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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 D 5722; 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 apparatus described in Practice G90.~~

~~1.2 This practice is based upon Cycle 1 of Practice G90 (concentrated natural sunlight with periodic surface water spray) plus a soak-freeze-thaw cycle (see Section Scope*).~~

1.1 This practice covers techniques to accelerate weathering effects of factory-coated embossed hardboard using Cycle 1 of Practice G 90 (concentrated natural sunlight with periodic surface water spray) plus a soak-freeze thaw cycle (see Section 5 of this practice).

1.3² 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). ~~experience.~~

~~1.4~~ 1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

~~1.5~~ 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

~~D 660 Test Method for Evaluating Degree of Checking of Exterior Paints~~ Test Methods for Chemical Resistance and Physical Properties of Carbon Brick

~~D 661 Test Method for Evaluating Degree of Cracking of Exterior Paints~~ Test Methods for Chemical Resistance and Physical Properties of Carbon Brick

~~D 662 Test Method for Evaluating Degree of Erosion of Exterior Paints~~ Test Methods for Chemical Resistance and Physical Properties of Carbon Brick

~~D 772 Test Method for Evaluating Degree of Flaking (Scaling) of Exterior Paints~~ Test Methods for Chemical Resistance and Physical Properties of Carbon Brick

~~D 4214 Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films~~ Test Methods for Chemical Resistance and Physical Properties of Carbon Brick

~~G 90 Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight~~ Test Methods for Chemical Resistance and Physical Properties of Carbon Brick

~~G 113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials~~ Test Methods for Chemical Resistance and Physical Properties of Carbon Brick

~~G 169 Test Methods for Chemical Resistance and Physical Properties of Carbon Brick~~

3. Terminology

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

¹ This practice is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.27 on Accelerated Testing.

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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.

*A Summary of Changes section appears at the end of this standard.

3.2 Definitions:

3.2.1 *hardboard*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 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*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 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~~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. 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.~~

~~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 G 169 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 G 90 and described in Apparatus Section of Practice G 90.

6.2 *Freezer*, capable of maintaining a temperature of ~~-18°C of -20 ± 3°C (0°F 5°C (-4 ± 5°F)-9°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 5 by 13 by maximum 1.3 cm (2 by 5 by maximum ½ in.).

7.2 ~~Attach the specimen to the mounting board. One method to accomplish this is to 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 G90, Cycle 1, the mounting plate with specimens is removed and immersed in a deionized water soak tank maintained at 21°C ± 3°C (70°F ± 5°F) for 1 h. A minimum exposure of 1 MJ/m²~~ Following daily exposure in the Fresnel reflecting concentrator accelerated weathering machine in Practice G 90, Cycle 1, the mounting plate with specimens is removed and immersed in a deionized water soak tank maintained at 25 ± 5°C (77 ± 9°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/m² of ultraviolet radiation as measured per Practice G 90 constitutes a daily cycle. If a minimum of 1 MJ/m² of ultraviolet radiation (295 to 385 nm) is not accumulated in one day of exposure, the specimens are to be left on the