Designation: D7233 – 08 (Reapproved 2017)

Standard Test Method for Testing Fracture of Level Paintbrush Filaments[1]

This standard is issued under the fixed designation D7233; 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 a procedure for determining the number of fractures present when paintbrush filaments are bent.

1.2 This method is applicable only to monofilaments with consistent longitudinal cross sectional dimensions commonly referred to as "level" filaments.

1.3 The values derived are in percent fractured filaments. For example, 2 fractured out of 18 filaments tested = 2/18 or 11 %.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *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.*

1.6 *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. Summary of Test Method

2.1 Filaments are clamped in place and bent to a specific displacement. While bent and still in the fixture, they are evaluated for fracture by visually determining whether the filaments have cracked or been permanently deformed and will not recover to virtually straight filaments. (See Fig. 1 and Fig. 2).

3. Significance and Use

3.1 This method is intended to evaluate filaments for suitability of use in paintbrushes prior to manufacture. Filament fracture resistance is very important because paintbrushes are bent or flexed during painting and it is necessary that the filaments are not permanently deformed with usage.

4. Apparatus[2]

4.1 The apparatus for this method is shown in Fig. 3. Filaments are secured between two clamps. The handwheel on the front of the gauge is rotated to bring the ends of the filaments toward each other as measured by the dial indicator at the top of the gauge.

4.2 The device is very delicate and care should be used in its operation. To prevent instrument damage, the clamps must not be brought together closer than a reading of 0.750 in. (19.0 mm) on the dial indicator.

5. Sampling, Test Specimens and Test Units

5.1 Record the polymer type, filament size and filament cross-sectional shape.

5.2 The sample filaments shall be conditioned for one (1) h at 73.5 ± 3.5°F (23.0 ± 2.0°C) and 50 ±5 % relative humidity.

5.3 The sample filaments shall be cut to a minimum of 1.5 in. (38.1 mm).

5.4 The distance between clamps on the test unit shall be 1.0 in. (25.4 mm) at a reading of 0.0 (zero deflection). (See Fig. 4.)

6. Procedure

6.1 Select three distinct sections of the bundle, box or lot of filaments to be evaluated. Do not include filaments from the perimeter of a bundle. Pull six (6) filaments from each section at equally dispersed intervals.

6.2 Set the clamps in a parallel horizontal position with the dial indicator set at 0.0 (zero deflection). (See Fig. 4.)

6.3 Place the six (6) filaments in the clamps. Be sure that no filament overlaps or is on top of another filament. Close clamps to secure.

[1] This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.61 on Paint Application Tools.

Current edition approved June 1, 2017. Published June 2017. Originally approved in 2008. Last previous edition approved in 2012 as D7233 – 08 (2012). DOI: 10.1520/D7233-08R17.

[2] The sole source of supply of the assembled fracture gauge test device known to the committee at this time is T. S. Simms and Co., 33 Bridge Rd., St. John, New Brunswick, Canada. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.

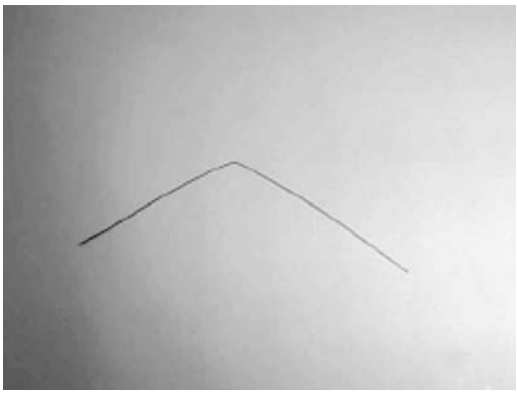

FIG. 1 Failed Filament

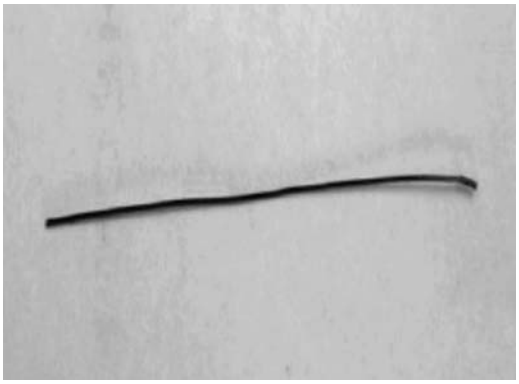

FIG. 2 Not Failed Filament

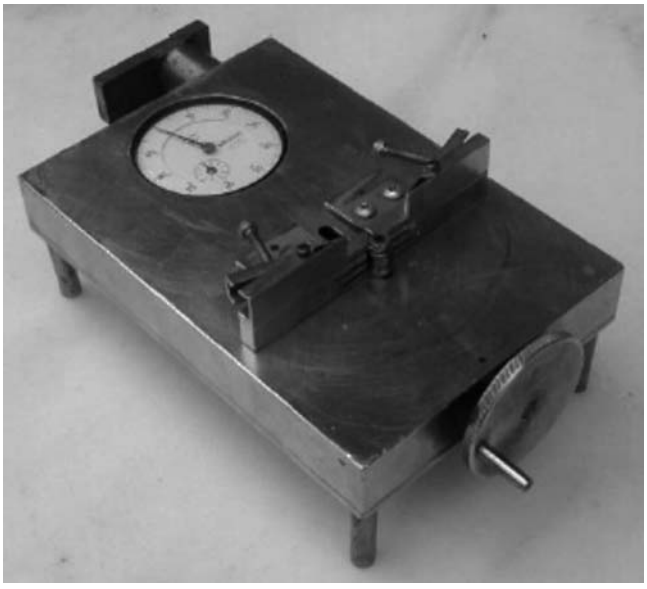

FIG. 3 Fracture Gauge

FIG. 4 Dial Face Set to 0.0

FIG. 5 Dial Face Reading 0.650 in.

6.4 Rotate the handwheel counterclockwise to deflect the filaments until the dial indicator reads 0.650 in. (16.5 mm) travel distance (see Fig. 5).

6.5 Immediately inspect each filament for fracture. Fractured filaments will exhibit a sharp point of fracture, will be kinked and will not be straight (see Fig. 1). Filaments without fracture will recover to be straight or will exhibit a deformation at the radius of bend (see Fig. 2).

6.6 Repeat steps 6.2 – 6.5 for remaining two (2) sets of six (6) filaments.

6.7 Report the results as fractured filaments per number of filaments tested. For example, 2 fractured out of 18 filaments tested = 2/18 or 11 %.

7. Calculation or Interpretation of Results

7.1 Calculate the percent (%) fractured filaments and compare results to product specifications. For example, (2/18) × 100 = 11 %.

7.2 The results can be influenced by cross sectional shape, cross sectional projected area, polymer type, processing history of the polymer and the processing history of the filaments selected.

7.3 Results can be affected by choice of testing conditions, that is, cold, dry conditions or hot, wet conditions. Interlaboratory comparisons should be done at identical conditions.

8. Precision and Bias

8.1 *Precision:*

8.1.1 Interlaboratory testing was done by three labs, each testing filaments removed from the same sample bundles in round-robin testing. Three different filament types known to have different fracture resistance were tested.

8.1.2 *Repeatability*—The standard deviation among labs was not greater than 3.2 % failed filaments per bundle when three separate samples were tested from the same bundle by each lab on each of the three separate filament types.

8.1.3 *Reproducibility*—Individual filaments cannot be tested twice due to the destructive nature of the test.

8.2 *Bias*—Bias cannot be determined since there is no standard filament reference established.

9. Keywords

9.1 bending