Designation: D3273 – 21

Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber[1]

This standard is issued under the fixed designation D3273; 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 U.S. Department of Defense.

1. Scope

1.1 This test method describes the use of an environmental chamber and operating conditions to evaluate the relative resistance of interior coatings to surface fungal growth in a severe interior environment during a 4-week period.

1.2 This test method can be used to evaluate the comparative resistance of interior coatings to accelerated mold growth. Performance at a certain rating does not imply any specific period of time for a fungal free coating. However, a better rated coating nearly always performs better in actual end use.

NOTE 1—This test method is intended for the accelerated evaluation of an interior coatings' resistance to fungal defacement. Use of this test method for evaluating exterior coatings' performance has not been validated, nor have the limitations for such use been determined. If this test method is to be used for the testing of an exterior coating system, a precautionary statement regarding interpretation of results as being outside of the scope of this test method must be included in the test report. Any accelerated weathering (leaching, weathering machine exposure, etc.) should be reported and should also bear reference to the fact that it is beyond the current scope of this test method.

1.3 Temperature and humidity must be effectively controlled within the relatively narrow limits specified in order for the chamber to function reproducibly during the short test period. Severity and rate of mold growth on a film is a function of the moisture content of both the film and the substrate. A relative humidity of >93 % at a temperature of 32.5 ± 1 °C (90 ± 2 °F) is necessary to initiate and maintain mold growth and for test panels to develop rapidly and maintain an adequate moisture level to support mold growth.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Significance and Use

3.1 An accelerated test for determining the resistance of interior coatings to mold growth is useful in estimating the performance of coatings designed for use in interior environments that promote mold growth and in evaluating compounds that may inhibit such growth and the aggregate levels for their use (see also Note 1).

3.2 This test method should preferably be used by persons who have had basic microbiological training.

4. Apparatus

4.1 *Environmental Chamber,* capable of maintaining a relative humidity of >93 % at a temperature of 32.5 ± 1 °C (90 ± 2 °F) while providing a continuous inoculation of the surface of the exposed test panels with mold spores. The chamber could be a stand-alone unit[3] that maintains the specified temperature and humidity and can accommodate the sample holding tank (Fig. 1) or an environmental room that fits one or multiple sample holding tanks.

[1] This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.28 on Biodeterioration.

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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] An example of this equipment is Model Hastest HST-800B-LJS.

FIG. 1 Sample Holding Tank with Test Samples

Alternatively, a self-contained environmental cabinet that generates the prescribed humidity and temperature conditions can be constructed as described by Weathering Direct / New Jersey Industrial Controls, LLC (Rockaway, NJ) at https://www.weathering-direct.com/D3273.html. The self-contained environmental cabinet can generate the prescribed temperature and humidity as per this method and can also hold the test panels (Fig. 2(A) and Fig. 2(B)). The self-contained environmental cabinet should be kept in a room controlled to no less than 21 °C (75 °F) so that heat loss from the cabinet is insignificant and >93 % relative humidity is readily obtained at the test temperature. Alternatively, the cabinet must be insulated with suitable materials to minimize heat loss.

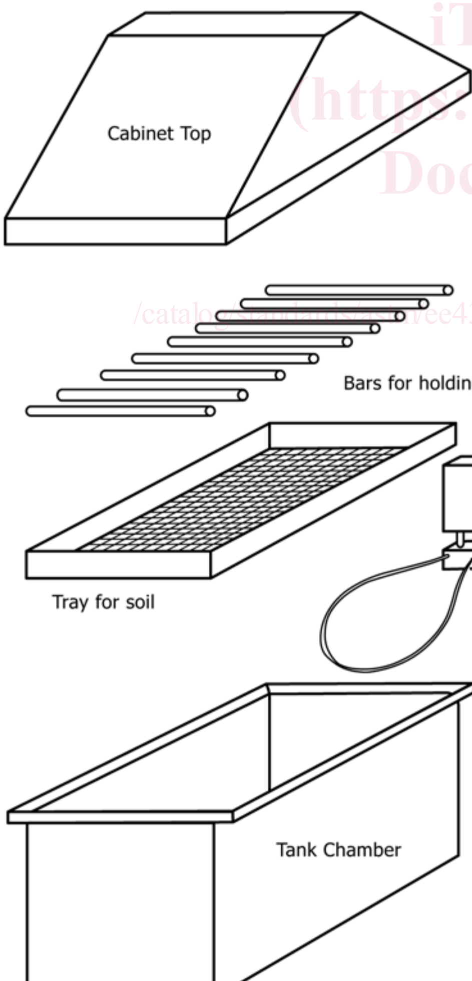

FIG. 2 (A) Environmental Cabinet Assembly

FIG. 2 (B) Environmental Cabinet Example *(continued)*

4.2 *Sample Holding Tank* used to hold the test panels and the inoculating soil tray (Fig. 1). The tank can be made of polypropylene, polyethylene, acrylic, or glass, with an offset shoulder at the top rim or holes for suspending rods. The minimum recommended tank size is 46 × 46 × 61 cm (18 × 18 × 24 in.). This typically holds a minimum of twenty-five 75 by 100 mm (3 by 4-in.) panels.

4.3 *Soil Tray,* stainless steel, aluminum or plastic, approximately 25 mm (1 in.) smaller than the inside dimensions of the sample holding tank and 25 to 75 mm (1 to 3 in.) deep with a non-corrodible metal[4] mesh bottom. If using a self-contained environmental cabinet, the tray should be supported 25 mm (1 in. ± ¼ in.) above the water level and centered in the chamber. One layer of fine plastic or fiberglass screen may be placed over the metal mesh, if needed for holding soil.

NOTE 2—Eliminating the plastic screen helps improve water vapor transfer into the soil, helping maintain active fungal cultures.

4.4 *Series of Wood, Glass, or Fiberglass Reinforced Plastic Bars,* suspended across the width of the chamber at a height and spacing that allows the use of test panels 75 by 100 mm (3 by 4 in.), hung vertically, with approximately 75 mm (3 in.) clearance above the inoculated soil with a suitable method of fastening. Screw eyes are used with the wooden panels while a wire frame, plastic cable ties, or a large clip is used with the gypsum board panels. Other support systems may be utilized.

NOTE 3—Other angles of exposure may be used but may alter the rate

[4] 150-mesh 316 stainless screen gives a high percentage of open area and will not allow dirt to contaminate the water.