evaluating Degree of Flaking \(Scaling\) of Exterior Paints](#)

[D4214 Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films](#)

[G90 Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight](#)

[G113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials](#)

[G169 Guide for Application of Basic Statistical Methods to Weathering Tests](#)

3. Terminology

3.1 The terminology used in this practice is defined in Terminology [G113](#).

3.2 *Definitions:*

3.2.1 *hardboard, n*—generic term for a panel manufactured primarily from inter-felted lignocellulosic fibers (usually wood), consolidated under heat and pressure in a hot press to a density of 500 kg/m³ (31 lb/ft³) or greater and to which other materials may have been added during manufacture to improve certain properties.

3.2.2 *embossed hardboard, n*—hardboard that is manufactured with a textured surface.

3.2.2.1 *Discussion*—Wood-like and stucco patterns are examples of typical embossed hardboard surfaces.

4. Summary of Practice

4.1 This practice is used to accelerate long-term weathering effects by subjecting the samples to concentrated natural sunlight (with periodic daytime surface water spray) plus a soak-freeze-thaw cycle.

4.2 This practice has been useful in accelerating finish failure involving loss of film integrity, such as cracking, peeling, and flaking of factory-coated embossed hardboard.

5. Significance and Use

5.1 The ability to quickly and accurately evaluate and predict long-term weathering performance of factory-applied

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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.

coatings is of paramount importance in making sound business and technical decisions.

5.2 It is important to include control specimens of known field performance to determine the efficacy of this practice for specific substrate(s) and coating system(s). These control specimens may include materials known to possess acceptable and unacceptable field performance for the defect(s) under consideration.

5.3 Results derived from this practice are best used to compare the relative performance of materials tested at the same time in the same device.

5.4 The inclusion of control specimens and their resulting data will assist in dealing with test variability caused by seasonal or annual variations in important climatic factors.

5.5 Extensive research was performed during the development of this standard practice. This research showed that this practice is not useful for determination of quantitative acceleration factors. However, this test is very useful as a comparative test.

5.6 A minimum of two replicates for both control specimens and test specimens is recommended to allow statistical evaluation of results. Refer to Practice G169 for additional guidance on establishing the number of replicates.

6. Apparatus and Materials

6.1 *Test Machines*, as illustrated in a figure titled “Schematic of a Fresnel Reflecting Concentrator Accelerated Weathering Machine” of Practice G90 and described in Apparatus Section of Practice G90.

6.2 *Freezer*, capable of maintaining a temperature of $-20 \pm 5^\circ\text{C}$ ($-4 \pm 9^\circ\text{F}$). The freezer shall be equipped with a thermocouple to monitor air temperature.

6.3 *Mounting Board*, paper-faced marine grade wood structural panel, surface routed to accept the test specimens during exposure (see Fig. 1).

7. Test Specimens

7.1 Recommended specimen size is 50 mm by 130 mm by maximum 13 mm thick (2 by 5 by maximum 1/2 in. thick).

7.2 Attach the specimen to the mounting board. One method to accomplish this is to apply exterior grade silicone adhesive to the center of each specimen. Use cotton gloves to press the specimen into the mounting plate. Other mounting techniques, agreed upon between the testing laboratory and the client are possible.

7.3 Useful results have been achieved when specimen edges and backs remain unsealed.

8. Procedures

8.1 One procedure recommended is in Practice G90.

8.2 *Soak-Freeze-Thaw Procedure:*

8.2.1 Following daily exposure in the Fresnel reflecting concentrator accelerated weathering machine in Practice G90, Cycle 1, the mounting plate with specimens is removed and immersed in a deionized water soak tank maintained at $25 \pm$

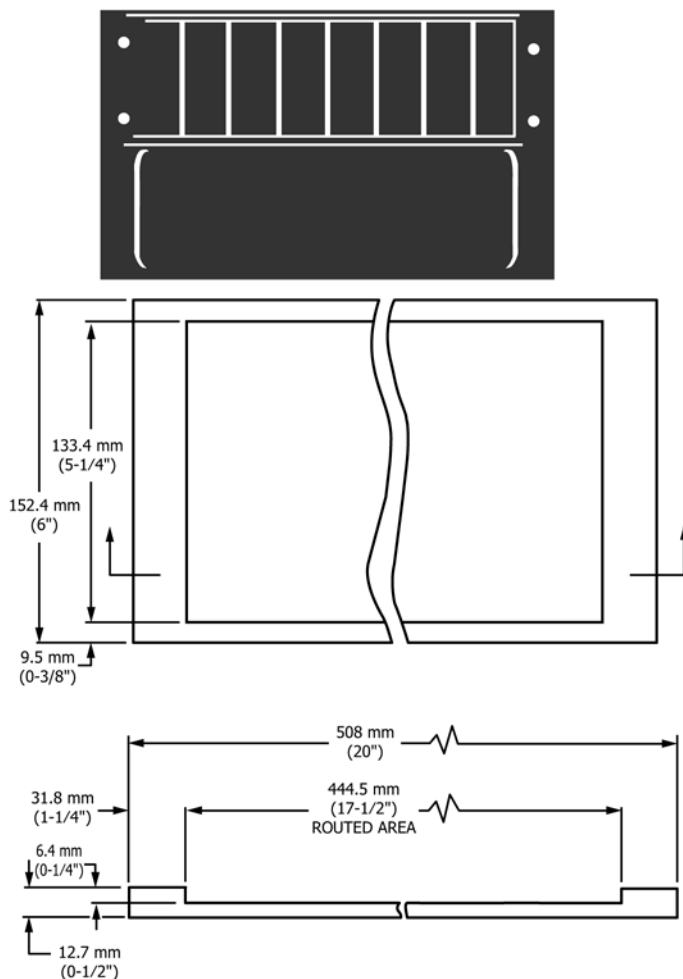


FIG. 1 Routed Specimen Mounting Board Showing Placement of Specimens

5°C ($77 \pm 9^\circ\text{F}$) for at least 1 h but not more than 1 h 15 min. If the board containing specimens floats in the immersion tank, the board may have to be inserted upside down for the specimens to be completely immersed in water. A minimum exposure of 1 MJ/m^2 of ultraviolet radiation as measured per Practice G90 constitutes a daily cycle. If a minimum of 1 MJ/m^2 of ultraviolet radiation (295 to 385 nm) is not accumulated in one day of exposure, the specimens are to be left on the apparatus and are not to be immersed or frozen that day. This exposure day does not constitute one test cycle. Continue with the exposure the following morning.

8.2.2 After soak, the plate with specimens is placed for a minimum of 12 h and a maximum of 15 h in a freezer maintained at $-20 \pm 5^\circ\text{C}$ ($-4 \pm 9^\circ\text{F}$). The following morning, allow the samples to thaw for a minimum of 1 h under laboratory ambient conditions.

NOTE 1—Because the start of the accelerated weathering after thawing can be delayed due to weather, the precise time of the thaw portion of the cycle cannot be specified.

8.2.3 The plate with specimens is remounted on the exposure device as prescribed in Practice G90.

8.2.4 The completion of 8.2.1, 8.2.2, and 8.2.3 constitutes one test cycle. Report test results after 30 cycles or other agreed upon time period.

8.2.5 At least every week, replace the water used for soaking test panels with new deionized water.

9. Test Evaluation

9.1 Applicable criteria for weathering evaluation may include, but are not limited to, the following test methods: chalking (Test Methods D4214), checking (Test Method D660), cracking (Test Method D661), discoloration, erosion (Test Method D662), face fiber swelling, flaking (Test Method D772), and intercoat adhesion.

9.2 Testing laboratory and client shall agree upon evaluation criteria, using applicable standards, and evaluation frequency.

9.3 The use of control specimens for specific weathering criteria is strongly suggested.

9.4 Initial pre-exposure inspection of all samples must be conducted to document any pre-existing surface imperfection.

10. Report

10.1 Report the following information:

10.1.1 A record of the type and identification of the product tested,

10.1.2 Method used,

10.1.3 Rating, if applicable,

10.1.4 Other pertinent information must be shown on the inspection report for each evaluation,

10.1.5 Date of inspection,

10.1.6 Date of exposure start,

10.1.7 Method of exposure (Practice D5722),

10.1.8 Total solar radiant exposure, MJ/m²,

10.1.9 Ultra-violet radiant exposure (UV) (295 to 385 nm), MJ/m²,

10.1.10 Number of cycles, and

10.1.11 Any comments felt to be relevant to the exposure or the test results.

11. Keywords

11.1 accelerated weathering; factory coatings (hardboard); film integrity; hardboard (composition board siding)

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