



Designation: D 2059 – 87 (Reapproved 1997)

## Standard Test Method for Resistance of Zippers to Salt Spray (Fog)<sup>1</sup>

This standard is issued under the fixed designation D 2059; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the determination of the resistance of all types of zippers to corrosion and their ability to function properly after exposure of specified duration in a prescribed salt spray.

1.2 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

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:

B 117 Practice for Operating Salt Spray (Fog) Testing Apparatus<sup>2</sup>

D 123 Terminology Relating to Textiles<sup>3</sup>

D 2050 Terminology Relating to Zippers<sup>3</sup>

D 2051 Test Method for Durability of Finish of Zippers to Laundering<sup>3</sup>

D 2052 Test Method for Colorfastness of Zippers to Dry-cleaning<sup>3</sup>

D 2053 Test Method for Colorfastness of Zippers to Light<sup>3</sup>

D 2054 Test Method for Colorfastness of Zipper Tapes to Crocking<sup>3</sup>

D 2057 Test Method for Colorfastness of Zippers to Laundering<sup>3</sup>

D 2058 Test Method for Durability of Finish of Zippers to Drycleaning<sup>3</sup>

D 2060 Test Methods for Measuring Zipper Dimensions<sup>3</sup>

D 2061 Test Methods for Strength Tests of Zippers<sup>3</sup>

D 2062 Test Methods for Operability of Zippers<sup>3</sup>

#### 2.2 U. S. Government Standard:

MIL 105D Sampling Procedures and Tables for Inspecting Attributes<sup>4</sup>

### 3. Terminology

#### 3.1 Definitions:

3.1.1 For definitions of terms relating to zippers used in this test method refer to Terminology D 2050. For definitions of other textile terms, refer to Terminology D 123.

### 4. Summary of Test Method

4.1 The effects of corrosion on zippers, should it occur, are evaluated visually and by measuring the crosswise strength and the force required to open and close the zipper both before and after exposure in a prescribed salt-spray atmosphere for a specified time.

### 5. Significance and Use

5.1 The resistance of a zipper to a variety of saline and non-saline environments can be estimated from the amount and nature of corrosion products and their effect on operability. Results of exposure to the salt spray are merely indicative of the reaction to other corrosive conditions. While the results cannot be related precisely to a given length of exposure in a specific atmosphere, they are useful for measuring relative performance under prescribed conditions for controlling a manufacturing process, and for measuring the effectiveness of protective coatings.

5.2 Test Method D 2059 for the determination of the resistance of zippers to salt spray is considered satisfactory for acceptance testing of commercial shipments of zippers since the test method is used extensively in the trade for acceptance testing.

5.2.1 In case of a dispute arising from differences in reported test results when using Test Method D 2059 for acceptance testing of commercial shipments, the purchaser and the supplier should conduct comparative tests to determine if there is a statistical bias between their laboratories. Competent statistical assistance is recommended for the investigation of bias. As a minimum, the two parties should take a group of test specimens that are as homogeneous as possible and that 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 Student's *t*-test for unpaired data and an acceptable probability level chosen by the two parties before the testing is begun. If a bias is found, either its cause must be found and corrected or the purchaser and the

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-13 on Textiles, and is the direct responsibility of Subcommittee D13.54 on Subassemblies. The method was developed in cooperation with the Slide Fastener Assn., Inc.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 03.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 07.01.

<sup>4</sup> Available from Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120.



supplier must agree to interpret future test results in the light of the known bias.

5.3 The method(s) in the standard along with those in Test Methods D 2051, D 2052, D 2053, D 2054, D 2057, D 2058, D 2060, D 2061, and D 2062 are a collection of proven 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 Apparatus specified in Method B 117.

## 7. Reagents

7.1 *Salt Solution*—Prepare a 5 % salt (NaCl) solution as directed in Method B 117.

## 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 1—If the wide variability of quality suggested in A2.2 of Annex A2 of Method B 117 is suspected, the agreement on taking a lot sample should be based on MIL-STD-105D. An adequate specification or other agreement between the purchaser and the supplier requires taking into account the variability between shipping cartons and zippers within a container to provide a sampling plan with a meaningful producer's risk, acceptable quality level, and limiting quality level.

8.2 *Laboratory Sample and Test Specimens*—As a laboratory sample for acceptance testing, take two zippers at random from each container in the lot sample. Use these zippers as the test specimens for a unit in the laboratory sample.

## 9. Test Specimens

9.1 From each laboratory sample take duplicate specimens consisting of a completely assembled zipper of 150-mm (6-in.) minimum length or a similar length of chain equipped with an appropriate slider. Set one specimen aside to serve as control for the determination of crosswise strength and operability without being exposed to salt spray.

## 10. Conditioning

10.1 Specimens to be tested by use of this method need no conditioning.

## 11. Procedure

11.1 Proceed as directed in Method B 117.

11.2 Open the specimen for one half its length and suspend it in a vertical plane, opened end down, from a rod in the salt-spray chamber. Take care that any suspension devices used do not introduce corrosive effects. When a number of specimens are tested simultaneously, take care to keep the specimens from touching each other and to avoid having corrosion products and condensate from one specimen fall on another.

11.3 Close the salt-spray chamber and bring the inside temperature within the range 33 to 36°C (92 to 97°F) and maintain the temperature within this range throughout the test.

11.4 Expose the specimens in the chamber to the salt spray for a continuous period of 24 h, after which, remove the specimens from the salt-spray chamber. Gently rinse or dip the specimens in a stream of tap water at room temperature and then blow off excess water with air free from entrained moisture.

11.5 Place the specimens on a horizontal surface such as a muslin-covered frame and allow them to dry under room conditions. When dry, examine the specimens, visually note and record the presence or absence of any corrosion.

11.6 After the inspection, manually operate the slider for ten complete opening and closing cycles if possible.

11.7 Test both the exposed specimen and the control specimen, which had been set aside (see 9.1), for crosswise strength as directed in Test Methods D 2061 and for opening and closing operability as directed in Test Methods D 2062. Record the results of these tests.

## 12. Report

12.1 State that the specimens were tested as directed in ASTM Test Method D 2059. Describe the material(s) or product(s) sampled and the method of sampling used.

12.2 Report the following information:

12.2.1 Presence or absence of any corrosion after exposure to the salt spray.

12.2.2 Crosswise strength of each specimen,

12.2.3 Forces required to open and to close each specimen, and

12.2.4 Number and description of specimens tested.

## 13. Precision and Bias

13.1 No statement is made on precision and bias since the formation of corrosion products is an attribute.

13.2 The precision and bias of the methods for crosswise strength and for opening and closing operability are as stated in Test Methods D 2061 and in Test Methods D 2062, respectively.

13.3 The user of the method should also refer to Appendix A2 of Method B 117 for cautions concerning the interpretation of test results.

## 14. Keywords

14.1 corrosion; zipper

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