Designation: E3152 – 23

Standard Guide for Standard Test Methods and Practices Available for Determining Antifungal Activity on Natural or Synthetic Substrates Treated with Antimicrobial Agents[1]

This standard is issued under the fixed designation E3152; 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 guide provides information on various test methods currently available to assess antifungal activity on natural or synthetic substrates.

1.2 Knowledge of microbiological techniques is required for the practice of this guide.

1.3 *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.*

1.4 *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]

C1338 Test Method for Determining Fungi Resistance of Insulation Materials and Facings

D2020 Test Methods for Mildew (Fungus) Resistance of Paper and Paperboard (Withdrawn 2009)[3]

D3273 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

D3456 Practice for Determining by Exterior Exposure Tests the Susceptibility of Paint Films to Microbiological Attack

D4300 Test Methods for Ability of Adhesive Films to Support or Resist the Growth of Fungi

D4445 Test Method for Fungicides for Controlling Sapstain and Mold on Unseasoned Lumber (Laboratory Method)

D4576 Test Method for Mold Growth Resistance of Wet Blue and Wet White

D4783 Test Methods for Resistance of Adhesive Preparations in Container to Attack by Bacteria, Yeast, and Fungi

D5259 Test Method for Isolation and Enumeration of Enterococci from Water by the Membrane Filter Procedure

D5590 Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay

D6329 Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers

D6469 Guide for Microbial Contamination in Fuels and Fuel Systems

D6974 Practice for Enumeration of Viable Bacteria and Fungi in Liquid Fuels—Filtration and Culture Procedures

D7436 Classification System for Unfilled Polyethylene Plastics Molding and Extrusion Materials with a Fractional Melt Index Using ISO Protocol and Methodology

D7584 Test Method for Evaluating the Resistance of the Surface of Wet Blue and Wet White to the Growth of Fungi in an Environmental Chamber

D7855/D7855M Test Method for Determination of Mold Growth on Coated Building Products Designed for Interior Applications Using an Environmental Chamber and Indirect Inoculation

D7910 Practice for Collection of Fungal Material From Surfaces by Tape Lift

E1326 Guide for Evaluating Non-culture Microbiological Tests

E2111 Quantitative Carrier Test Method to Evaluate the Bactericidal, Fungicidal, Mycobactericidal, and Sporicidal Potencies of Liquid Chemicals

E2197 Quantitative Disk Carrier Test Method for Determining Bactericidal, Virucidal, Fungicidal, Mycobactericidal, and Sporicidal Activities of Chemicals

[1] This guide is under the jurisdiction of ASTM Committee E35 on Pesticides, Antimicrobials, and Alternative Control Agents and is the direct responsibility of Subcommittee E35.15 on Antimicrobial Agents.

Current edition approved April 1, 2023. Published April 2023. Originally approved in 2018. Last previous edition approved in 2018 as E3152 – 18. DOI: 10.1520/E3152-23.

[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] The last approved version of this historical standard is referenced on www.astm.org.

E2471 Test Method for Using Seeded-Agar for the Screening Assessment of Antimicrobial Activity In Carpets
E2756 Terminology Relating to Antimicrobial and Antiviral Agents
E3227 Test Practice for Qualitative Assessment of Antifungal Activity on Textiles
F1094 Test Methods for Microbiological Monitoring of Water Used for Processing Electron and Microelectronic Devices by Direct Pressure Tap Sampling Valve and by the Presterilized Plastic Bag Method
G21 Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

2.2 *AATCC Standards:*[4]
AATCC 30 Antifungal Activity, Assessment on Textile Materials: Mildew and Rot Resistance of Textile Materials
AATCC TM 90 2016 Antimicrobial Activity Assessment of Textile Materials: Agar Plate Method
AATCC 174 (Part III)-2016 Antimicrobial Activity Assessment of Carpets

2.3 *AWPA Standards:*[5]
AWPA E10-11 Standard Method of Testing Wood Preservatives by Laboratory Soil-Block Cultures
AWPA E24-15 Standard Method of Evaluating the Resistance of Wood Product Surfaces to Mold Growth

2.4 *BSi Standards:*[6]
BS 3900:Part G6:1989 British Standard Methods of test for paints Part G6. Assessment of resistance to fungal growth
BS EN 113:1997 Wood preservatives – Test method for determining the protective effectiveness against wood destroying basidiomycetes – Determination of the toxic values
BS EN 1104:2005 Paper and Board intended to come into contact with foodstuffs – Determination of the transfer of antimicrobial constituents

2.5 *ISO Standards:*[7]
ISO 846 Evaluation of the Action of Microorganisms on Plastics
ISO 16000 Indoor Air Sampling Strategy for Moulds
ISO 16256 Clinical Laboratory Testing and in-vitro diagnostic test systems – Reference method for testing the in vitro activity of antimicrobial agents against yeast fungi involved in infectious disease

2.6 *JIS Standards:*
JIS K 1571:2010 Test methods for determining the effectiveness of wood preservatives and their performance requirements

2.7 *Other Standards:*
Ford Motor Company Specification
MIL-STD-810G Method 508.6 Fungus
TAPPI T-487 Fungus Resistance of Paper and Paperboard
EPA Pesticide Assessment Guidelines – Subdivision G Product Performance, Section 93-30[8]

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this guide, refer to Terminology E2756.

4. Significance and Use

4.1 Fungi are known to produce objectionable odors, stains, and premature biodeterioration of various consumer products and construction substrates including textiles, carpet, ceiling tile, gypsum wallboard, lumber, and plasticized vinyl and other polymers.

4.2 Antifungal activity is typically:

4.2.1 Determination of article susceptibility to fungal colonization,

4.2.2 Determination of fungistatic activity (qualitative determination of prevented or delayed fungal colonization), and

4.2.3 Determination of fungicidal/sporicidal activity (quantitative determination of spore kill).

4.3 The degree of required surface examination varies from gross visual examination to detailed microscopic assessment among these methods.

4.4 This guide provides an overview of established methods and suggestions for their applicability, with consideration to the type of substrate treated or the type of antifungal treatment being assessed.

5. Methods Overview

ASTM Standards

5.1 C1338 Test Method for Determining Fungi Resistance of Insulation Materials and Facings (Qualitative measure of susceptibility and/or fungistatic activity)

5.1.1 *Scope*—This test method covers the determination of the ability of new insulation materials and their facings to support fungal growth.

5.1.2 *Significance and Use:*

5.1.2.1 The type of materials used in the manufacture of insulation products and the type of membrane used to face these products can sometimes affect fungi sustenance in the presence of high humidity.

5.1.2.2 This test method is used to determine the relative ability of an insulation and its facing to support or resist fungal growth under conditions favorable for their development.

5.1.2.3 This test method uses a comparative material to determine the relative ability of a material to support fungal growth. In some specialized product areas, it is required that no growth takes place. In such cases, the use of the comparative material is omitted and the pass/fail criterion is based upon growth.

[4] Available from American Association of Textile Chemists and Colorists (AATCC), P.O. Box 12215, Research Triangle Park, NC 27709-2215, http://www.aatcc.org.

[5] Available from American Wood Protection Association (AWPA), P.O. Box 361784, Birmingham, AL 35236-1784, http://www.awpa.com.

[6] Available from British Standards Institution (BSI), 389 Chiswick High Rd., London W4 4AL, U.K., http://www.bsigroup.com.

[7] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[8] Available from United States Environmental Protection Agency (EPA), William Jefferson Clinton Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460, http://www.epa.gov.