Designation: D2257 – 98 (Reapproved 2012)

Standard Test Method for Extractable Matter in Textiles[1]

This standard is issued under the fixed designation D2257; 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 Department of Defense.

1. Scope

1.1 This test method covers a procedure for determining the extractable material on most fibers, yarns, and fabrics. Three options are included. Option 1 uses heat and Soxhlet extraction apparatus. Option 2 uses room temperature and extraction funnels. Option 3 uses either Option 1 or Option 2 extraction but provides for calculation of extractable matter from the loss in mass of the material due to the extraction rather than the extractable matter residue.

NOTE 1—Other standards for the determination of extractable matter in textiles made of specific fibers include: Specification D541, Specification D681, and Test Method D1574.

1.1.1 The solvents for use in this method are any solvents that the party or parties concerned agreed on; such as, Halogenated Hydrocarbon (HH) chloroform, tetrachloroethane, alcohol.

1.1.2 This test method may not extract cross-linked finishes or resins which may be on the textile.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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 and health practices and determine the applicability of regulatory limitations prior to use.* See Sections 6 and 7.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D123 Terminology Relating to Textiles

D541 Specification for Single Jute Yarn (Withdrawn 1996)[3]

D681 Specification for Jute Rove and Plied Yarn for Electrical and Packing Purposes (Withdrawn 2000)[3]

D1574 Test Method for Extractable Matter in Wool and Other Animal Fibers

D1909 Standard Table of Commercial Moisture Regains for Textile Fibers

D2258 Practice for Sampling Yarn for Testing

D3333 Practice for Sampling Manufactured Staple Fibers, Sliver, or Tow for Testing

D4920 Terminology Relating to Conditioning, Chemical, and Thermal Properties

2.2 *Other Documents:*

IWTO 10-62(E) Method for Determination of the Dichloromethane Soluble Matter in Combed Wool Sliver[4]

3. Terminology

3.1 *Definitions:*

3.1.1 *extractable matter, n*—nonfibrous material in or on a textile not including water, which is removable by a specified solvent or solvents as directed in a specified procedure.

3.1.1.1 *Discussion*—Nonfibrous material is usually oily, waxy, resinous, or polymeric in nature, but may also include other material, such as protein, particularly if ethyl alcohol is used, or in, the extracting solvent.

3.1.2 For definitions of other moisture terms related to textiles, refer to Terminology D4920. For definitions of other textile terms used in this test method refer to Terminology D123.

4. Summary of Test Method

4.1 The specimen is extracted either in Soxhlet apparatus (Option 1), or extraction funnel (Option 2) first with an agreed solvent (Note 2). The solvents are evaporated and the residues and the specimens are dried and weighed separately. The amounts of extracted matter are reported as percentages of

[1] This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.51 on Conditioning and, Chemical and Thermal Properties.

Current edition approved Feb. 1, 2012. Published February 2012. Originally approved in 1989. Last previous edition approved in 1998 as D2257 – 98(2004). DOI: 10.1520/D2257-98R12.

[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.

[4] Available from International Wool Secretariat, Carlton Gardens, London S.W. 1, England.

either the oven-dried mass or of the oven-dried mass plus commercial moisture regain for the textile.

4.2 Alternatively, in Option 3, the specimen is dried and weighed before and after extraction using Option 1 or Option 2. Extractable matter is calculated as the loss in mass reported as percentages of the extracted oven-dried mass or this mass plus commercial moisture regain for the textile.

5. Significance and Use

5.1 This test method may be used for acceptance testing of commercial shipments.

5.1.1 In case of a dispute arising from differences in reported test results using this test method for acceptance testing of commercial shipments, the purchaser and the supplier should conduct comparative tests to determine if there is a statistical bias between the laboratories. Competent statistical assistance is recommended for the investigation of bias. As a minimum, the two parties should take a group of test specimens which are as homogeneous as possible and which are from a lot of material of the type in question. The test specimens should then be randomly assigned in equal numbers to each laboratory for testing. The average results from the two laboratories should be compared using appropriate statistical analysis and a probability level chosen by the two parties before the testing begins. If a bias is found, either its cause must be found and corrected, or the purchaser and supplier must agree to interpret future test results with consideration to the known bias.

5.2 This test method is used for the determination of the amounts of naturally present oily or waxy impurities that have not been completely removed from textiles made from animal fibers, and for the determination of the amounts of oily or waxy finishing materials applied to raw materials or textiles during manufacture. See 3.1.1, *extractable matter*.

5.3 The test method may be used as a step in the determination of the commercial weight of fiber, yarn, and textile shipments.

5.4 The International Wool Textile Organization specifies the use of a halogenated hydrocarbon, dichloromethane, also called methylene chloride (CH_2Cl_2) instead of the solvent specified in this test method (IWTO-10-62(E)).

5.5 Extractables by mass loss is frequently used for textiles which have a relatively large amount of extractable material to effect a significant mass change.

6. Apparatus and Reagents

6.1 *Extraction Apparatus*

6.1.1 Soxhlet Extraction Apparatus for Option 1 extraction

6.1.2 Extraction Funnels, wide-mouth, 125 or 150-mL capacity for Option 2 extraction.

6.2 *Thimbles,* fat-free cellulose or Alundum, for Option 1.

6.3 *Specimen Compressor,* pestle or long forceps, for handling specimens in Option 2.

6.4 *Containers,*

6.4.1 To hold extractables and that will seal to prevent moisture changes, for example weighing bottles, for Option 1.

6.4.2 To collect solvent from extractions, for Option 2.

NOTE 2—If metal containers are used, check to ensure that the extracatable matter does not react with the metal if the residue is to be weighed.

6.5 *Oven*

6.5.1 *Ventilated Forced-Draft Drying Oven,* capable of maintaining a temperature of 105 ± 3°C.

6.5.2 *Vacuum Type,* maintained at 65 ± 2°C for use in Option 3 when low-boiling ingredients are present.

6.6 *Tray,* to contain desiccant, with a screen to prevent specimen or container contact with desiccant, for use in the vacuum oven. If Phosphorus pentoxide (P_20_5) or sulfuric acid (H_2SO_4) is used, the screen must be acid resistant.

6.7 *Dessicator*

6.8 *Analytical Balance*—sensitive to 0.0001 g.

6.9 *Nitrogen,* to supply the vacuum oven.

6.10 *Solvent*—as agreed (see 1.1.1). (**Warning—**Various solvents have been used in the past, and are still used to some extent. Many of these solvents are flammable, toxic or have anesthetic effects, or unpleasant odors. As with all volatile solvents, the use of adequate ventilation under a hood is recommended when using this solvent.)

7. Hazards

7.1 Refer to the manufacturer's material safety data sheets for specific information on chemicals used in this test.

7.2 After extraction with alcohol or other flammable or toxic solvents, the specimens must be air-dried under a hood until nearly all of the solvent has evaporated before they are dried in the oven. Otherwise there is a danger of building up a dangerous concentration of explosive vapor in the oven. Oven doors have been blown across the room by the force of an explosion.

7.3 **Warning**—Dichloromethane is toxic, and its use is recommended only when necessary to conform to international specifications, and then with adequate ventilation under a hood.

8. Sampling

8.1 *Lot Sample*—As a lot sample for acceptance testing, take at random the number of shipping containers directed in an applicable material specification or other agreement between the purchaser and the supplier. Consider shipping containers to be the primary sampling unit.

NOTE 3—An adequate specification or other agreement between the purchaser and the supplier requires taking into account the variability between shipping containers, within a shipping container, and between specimens taken from a single unit within a shipping container, so as to provide a sampling plan with a meaningful producer's risk, consumer's risk, acceptable quality level, and limiting quality level.

8.2 *Laboratory Sample*—As a laboratory sample for acceptance testing, proceed as follows:

8.2.1 *Yarn on Packages*—Take at random from each shipping container in the lot sample the number of packages directed in an applicable material specification or other agreement between the purchaser and the supplier, such as an agreement to use Practice D2258. Preferably, the same number