



Designation: D 3274 – 95

Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation¹

This standard is issued under the fixed designation D 3274; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 The photographic reference standards available for use with this test method provide a numerical basis for rating the degree of fungal and algal growth or soil and dirt accumulation on paint films.

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 4610 Guide for Determining the Presence of and Removing Microbial (Fungal or Algal) Growth on Paint and Related Coatings²

2.2 ASTM Adjuncts:

Pictorial Photographic Standards³

3. Terminology

3.1 *Types of Fungal and Algal Growth*—Fungi are heterotrophs capable of reproducing both asexually and sexually. Asexual reproduction takes place either by the fragmentation of the mycelium or by the production of spores. Sexual reproduction can occur by fusion of gametes, penetration of a gamete into a reproductive structure known as a gametangium, or by fusion of gametangia. Some common definitions include:

3.2 *spore*—an asexual reproductive cell capable of developing into a mature fungus without fusion with another cell.

3.2.1 *Discussion*—Spores tend to be spherical in morphology and are observed singly or in clusters. Spores may or may not be associated with fungal mycelia and can range in a wide variety of colors. Although primarily gray or black, some spores are even green in color and have been mistaken as terrestrial algae. Spores of *Aureobasidium pullulans* magnified 100 $\times$ are shown in Fig. 1.

3.3 *hyphae*—thread-like, tubular, fungal filaments that compose the mycelium. Hyphae may appear individually or have spores attached.

3.3.1 *Discussion*—Hyphae of *Aureobasidium pullulans*, magnified 50 $\times$ are shown in Fig. 2.

3.4 *mycelium*—vegetative mass of hyphae forming the body of a fungus.

3.5 *fruiting body*—fungus structure consisting of specialized hyphae where sexual reproduction occurs.

3.6 Amorphous growth typical of an alga such as *Chlorococcum* Sp. appears in Fig. 3 at a magnification of 39 $\times$. Terrestrial algae can appear green to dark brown in color.

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. Because of their dark pigmentation, it is frequently difficult to distinguish fungi and algae from soil or dirt particles. The use of magnification of as much as 100 $\times$ affords easy distinguishability among fungal spores, fungal mycelia, algae, and dirt and is recommended in cases where such difficulty is apparent.

4.2 Dirt accumulation observed on specimens can occur more readily with coatings formulated at lower pigment volume concentration or those containing softer resins.

4.3 Use of Photographic Standards:³

4.3.1 The photographic reference standards that are part of this test method are for illustration purposes and should be used for visual comparisons.

4.3.2 The photographic standards illustrated in Fig. 4 rate the disfigurement of paint films from 0 to 8. A rating of 10 would indicate a film totally absent of disfigurement by particulate matter.

¹ This method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings and Materials 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 Available from ASTM Headquarters (order Adjunct ADJD3274). Copies of the pictorial photographic standards are contained in the publication *Pictorial Standards of Coating Defects*, which may be obtained from the Federation of Societies of Coating Technology, 492 Norristown Rd., Blue Bell, PA 19422.