



Designation: D7992/D7992M – 15

# Standard Practice for Elevated Temperature and Moisture Conditioning of Pultruded Fiber Reinforced Polymer (FRP) Composites Used in Structural Designs<sup>1</sup>

This standard is issued under the fixed designation D7992/D7992M; 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 In general, it is feasible that the mechanical properties of FRP composites will be affected by environmental conditions such as exposure to moisture at elevated temperatures. In order to make reliable comparisons between different materials under elevated temperature and moisture environmental conditions, it is necessary to standardize the elevated temperature and moisture conditions to which specimens of these materials are subjected prior to and during testing. This practice defines procedures for elevated temperature and moisture conditioning of pultruded FRP composites intended for use in structural design applications. The conditioning medium representing elevated temperature and moisture exposure described in this standard practice is distilled water maintained at  $37.8 \pm 1.5^\circ\text{C}$  ( $100 \pm 3^\circ\text{F}$ ) for 1000 hours.

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 may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may 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 and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

- D618 Practice for Conditioning Plastics for Testing
- D3918 Terminology Relating to Reinforced Plastic Pultruded Products

<sup>1</sup> 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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<sup>2</sup> 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.

- 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, n*—a temperature of  $23 \pm 2^\circ\text{C}$  ( $73.4 \pm 3.6^\circ\text{F}$ )

3.1.2 *standard laboratory atmosphere, n*—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 *elevated temperature and moisture resistance, n*—the ability of a thermoset pultruded composite to withstand elevated temperature and moisture exposure at  $37.8 \pm 1.5^\circ\text{C}$  ( $100 \pm 3^\circ\text{F}$ ) for 1000 hours. This ability will be quantified in terms of the % retention of the mechanical property of interest as compared to samples held at standard laboratory atmosphere.

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

## 4. Significance and Use

4.1 The elevated temperature and moisture conditioning procedures prescribed in this practice are designed to provide a standard procedure to be used to evaluate and compare the effect of elevated temperature and moisture conditioning 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.

## 5. Sampling

5.1 Sampling shall be in accordance with the locations from which test specimens shall be taken from the reinforced pultruded composites as defined in Practice D7745.