Designation: D 2057 – 01

Standard Test Method for Colorfastness of Zippers to Laundering[1]

This standard is issued under the fixed designation D 2057; 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 test method covers the determination of alteration in shade and of staining under conditions similar to that experienced in domestic washing of zipper stringers. This test method is applicable to the textile portion of zipper stringers that utilize tapes made of cotton, linen, or manufactured organic fibers, and to combinations thereof.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as the standard. Within the text, the inch-pound units are shown in parentheses. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other. combining values from the two systems may result in nonconformance with this test method.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 123 Terminology Relating to Textiles[2]

D 2050 Terminology Relating to Zippers[2]

D 2051 Test Method for Durability of Finish of Zippers to Laundering[2]

D 2052 Test Method for Colorfastness of Zippers to Drycleaning[2]

D 2053 Test Method for Colorfastness of Zippers to Light[2]

D 2054 Test Method for Colorfastness of Zipper Tapes to Crocking[2]

D 2058 Test Method for Durability of Finish of Zippers to Drycleaning[2]

D 2059 Test Method for Resistance of Zippers to Salt Spray (Fog)[2]

D 2060 Test Methods for Measuring Zipper Dimensions[2]

D 2061 Test Methods for Strength Test for Zippers[2]

D 2062 Test Methods for Operability of Zippers[2]

D 3692 Practice for Selection of Zippers for Care-Labeled Apparel and Household Furnishings[3]

2.2 *AATCC Methods:*

Method 143 Appearance of Apparel and Other Textile End Products after Repeated Home Launderings[4]

Evaluation Procedure 1, AATCC Gray Scale for Color Change[4]

Evaluation Procedure 3, AATCC Chromatic Transference Scale[4]

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of zipper terms used in this standard, refer to Terminology D 2050. For definitions of other textile terminology used in this standard, refer to Terminology D 123.

4. Summary of Test Method

4.1 Specimens in contact with a multifiber test cloth are laundered in home laundry and drying equipment, with or without bleach, under appropriate temperature conditions to produce the effect of home laundering on zipper color. The alteration in shade and the degree of staining of the multifiber test cloth are graded by reference to the AATCC Gray Scale or to the AATCC Chromatic Transference Scale, as appropriate.

5. Significance and Use

5.1 Test Method D 2057 is useful for testing to determine if the degree of alteration in shade is satisfactory for the intended end-use and for determining if unacceptable staining of color into adjacent fabric will occur.

NOTE 1—For guidance in evaluating the results of this method, refer to Practice D 3692.

5.2 This test method is considered satisfactory for acceptance testing of commercial shipments because the method has been used extensively in the trade for acceptance testing.

5.2.1 If there are differences of practical significance between reported test results for two laboratories (or more), comparative tests should be performed to determine if their is a statistical bias between them, using competent statistical assistance. As a minimum, the test samples should be used that

[1] This test method is under the jurisdiction of ASTM Committee D13 on Textiles; and is the direct responsibility of Subcommittee D13.54 on Subassemblies. The method was developed in cooperation with the Slide Fastener Association, Inc.

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[2] *Annual Book of ASTM Standards*, Vol 07.01.

[3] *Annual Book of ASTM Standards*, Vol 07.02.

[4] Technical Manual of the American Association of Textile Chemists and Colorists, P. O. Box 12215, Research Triangle Park, NC 27709.

are as homogeneous as possible, that are drawn from the material from which the disparate test results were obtained, and that are randomly assigned in equal numbers to each laboratory for testing. Other materials with established test values may be used for this purpose. The test results from the two laboratories should be compared using a statistical test for unpaired data, at a probability level chosen prior to the testing series. If a bias is found, either its cause must be found and corrected, or future test results must be adjusted in consideration of the known bias.

5.3 The method(s) in this standard along with those in D 2051, D 2052, D 2053, D 2054, D 2058, D 2059, D 2060, D 2061, and D 2062 are a collection of proven zipper test methods. They can be used as aids in the evaluation of zippers without the need for a thorough knowledge of zippers. The enumerated test methods do not provide for the evaluation of all zipper properties. Besides those properties measured by means of the enumerated test methods there are other properties that may be important for the satisfactory performance of a zipper. Test methods for measuring those properties have not been published either because no practical methods have yet been developed or because a valid evaluation of the information resulting from existing unpublished methods requires an intimate and thorough knowledge of zippers.

6. Apparatus

6.1 *Automatic Washing Machine,*[5] with "normal setting" agitator speed of 179 ± 2 spm, washing time of 12 min, spin speed of 645 ± 15 rpm, final spin cycle of 6 min and rinse temperature less than 29 °C (85°F).

6.2 *Automatic Tumble Dryer,*[6] with controlled exhaust temperature that cycles from 61 to 71°C (140 to 160°F) and a cooling period while tumbling 5 min at the end of the drying cycle.

6.3 *AATCC Chromatic Transference Scale.*[4]

6.4 *Gray Scale for Color Change.*[4]

7. Reagents and Materials

7.1 *Multifiber Test Fabric No. 10.*[7]

7.2 Any household detergent.

7.3 Any liquid chlorine household bleach containing 5.25 % sodium hypochlorite.

7.4 Any dry, nonchlorine household bleach based on sodium perborate/sodium carbonate (pH of a 1 % solution should be 10.7 to 11.3).

8. Sampling

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

NOTE 2—An adequate specification or other agreement between the purchaser and supplier requires taking into account the variability between shipping cartons and between zippers in a container 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 and Test Specimens*—As a laboratory sample for acceptance testing, take the number of zippers specified in Section 9 at random from each container in the lot sample. Consider the zippers as both the laboratory sample and the test specimens.

9. Number of Specimens

9.1 Unless otherwise agreed upon, as when specified in an applicable material specification, take one zipper at random from each individual container selected for sampling.

10. Test Specimen

10.1 The test specimen shall consist of approximately 7740 mm^2(12 $in.^2$) of zipper chain. The specimen need not be a continuous length.

10.2 A 51-mm (2-in.) square of multifiber test cloth No. 10 as specified in AATCC Method 61 shall be sewn or stapled to the stringer length, with the filling stripes running at right angles to the stringer length. The multifiber test cloth shall be attached with a single line of stitching or stainless steel staples midway on the stringer width.

10.3 Duplicate specimens shall be prepared and held for comparison in evaluating the results of the test.

11. Conditioning

11.1 There are no special environmental conditions required.

12. Procedure

12.1 Test each specimen as directed in AATCC Method 143, Paragraph 8 Procedure, using the specimens and enough dummy pieces of undyed cotton sheeting or towels to make a 1.8 kg (4 lb) load using no fewer than 10 dummy pieces.

12.2 Any domestic household detergent may be used in place of the AATCC detergent specified as well as the water temperature and bleach condition from Table 1 of this test method as agreed upon by the purchaser and seller. When chlorine bleach is used, introduce one cup into the washer in the manner directed on the bleach container. When nonchlorine bleach is used, introduce it into the washer in the amount and manner directed on the bleach container.

TABLE 1 Laundering Conditions

Machine Washing Temperatures,° C (°F)	Bleach Condition
No. 1: 41± 3 (105 ± 5)	(*a*) chlorine bleach
No. 2: 49 ± 3 (120 ± 5)	(*b*) nonchlorine bleach
No. 3: 60 ± 3 (140 ± 5)	(*c*) no bleach

[5] A Kenmore Automatic Washer has been accepted as the standard machine. Available from Sears, Roebuck and Co. For model number and address of nearest Commercial Sales Department, write AATCC, P. O. Box 12215, Research Triangle Park, NC 27709. Any other washer that is known to give comparable results may be used.

[6] A Kenmore Electric Dryer has been accepted as the standard. Available from Sears, Roebuck and Co. For model number and address of nearest Commercial Sales Department, write to AATCC, P. O. Box 12215, Research Triangle Park, NC 27709. Any other dryer known to give comparable results may be used.

[7] Available from Testfabrics, Inc., P. O. Drawer O, Middlesex, NJ 08846.

12.3 Dry using Table IV and the Cotton Sturdy Procedure of AATCC Method 143.

NOTE 3—It has been found that there is no appreciable difference in staining regardless of which household detergent is used. Because of differences in water hardness, different detergents may affect shade because of varying degrees of deposition from the hard water. However, the depositions would be the same on the entire item into which the zipper was applied.

12.4 Repeat the washing - drying procedure through four additional cycles, or as agreed upon by the purchaser and seller.

13. Evaluation

13.1 Grade the textile portion of the specimens for change in color to the nearest one half rating unit as directed in AATCC Evaluation Procedure 1.

13.2 Grade the degree of staining of each stripe of the multifiber fabric to the nearest one half rating unit as directed in AATCC Evaluation Procedure 3.

14. Report

14.1 State that the specimens were tested as directed in ASTM Test Method D 2057. Describe the material or product sample, the method of sampling used, the test option utilized, the brand name and amount of detergent used, the brand name and amount of bleach used if nonchlorine bleach is used.

14.2 Report the following information:

14.2.1 Number of specimens tested,

14.2.2 Alteration in shade for each specimen as the noted grade on the AATCC Gray Scale for Color Change, and

14.2.3 Staining for each multifiber stripe specimen as the grade on the AATCC Chromatic Transference Scale.

15. Precision and Bias

15.1 *Precision*—An interlaboratory test and calculation of components of variance was felt to be inappropriate because of the restricted and discontinuous rating scales, the non-linear relationships between the rating scales and color difference units, the increased variability in color difference units as the true value of the ratings decrease, and the restriction of the data for degree of staining to the cotton portion of the multifiber test fabric. Based on these reasons and on general practice in the trade, a lot or consignment of zippers is generally considered as having a rating that is significantly worse than a specified value when a specimen from the lot or consignment has a rating for change in color that is more than one-half step below the specified rating on the AATCC Gray Scale for Color Change or for degree of staining, a rating that is more than one-half step below the specified rating on the AATCC Chromatic Transference Scale.

15.2 *Bias*—No justifiable statement can be made on the bias of Test Method D 2057 for grading zippers for change in color or for degree of staining, since the true values of the properties cannot be established by accepted referee methods.

16. Keywords

16.1 colorfastness; laundering; zipper