



Designation: D7078/D7078M – 20

Standard Test Method for Shear Properties of Composite Materials by V-Notched Rail Shear Method¹

This standard is issued under the fixed designation D7078/D7078M; 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 the shear properties of high-modulus fiber-reinforced composite materials by clamping the ends of a V-notched specimen between two pairs of loading rails. When loaded in tension, the rails introduce shear forces into the specimen through the specimen faces. In comparison, the specimen of Test Method [D5379/D5379M](#) is loaded through its top and bottom edges. Face loading allows higher shear forces to be applied to the specimen, if required. Additionally, the present test method utilizes a specimen with a larger gage section than the V-notched specimen of Test Method [D5379/D5379M](#). In both test methods, the use of a V-notched specimen increases the gage section shear stresses in relation to the shear stresses in the vicinity of the grips, thus localizing the failure within the gage section while causing the shear stress distribution to be more uniform than in a specimen without notches. In comparison, Test Method [D4255/D4255M](#) utilizes an unnotched specimen clamped between two pairs of loading rails that are loaded in tension. Also, in contrast to Test Method [D4255/D4255M](#), the present test method provides specimen gripping without the need for holes in the specimen.

The composite materials are limited to continuous-fiber or discontinuous-fiber-reinforced composites in the following material forms:

1.1.1 Laminates composed only of unidirectional fibrous laminae, with the fiber direction oriented either parallel or perpendicular to the fixture rails.

1.1.2 Laminates of balanced and symmetric construction, with the 0° direction oriented either parallel or perpendicular to the fixture rails.

1.1.3 Laminates composed of woven, braided, or knitted fabric filamentary laminae.

1.1.4 Short-fiber-reinforced composites with a majority of the fibers being randomly distributed.

1.2 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.2.1 Within the text, the inch-pound units are shown in brackets.

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

[D792 Test Methods for Density and Specific Gravity \(Relative Density\) of Plastics by Displacement](#)

[D883 Terminology Relating to Plastics](#)

[D2584 Test Method for Ignition Loss of Cured Reinforced Resins](#)

[D2734 Test Methods for Void Content of Reinforced Plastics](#)

[D3171 Test Methods for Constituent Content of Composite Materials](#)

[D3878 Terminology for Composite Materials](#)

[D4255/D4255M Test Method for In-Plane Shear Properties of Polymer Matrix Composite Materials by the Rail Shear Method](#)

[D5229/D5229M Test Method for Moisture Absorption Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials](#)

¹ This test method is under the jurisdiction of ASTM Committee [D30](#) on Composite Materials and is the direct responsibility of Subcommittee [D30.04](#) on Lamina and Laminate Test Methods.

Current edition approved April 1, 2020. Published April 2020. Originally approved in 2005. Last previous edition approved in 2019 as D7078/D7078M – 19. DOI: 10.1520/D7078_D7078M-20.

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.