



Designation: D4680 – 98 (Reapproved 2023)

Standard Test Method for Creep and Time to Failure of Adhesives in Static Shear by Compression Loading (Wood-to-Wood)¹

This standard is issued under the fixed designation D4680; 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 the determination of time-dependent properties of structural adhesives in wood-to-wood bonds when specimens are subjected to shearing stresses at various levels of static load, constant temperature, and relative humidity. Apparatus and procedures are provided for direct measurement of time-dependent shear deformation (creep) and time to failure of adhesive bonds under static load. Guidelines for selecting test conditions, methods for calculating creep rate, creep strain, creep modulus, and extrapolation of time to failure, are given along with methods of presenting these data.

1.2 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.

1.3 *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:*²

[D143 Test Methods for Small Clear Specimens of Timber](#)

[D905 Test Method for Strength Properties of Adhesive Bonds in Shear by Compression Loading](#)

¹ This test method is under the jurisdiction of ASTM Committee D14 on Adhesives and is the direct responsibility of Subcommittee D14.30 on Wood Adhesives.

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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.

[D907 Terminology of Adhesives](#)

[D2016 Methods of Test for Moisture Content of Wood](#)
(Withdrawn 1987)³

2.2 *ASTM Adjuncts:*

[Compression-Shear Creep Test Apparatus](#)⁴

3. Terminology

3.1 *Definitions:*

3.1.1 Many terms in these test methods are defined in Terminology [D907](#).

3.1.2 *creep, n*—the dimensional change with time of a material under load, following the initial instantaneous elastic or rapid deformation. Creep at room temperature is sometimes called cold flow.

3.1.3 *creep modulus, n*—the ratio of initial applied stress to creep strain.

3.1.4 *creep strain, n*—the total strain, at any given time, produced by the applied stress during a creep test.

3.1.4.1 *Discussion*—In this test method, creep strain is calculated by dividing displacement at any given time by the estimated apparent thickness of the adhesive bondline.

3.1.5 *rate of creep, n*—the slope of the creep-time curve at a given time.

3.1.6 *shear stress, n*—the stress component tangential to the plane on which the forces act, that is, in the plane of the bond line.

3.1.7 *strain, n*—the unit change, due to stress, in the size or shape of a body referred to its original size or shape.

3.1.8 *stress, n*—the force exerted per unit area at a point within the plane.

4. Significance and Use

4.1 Creep data that are obtained over a relatively short period of time in this test method can provide a measure of an adhesive bond's ability to withstand static loading in shear over a relatively long period of time. Creep measurements are made

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from ASTM International Headquarters. Order Adjunct No. [ADJD4680](#). Original adjunct produced in 1987.