



# Standard Test Method for Tearing Resistance of Roofing and Waterproofing Materials and Membranes<sup>1</sup>

This standard is issued under the fixed designation D 5601; 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 measures the tearing resistance of roofing or waterproofing sheet materials or membranes by the tongue (single rip) method using a constant-rate-of-extension (CRE) tensile testing machine.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given 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. Summary of Test Method

2.1 A rectangular specimen, cut in the center of the shorter edge to form two “tongues” (or “tails”), is gripped in the clamps of a recording tensile machine and pulled to tear the specimen. The peak tearing force is read from the chart, and the average tearing force is calculated from the area under the curve on the autographic chart.

## 3. Significance and Use

3.1 This test method is designed to aid those interested in the engineering properties of roofing and waterproofing sheet materials and membranes.

3.2 This test method enables a researcher to measure the relative tearing resistance of roofing and waterproofing sheet materials and membranes under standard conditions in the laboratory.

3.3 The data obtained from this test method will not permit prediction of the service life of a membrane. Tear resistance is important during application, and changes in tear resistance are believed to be linked to the performance of roofing and waterproofing membranes, but the actual link between test data and performance is unknown and is dependent on the materials and exposure.

## 4. Apparatus

4.1 *Recording Tensile Testing Machine*, of the CRE type.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-8 on Roofing, Waterproofing, and Bituminous Materials and is the direct responsibility of Subcommittee D08.20 on Roofing Membrane Systems.

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4.2 *Clamps*, having all jaw surfaces parallel, flat, and capable of preventing slipping of the specimen during the test; and measuring at least 1 by 3 in. (25 by 75 mm), with the longer dimension perpendicular to the direction of application of the load.

4.3 *Integrator, Planimeter, or Computer Equipment*, for measuring the area under the force-tear distance curve.

## 5. Sampling

5.1 This test method requires a total of approximately 240 in.<sup>2</sup> (0.16 m<sup>2</sup>) per sample of material or membrane cut from the field of the sheet.

5.2 Cut five 3 by 8-in. (76 by 203-mm) specimens in the machine direction (the length) and five 3 by 8-in. (76 by 203-mm) specimens in the cross machine direction (width) of each sample. Cut all specimen edges. Cut a 3½ in. (89-mm) slit lengthwise in each specimen, so that the slit is centered.

## 6. Procedure

6.1 Condition the specimens to equilibrium at 73.4 ± 3.6°F (23 ± 2°C) and 50 ± 5 % relative humidity. Other additional temperatures or relative humidities may be used.

6.2 Set the distance between the jaws at 3 in. (76 mm), and use a crosshead speed of 2 ± 0.1 in./min (51 ± 2.5 mm/min).

6.3 Place the specimens in the clamps so that the split is centered in the jaw and one of the tongues is held in each clamp in such a manner that the originally adjacent cut edges of the tongues form a straight line joining the centers of the clamps and the two tongues present opposite faces to the operator (see Fig. 1).

6.4 Set the crosshead in motion, and start the stopwatch when the specimen begins to tear.

6.5 Discontinue the test after 2 ± 0.5 min.

## 7. Report

7.1 Report the complete specimen identification, conditioning temperature, and relative humidity and the peak tear resistance for each specimen.

7.2 Calculate the average tear resistance for the last 1 in. (25 mm) of tear by surveying the area under the tear curve (load × displacement) by the tear length (displacement) to the nearest lbf (0.02 N).

7.3 Report whether the tear is a linear extension or runs off the line of the initial cut. Compute and report the average tear

resistance to the nearest 0.1 lbf/in. (0.02 kN/m) by measuring the area under the curve for the last inch torn and record for each specimen.

## 8. Precision and Bias

### 8.1 Precision:

8.1.1 *Repeatability*—Duplicate values by the same operator shall not be considered suspect unless they differ by more than 6.6 lbf/in. (1.2 kN/m).

8.1.2 *Reproducibility*—The values reported by each of two laboratories, representing the arithmetic average of five duplicate determinations, shall not be considered suspect unless they differ by more than 10.5 lbf/in. (1.8 kN/m).

8.2 *Bias*—There is no bias to this test method because tear resistance is defined by this test method.

## 9. Keywords

9.1 roofing membrane; tearing resistance; waterproofing membrane

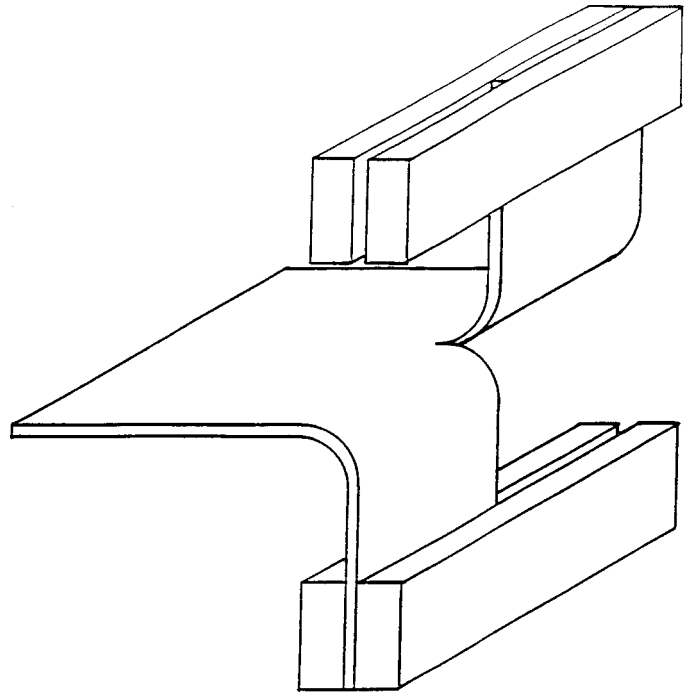


FIG. 1 Sample Mounted in Testing Machine

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