



Standard Test Method for Conducting Time-to-Failure (Creep-Rupture) Tests of Joints Fabricated from Nonbituminous Organic Roof Membrane Material¹

This standard is issued under the fixed designation D5405/D5405M; 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 laboratory determination of the time-to-failure (creep-rupture) of joints fabricated from nonbituminous organic roof membrane material. The test method covers both T-peel and lap-shear joints subjected to constant tensile load under controlled environmental conditions. The joints, made from either unreinforced or fabric-reinforced membrane material, are prepared in the laboratory or sampled from roofs in service.

1.2 Sheet materials from which the joints are fabricated include vulcanized rubbers, nonvulcanized polymeric sheets, and thermoplastics. The bonding methods for joint formation include the use of liquid-based adhesives, preformed tapes, and thermal and solvent weld processes.

1.3 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.

1.4 *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:²

D816 Test Methods for Rubber Cements
D907 Terminology of Adhesives

¹ This test method is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.18 on Nonbituminous Organic Roof Coverings.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

D1079 Terminology Relating to Roofing and Waterproofing
D1876 Test Method for Peel Resistance of Adhesives (T-Peel Test)

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D907 and D1079.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *creep-rupture test*—a test that measures the time-to-failure of a specimen subjected to a constant load; progressive specimen deformation may also be measured.

3.2.2 *failure*—rupture of the bond resulting in complete separation of its adherends under the test conditions; or, alternatively, rupture of the membrane material away from the bonded section of the test specimen (that is, material rupture).

3.2.3 *time-to-failure*—the period of time beginning when a joint specimen is placed under load and ending when failure occurs.

4. Summary of Test Method

4.1 This test method is a creep-rupture test without measurement of specimen deformation. The time-to-failure, in hours, of joints fabricated from nonbituminous organic roof membrane materials is measured when subject to constant deadweight loads under controlled temperature and humidity conditions.

5. Significance and Use

5.1 An important factor affecting the performance of joints of nonbituminous membranes is their ability to remain bonded over the membrane's expected service life. Time-to-failure tests provide a means of characterizing the behavior of joints under constant load over time.

5.2 Creep is a sensitive index of rheological properties that depend on material, load, temperature, and time. Time-to-failure data that are obtained over a relatively short time period can evaluate one factor affecting a joint's ability to withstand static loading over a relatively long time period.

5.3 Time-to-failure data for joints of nonbituminous organic roof membrane specimens can be used for the following: (1) to