



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

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1. Scope

1.1 This practice covers techniques to accelerate weathering effects of factory-coated embossed hardboard using apparatus described in Practice G 90.

1.2 This practice is based upon Procedure B, Cycle 1 of Practice G 90 (concentrated natural sunlight with periodic surface water spray) plus a soak-freeze-thaw cycle (see 5 of this practice).

1.3 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 pass-fail control specimens derived from real time exposure test experience (see 8.2 for specific guidelines).

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

1.5 *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:

- D 660 Test Method for Evaluating Degree of Checking of Exterior Paints²
- D 661 Test Method for Evaluating Degree of Cracking of Exterior Paints²
- D 662 Test Method for Evaluating Degree of Erosion of Exterior Paints²
- D 772 Test Method for Evaluating Degree of Flaking (Scaling) of Exterior Paints²
- D 4214 Test Methods for Evaluating Degree of Chalking of Exterior Paint Films²
- G 90 Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight³

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² *Annual Book of ASTM Standards*, Vol 06.01.

ering of Nonmetallic Materials Using Concentrated Natural Sunlight³

G 113 Terminology Relating to Natural and Artificial Weathering of Nonmetallic Materials³

3. Terminology

3.1 The terminology used in this practice is defined in Terminology G 113.

3.2 Definitions:

3.2.1 *hardboard*—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 0.50 g/cm³ (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*—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 a 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 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 reference 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

³ *Annual Book of ASTM Standards*, Vol 14.02.

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. However, quantitative service life approximations “acceleration factors” based on the above data are not recommended unless a sufficient number of field/accelerated test comparisons have been analyzed to compute the statistical significance of the “time to failure” estimate for each exposure.

5.5 A minimum of two replicates for both control specimens and test specimens is recommended to allow statistical evaluation of results.

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 G 90 and described in Apparatus Section of Practice G 90.⁴

6.2 *Freezer*, capable of maintaining a temperature of $-18^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ($0^{\circ}\text{F} \pm 5^{\circ}\text{F}$). The freezer shall be equipped with a thermocouple to monitor air temperature.

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

7. Test Specimens

7.1 Recommended specimen size is 5 by 13 by maximum 1.3 cm (2 by 5 by maximum 1/2 in.).

7.2 Apply exterior grade silicone adhesive to the four corners and 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 Procedure B in Practice G 90.

8.2 *Soak-Freeze-Thaw Procedure:*

8.2.1 Following daily exposure in the Fresnel reflecting concentrator accelerated weathering machine in Practice G 90, Procedure B, Cycle 1, the mounting plate with specimens is removed and immersed in a deionized water soak tank maintained at $21^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ($70^{\circ}\text{F} \pm 5^{\circ}\text{F}$) for 1 h.

8.2.2 After soak, the plate with specimens is placed for 12 h in a freezer maintained at $-18^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ($0^{\circ}\text{F} \pm 5^{\circ}\text{F}$). The following morning, allow the samples to thaw for a minimum of 1 h under laboratory ambient conditions.

8.2.3 The plate with specimens is remounted on the exposure device as prescribed in Practice G 90.

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

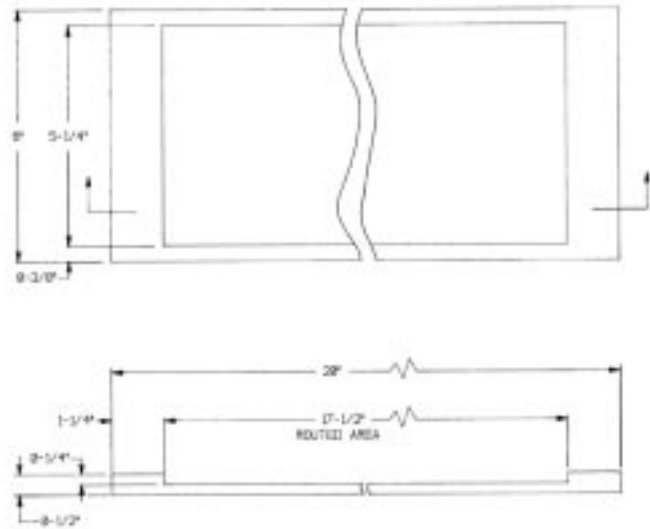
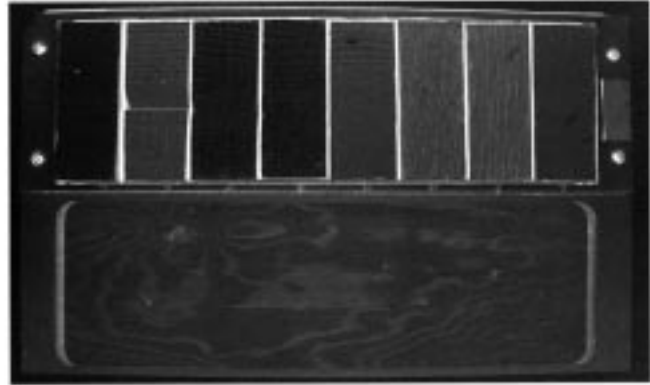


FIG. 1 Routed Specimen Mounting Board Showing Placement of Specimens

agreed upon time period.

9. Test Evaluation

9.1 Applicable criteria for weathering evaluation may include, but are not limited to, the following test methods: chalking (Test Method D 4214), checking (Test Method D 660), cracking (Test Method D 661), discoloration, erosion (Test Method D 662), face fiber swelling, flaking (Test Method D 772), 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 pass-fail reference 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,

⁴ These test machines are available at Heraeus DSET Laboratories, Inc., 45601 N. 47th Ave., Phoenix AZ 85027 (602) 465-7356, and South Florida Test Service, 31818 N. 203rd Ave., Wittmann, AZ 85361 (602) 388-2451. Users who become aware of alternate sources should contact the Test Steward.

- 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 G 90, Embossed Hardboard Coatings Procedure),
- 10.1.8 Total radiation, MJ/m²,
- 10.1.9 Ultra violet rays (UV) (300 to 385 nm), MJ/m²,
- 10.1.10 Number of cycles,
- 10.1.11 Remarks about unusual weather, and
- 10.1.12 Any comments felt to be relevant to the exposure or the test results.

11. Precision and Bias

11.1 *Precision*—Varying weather conditions from year to year and at different exposure sites preclude a precision statement.

11.2 *Bias*—As no accepted reference material exists, a bias statement is not possible.

12. Keywords

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

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