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Laboratory Procedure for Synthetic Soil

1. Foreword

1.1 The AATCC Synthetic Soil Formula is applicable for several methods within AATCC and other organizations. Historically, AATCC listed the formula within select AATCC methods. It was determined that the formula should be listed independently.

1.2 AATCC TM123 Carpet Soiling: Accelerated Soiling Method—was written in 1967 and used throughout the 1970s, 80s, and 90s. Many types of soil application devices were developed during this time. During this time, the soil ingredients were determined, a formula was developed, and recorded in TM 123. During this period, soil resistance technology was improved in the carpet industry. Improving the variation of the test soil application on the carpet specimen became necessary. A workgroup of carpet & fiber manufacturers and chemical suppliers formed an ASTM workgroup to improve the methods' variation. They conducted many trials with different tumblers, mixing media, and other attributes. Finally, a reproducible way to apply the soil mixture, detailed in AATCC TM123, was agreed on.

1.3 A new method was written within ASTM D13.21 to describe the method; it was designated ASTM D6540—Standard Test Method for Accelerated Soiling of Pile Yarn Floor Covering. ASTM D6540 referenced the formula found in AATCC TM123.

1.4 TM123 was dropped as an active soiling test method in subsequent years. It was withdrawn in 2001. The Synthetic Soil formula was transferred to AATCC TM122 Carpet Soiling: Service Soiling Method to preserve the soiling formula. As TM122 may eventually suffer the same faith as TM123, to keep the formula active, it was determined that it should be listed independently.

1.5 To ensure that the soil formula is available regardless of the status of the test standard, the formula is now stated in AATCC LP4 Laboratory Procedure for Synthetic Soil.

1.5.1 Previous references to AATCC Synthetic Soil Formula have been removed from AATCC TM122. ASTM D6540 references to the formula have been updated to align with AATCC LP4.

2. Purpose and Scope

2.1 Synthetic Soil is used as a soiling option for stain and soiling evaluations.

2.2 Synthetic soil originated from carpet-related methods; however, its use is not limited and can be used in other methods requiring a synthetic soil application.

3. Principle

3.1 This lab procedure provides the historical background of the Synthetic Soil Formula (see 1.2 and 1.3) and includes the formula (see Table I) and the mixing guidelines (see 7.2).

4. Referenced Documents

4.1 AATCC TM122-2019 Carpet Soiling: Service Soiling Method (see 8.2).

4.2 AATCC TM123-2000 Carpet Soiling: Accelerated Soiling Method (see 8.2).

4.3 ASTM D6540—Standard Test Method for Accelerated Soiling of Pile Yarn Floor Covering (see 8.1).

5. Terminology

5.1 **soil, n.**—dirt, oil, or other substances not normally intended to be present on a substrate such as a textile material.

5.2 **soiling, n.**—*in textiles*, a process by which a textile substrate becomes more or less uniformly covered with/or impregnated with soil.

6. Safety Precautions

NOTE: These safety precautions are for information purposes only. The precautions are ancillary to the testing procedures and are not intended to be all-inclusive. It is the user's responsibility to use safe and proper techniques in handling materials in this test method. Manufacturers MUST be consulted for specific details such as material safety data sheets and other manufacturers' recommendations. All OSHA standards and rules must also be consulted and followed.

6.1 Good laboratory practices should be followed. Wear safety glasses in all laboratory areas. Wear impervious

gloves when handling soil.

6.2 All chemicals should be handled with care.

7. Procedure

7.1 The soil Formula is listed in Table I.

7.2 Synthetic Soil Mixing Guidelines.

7.2.1 Canadian Peat moss should be dry and free of lumps.

7.2.2 Portland cement must be dry. If it contains lumps, discard it and use a fresh supply.

7.2.3 Mix all dry ingredients thoroughly before adding mineral oil.

7.2.4 Dry mix at 50°C (122°F) for 6-8 hours.

7.2.5 Place the dry mixture in a ball mill with ceramic balls. Turn the mill on and run it for approximately 24 hours.

7.2.6 Store mixture in vapor-tight containers with a desiccant.

7.3 The synthetic soil may be purchased pre-mixed (see 8.2).

8. Notes

8.1 Available from ASTM International, 100 Barr Harbor Dr., W. Conshohocken PA 19428; +1.610.832.9500; www.astm.org.

8.2 For potential material information about this lab procedure, please visit the online AATCC Buyer's Guide at www.aatcc.org/bg. AATCC provides the possibility of listing equipment and materials sold by its Corporate Member, but AATCC does not qualify or in any approve, endorse, or certify that any of the listed equipment or materials meet the requirements of its test methods.

9. History

9.1 Developed in 2023 by AATCC Committee RA57.

Table I—Synthetic Soil Formula	
Ingredients	% By Weight
Canadian peat moss	38.0
Portland cement	17.0
Kaolin clay	17.0
Silica Gel Sorbent (230–400 mesh)	17.0
Carbon black (Lamp or furnace black)	1.75
Black iron oxide	0.50
Mineral oil (medical grade)	8.75