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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Practice for Determining by Exterior Exposure Tests the Susceptibility of Paint Films to Microbiological Attack¹

This standard is issued under the fixed designation D 3456; 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 provides guidelines for determining the susceptibility of paint films to microbiological attack on exterior exposure. While it is recognized that various organisms may occur on an exposed coating, the specific types of organisms are mainly of academic interest. The degree to which microbiological discoloration occurs is the primary concern.

1.2 *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 1006 Practice for Conducting Exterior Exposure Tests of Paints on Wood²
- D 1849 Test Method for Package Stability of Paint³
- D 3274 Test Method of Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation²

3. Summary of Practice

3.1 Simple observation of a coated object subjected to exterior exposure is considered a practical and reliable method for determining the degree that microorganisms discolor the coating. However, this applies to a specific coated object exposed under a given set of conditions. It should be recognized that there are critical factors that influence the amount of fungal growth that may occur on the same coated object when exposed to other conditions. These factors include the geographic location, local atmospheric conditions such as the dust and pollen content of the air, angle of exposure, degree to which the coating is subjected to weathering, effects of moisture and sunlight, the substrates on which the coating is applied, and the coatings in the paint system under test. The

latter factor includes the stability of the coating while packaged in the container, as well as the composition of the coatings included in the total system and the thickness of each coating applied. Thus, while microorganisms occur on the surface of the last film applied, the degree of microbiological growth that will occur is also influenced by the composition of the undercoats. All the above factors should be considered in the selection of a coating resistant to discoloration by microorganisms.

4. Significance and Use

4.1 The growth of fungi and algae in and on the surface of paint films represents a major cause of discoloration or disfigurement of painted surfaces. This practice covers the preparation of coatings for testing, their application on substrates, and the arrangement of the coated panels on exterior test fences to determine the degree of microbiological attack that may occur on the surface of the coatings over a period of time. This practice is intended to provide guidelines for, and a discussion of, the various factors critical in selection of exterior coatings resistant to discoloration or disfigurement by algae and fungi.

5. Preparation and Application of Coatings

5.1 *Conditioning of Coatings Prior to Application*—Individual coatings to be used in the paint system should be properly aged under suitable conditions prior to testing. Hydrolysis, amalgamation, absorption, and other physical and chemical changes that may have a profound influence on the resistance of a coating to microorganisms usually increase with increasing temperature. It is recognized that actual storage periods of paints prior to use may vary from one to several years, and the peak temperature encountered may be as warm as 160°F (70°C). However, a recommended conditioning period consists of 1 year at room temperatures or 1 month at 125°F (50°C) as in Test Method D 1849. The conditioning of coatings prior to testing shall be agreeable to the producer and the user in the case of a referee test.

5.2 *Preparation of Coatings for Application*—Prior to application of the various coatings to be included in the total paint system, thoroughly reconstitute each coating by appropriate mixing or shaking. At the time of application, there must be no settling, incompatibility, or other stability problem observable in the coating in the container.

¹ This practice is under the jurisdiction of ASTM Committee D-1 on Paint, and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.28 on Biodeterioration.

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

³ *Annual Book of ASTM Standards*, Vol 06.02.