



Designation: D2059/D2059M – 03 (Reapproved 2022)

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

This standard is issued under the fixed designation D2059/D2059M; 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 either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the 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, 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:*<sup>2</sup>

- B117 Practice for Operating Salt Spray (Fog) Apparatus
- D123 Terminology Relating to Textiles
- D2050 Terminology Relating to Subassemblies Used in the Manufacture of Textiles
- D2051 Test Method for Durability of Finish of Zippers to Laundering
- D2052 Test Method for Colorfastness of Zippers to Dry-cleaning

<sup>1</sup> 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 Assn., Inc.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM web site, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM web site.

- D2053 Test Method for Colorfastness of Zippers to Light
- D2054 Test Method for Colorfastness of Zipper Tapes to Crocking
- D2057 Test Method for Colorfastness of Zippers to Laundering
- D2058 Test Method for Durability of Finish of Zippers to Drycleaning
- D2060 Test Methods for Measuring Zipper Dimensions
- D2061 Test Methods for Strength Tests for Zippers
- D2062 Test Methods for Operability of Zippers

2.2 *U. S. Government Standard:*

- MIL-STD-105D Sampling Procedures and Tables for Inspecting Attributes<sup>3</sup>

### 3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of zipper terms used in this standard refer to Terminology D2050. For definitions of other, textile terminology used in this standard refer to Terminology D123.

### 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 D2059 for the determination of the resistance of zippers to salt spray is considered satisfactory for

<sup>3</sup> Available from Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120.

acceptance testing of commercial shipments of zippers because the test method is 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 test should be performed to determine if there is a statistical bias between them, using competent statistical assistance. As a minimum, the test samples should be used that 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 the standard along with those in Test Methods **D2051**, **D2052**, **D2053**, **D2054**, **D2057**, **D2058**, **D2060**, **D2061**, and **D2062** 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 **B117**.

## 7. Reagents

7.1 *Salt Solution*—Prepare a 5 % salt (NaCl) solution as directed in Method **B117**.

## 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 **B117** 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 **B117**.

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 °C to 36 °C [92 °F 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 **D2061** and for opening and closing operability as directed in Test Methods **D2062**. Record the results of these tests.

## 12. Report

12.1 State that the specimens were tested as directed in ASTM Test Method D2059. 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.