



Designation: D7792/D7792M – 23

Standard Practice for Freeze/Thaw Conditioning of Pultruded Fiber Reinforced Polymer (FRP) Composites Used in Structural Designs¹

This standard is issued under the fixed designation D7792/D7792M; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope*

1.1 In general, it is feasible that the mechanical properties of FRP composites will be affected by environmental conditions such as freeze/thaw cycling. In order to make reliable comparisons between different materials under freeze/thaw environmental conditions, it is necessary to standardize the freeze/thaw conditions to which specimens of these materials are subjected prior to and during testing. This practice defines procedures for freeze/thaw conditioning of pultruded FRP composites intended for use in structural design applications.

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, each system shall be used independently of the other. Combining values from the two systems has the potential to result in nonconformance with the 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

D618 Practice for Conditioning Plastics for Testing
D883 Terminology Relating to Plastics

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.18 on Reinforced Thermosetting Plastics.

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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.

D3918 Terminology Relating to Reinforced Plastic Pultruded Products (Withdrawn 2020)³
D6641/D6641M Test Method for Compressive Properties of Polymer Matrix Composite Materials Using a Combined Loading Compression (CLC) Test Fixture
D7290 Practice for Evaluating Material Property Characteristic Values for Polymeric Composites for Civil Engineering Structural Applications
D7745 Practice for Testing Pultruded Composites

3. Terminology

3.1 *Definitions:*

3.1.1 *standard laboratory temperature*—a temperature of $23 \pm 2^\circ\text{C}$ [$73.4 \pm 3.6^\circ\text{F}$].

3.1.2 *standard laboratory atmosphere*—an atmosphere having a temperature of $23 \pm 2^\circ\text{C}$ [$73.4 \pm 3.6^\circ\text{F}$] and a relative humidity of $50 \pm 10\%$.

3.1.3 *freeze/thaw resistance*—the ability of a thermoset pultruded composite to withstand repeated water exposure and subsequent freeze cycling for 100 freeze/thaw cycles. This ability will be quantified in terms of the % retention of the mechanical property of interest as compared to samples exposed to water for a comparable time without subsequent freeze/thaw cycling.

3.2 Terminology relating to pultruded composites is found in Terminology D3918.

4. Significance and Use

4.1 The freeze/thaw conditioning procedures prescribed in this practice are designed to provide a standard procedure to be used to evaluate and compare the effect of 100 freeze/thaw cycles under controlled laboratory conditions on pultruded FRP composites to be used in structural design applications. The conditioning procedures prescribed in this practice are designed to obtain reproducible results to compare and evaluate these materials but are not intended to produce equilibrium conditions or actual service conditions for these materials.

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

*A Summary of Changes section appears at the end of this standard