



Standard Specification for Glass-Fiber-Reinforced Polyester Plastic Panels¹

This standard is issued under the fixed designation D3841; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers the classification, materials of construction, workmanship, minimum physical requirements, and methods of testing glass-fiber reinforced polyester plastic panels intended for use in construction. Panels for specialized or unique applications have the potential to require values significantly above or below those stated in this specification. Recommended practices for certain specific applications are included as **Appendix X1**. This specification is not intended to restrict or limit technological changes affecting performance when those changes are agreed upon between the purchaser and the seller.

1.2 Supplementary information on chemical resistance, resistance to heat, and installation practices are provided in **Appendix X1**.

1.3 The classification of these plastic panels into types based on relative response to a laboratory test shall not be considered a fire hazard classification.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in Tables and Figures) shall not be considered as requirements of this standard.

1.6 *Fire properties are determined by using laboratory flammability tests (Test Methods **D635**, **D1929**, and **E84**).*

1.6.1 This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products or assemblies under actual fire conditions.

1.6.2 Fire testing is inherently hazardous. Adequate safeguards for personnel and property shall be employed in conducting these tests.

¹ This specification is under the jurisdiction of ASTM Committee **D20** on Plastics and is the direct responsibility of Subcommittee **D20.24** on Plastic Building Products.

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1.7 The following precautionary caveat pertains only to the test method portion, Section 8 of this specification. *This specification 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 specification to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—There is no known ISO equivalent to this standard.

1.8 *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

- D570** Test Method for Water Absorption of Plastics
- D618** Practice for Conditioning Plastics for Testing
- D635** Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
- D638** Test Method for Tensile Properties of Plastics
- D696** Test Method for Coefficient of Linear Thermal Expansion of Plastics Between –30°C and 30°C with a Vitreous Silica Dilatometer
- D790** Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- D883** Terminology Relating to Plastics
- D1435** Practice for Outdoor Weathering of Plastics
- D1494** Test Method for Diffuse Light Transmission Factor of Reinforced Plastics Panels
- D1600** Terminology for Abbreviated Terms Relating to Plastics
- D1929** Test Method for Determining Ignition Temperature of Plastics
- D3892** Practice for Packaging/Packing of Plastics

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.

- D4364** Practice for Performing Outdoor Accelerated Weathering Tests of Plastics Using Concentrated Sunlight
- E72** Test Methods of Conducting Strength Tests of Panels for Building Construction
- E84** Test Method for Surface Burning Characteristics of Building Materials
- E631** Terminology of Building Constructions
- E831** Test Method for Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis
- E903** Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres
- E972** Test Method for Solar Photometric Transmittance of Sheet Materials Using Sunlight
- E1084** Test Method for Solar Transmittance (Terrestrial) of Sheet Materials Using Sunlight
- E1175** Test Method for Determining Solar or Photopic Reflectance, Transmittance, and Absorptance of Materials Using a Large Diameter Integrating Sphere
- G147** Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests
- G151** Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources
- G155** Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

3. Terminology

3.1 *General*—For definitions of terms used in this specification relating to plastics, refer to Terminology **D883**. For abbreviations used in this specification relating to plastics, refer to **D1600**. For definitions of terms in this specification relating to building constructions, refer to Terminology **E631**.

4. Classification

4.1 Light transmitting panels covered by this specification are divided into two types, based on relative response to a laboratory flammability test:

- 4.1.1 *Type CC1*.
- 4.1.2 *Type CC2*.

NOTE 2—Types CC1 and CC2 are classifications incorporated in the major model building codes. Panels used in other applications are also classified by major model building codes in accordance with appropriate chapters of those codes.

4.2 These types are further subdivided in accordance with **7.8** by grades based on relative response to weathering tests:

- 4.2.1 *Grade 1*—Weather resistance.
- 4.2.2 *Grade 2*—General purpose.

4.3 Within the classification of type and grade of plastic panel described in this specification are commercial products with the following variations as agreed upon between purchaser and supplier:

4.3.1 *Size (Length and Width)*—The most common nominal sizes currently available are 26 to 60 in. (66.0 to 152.4 cm) in width, and 6 to 16 ft (1.8 to 4.9 m) in length. Corrugated panels, to approximately 40 ft (12.2 m), and flat sheet in coils of longer lengths, are generally available.

4.3.2 *Surface Treatments*—Some manufacturers offer special surface treatments of various types for the purpose of improving durability. Individual suppliers can provide details.

4.3.3 *Light Transmission*—Refer to manufacturers' literature for range of transmission available.

4.3.4 *Solar Energy Transmission*—Refer to manufacturers' literature for range of transmission available.

4.3.5 *Color*—Refer to manufacturers' literature for range of colored products available.

4.3.6 *Load Deflection*—Refer to manufacturers' literature for load and deflection data on specific profiles.

4.3.7 *Weight Per Square Foot or Thickness*—Panels are generally designed and sold by weight per square foot, the most common of which are 4 through 12 oz (1.2 through 3.7 kg/m²). Other weights are available. Flat sheet is potentially designated and sold by either weight (as indicated above) or thickness, the most common of which are 0.030 through 0.125 in. (0.76 through 3.2 mm), as measured in accordance with **8.4.1**. Other thicknesses are available.

NOTE 3—Besides standard profiles, special or custom profiles may be developed.

5. Materials

5.1 The polyester resin used in the panels shall be a thermosetting styrenated and acrylated polyester resin composed of polymeric esters in which the recurring ester groups are an integral part of the main polymer chain. The resin shall be reinforced with glass fibers. The polyester resin is permitted to contain additives for various purposes, such as additives to provide low smoke density or high fire retardancy, catalyst residues, stabilizers, pigments, dyes, and fillers.

6. Workmanship, Finish, and Appearance

6.1 The panels will conform to the specific dimensions of the profile being produced and shall be fully cured. Panels shall not contain visual cracks, resin voids, foreign inclusions, or surface wrinkles that would impair the proper nesting of the corrugated panels, alter the specific dimensions of the panels, or otherwise affect their serviceability.

7. Physical Requirements

7.1 *Size (Length and Width)*—Tolerance on nominal length and width shall be ± 0.25 in. (± 6 mm) measured in accordance with **8.2**. Panels exceeding 16 ft in length shall have a length tolerance of $+0.75 -0.125$ in. ($+19 -3.2$ mm).

7.2 *Squareness*—Panels shall be within 0.125 in. (3.2 mm) of square when measured in accordance with **8.3**.

7.3 *Weight*—Tolerance on the specified weight of all panels shall be ± 10 % when determined in accordance with **8.4**.

7.3.1 *Thickness*—When a thickness requirement is specified for flat panels in place of standard weight per square foot, the tolerance shall be ± 10 % when determined in accordance with **8.4.1**.

7.4 *Profile*—The pitch and depth of the corrugations shall have the following tolerances: *Pitch* ± 0.0625 in. (± 5.2 mm) per square foot when measured in accordance with **8.5**, and *Depth* ± 0.0625 in. when measured in accordance with **8.6**.

7.5 *Color*—Color shall be uniform throughout the sheet when examined in accordance with **8.7**.