



# Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels<sup>1</sup>

This standard is issued under the fixed designation D5319; 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 This specification covers the classification, materials of construction, workmanship, physical requirements, and methods of testing glass-fiber-reinforced polyester composite wall and ceiling panels intended for use in light construction and semi-structural applications.

1.2 Supplementary information on chemical resistance, impact resistance, and installation practice are provided in [Appendix X1](#).

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

1.4 Laboratory flammability tests (Test Methods [E84](#) and [D1929](#)) applicable to this specification should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or conditions. However, results may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.

1.5 The intent of this specification is to define the class, grade, and general laminate properties of the composite wall and ceiling liner panels in order to ensure a quality product which will perform in the intended application. This specification is not intended to restrict or limit technological changes affecting performance when changes are agreed upon between the purchaser and manufacturer.

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

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

1.8 *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.*

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

## 2. Referenced Documents

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

[D374 Test Methods for Thickness of Solid Electrical Insulation](#)

[D618 Practice for Conditioning Plastics for Testing](#)

[D883 Terminology Relating to Plastics](#)

[D1600 Terminology for Abbreviated Terms Relating to Plastics](#)

[D1929 Test Method for Determining Ignition Temperature of Plastics](#)

[D2244 Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates](#)

[D3029 Test Methods for Impact Resistance of Flat, Rigid Plastic Specimens by Means of a Tup \(Falling Weight\) \(Withdrawn 1995\)<sup>3</sup>](#)

[E84 Test Method for Surface Burning Characteristics of Building Materials](#)

[E631 Terminology of Building Constructions](#)

## 3. Terminology

3.1 *General*—Definitions are in accordance with Terminologies [D883](#) and [E631](#) and abbreviations with Terminology [D1600](#), unless otherwise indicated.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *camber, n*—non-linearity of the long axis of a panel.

NOTE 2—In the process of water jet, knife, saw, or rotary shear trimming of a continuous panel, sideways motion of the panel through the cutting medium can be induced by imbalances in the system. The resulting trim cuts, although maintaining parallelism between the long sides, may

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

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

describe a continuous curve, rather than a straight line along the long axis of the panel. Imbalances in side-to-side cure rates or material distribution may also produce this phenomenon. This curvature of the long axis may create problems with installation of the panel. Limits are placed on the degree of non-linearity to minimize those problems.

#### 4. Classification

4.1 The panels covered by this specification are divided into four classifications based on relative response to the laboratory flammability of Test Method E84.

4.1.1 *Class A*—Flame spread index 0 to 25, smoke development index of 450 or less.

4.1.2 *Class B*—Flame spread index 26 to 75, smoke development index of 450 or less.

4.1.3 *Class C*—Flame spread index 76 to 200, smoke development index of 450 or less.

4.1.4 *Class D*—General purpose, no flame spread or smoke development indices.

NOTE 3—Refer to 1.3 on flammability testing and fire hazard classification.

4.2 These classifications may be further subdivided into grades based on nominal thickness when tested in accordance with 8.4:

4.2.1 *Grade 1*—0.027 to 0.033 in. (0.69 to 0.84 mm); 0.030 in. nominal (0.76 mm).

4.2.2 *Grade 2*—0.036 to 0.044 in. (0.91 to 1.12 mm); 0.040 in. nominal (1.02 mm).

4.2.3 *Grade 3*—0.040 to 0.050 in. (1.02 to 1.27 mm); 0.045 in. nominal (1.14 mm).

4.2.4 *Grade 4*—0.054 to 0.066 in. (1.37 to 1.68 mm); 0.060 in. nominal (1.52 mm).

4.2.5 *Grade 5*—0.067 to 0.083 in. (1.70 to 2.11 mm); 0.075 in. nominal (1.91 mm).

4.2.6 *Grade 6*—0.081 to 0.099 in. (2.06 to 2.51 mm); 0.090 in. nominal (2.29 mm).

4.2.7 *Grade 7*—0.108 to 0.132 in. (2.74 to 3.35 mm); 0.120 in. nominal (3.05 mm).

4.3 Within the classification of grade and class of composite panel described in this specification are commercial products with the following variations as agreed upon between the purchaser and manufacturer.

4.3.1 *Size (Length and Width)*—The nominal sizes available are 23.75 in. (603.25 mm) to 120 in. (3048 mm) in width and 47.75 in. (1212.85 mm) to 500 continuous feet of coil stock (152 m) in length.

4.3.2 *Thickness*—The nominal thicknesses available are 0.0303 in. (0.77 mm) to 0.120 in. (3.05 mm).

4.3.3 *Color*—Refer to manufacturers' literature for the range of colored product available.

4.3.4 *Surface*—The two most popular surfaces available are textured and smooth.

#### 5. Materials

5.1 The polyester resin used in the composite shall be a thermosetting polyester resin with cross-linking monomers 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 may contain additives for various purposes, such as additives to

provide lower smoke density or higher fire retardancy, catalyst residues, stabilizers, pigments, dyes, filters, or other types of reinforcing fibers.

#### 6. Physical Properties

6.1 *Size (Length and Width)*—Tolerance for nominal length and width specified shall be  $\pm 0.25$  in. (6.35 mm). Panel lengths over 12 ft (3.7 m) shall have a tolerance of  $\pm 0.5$  in. (12.7 mm) when measured in accordance with 8.2.

6.2 *Squareness*—Panels shall be within 0.125 in. (3.18 mm) of square when measured in accordance with 8.3.

6.3 *Thickness*—Tolerance on the specified thickness shall be within  $\pm 10\%$  when determined in accordance with 8.4.

6.4 *Camber*—Tolerance on camber shall be  $\pm 0.25$  in. (6.35 mm) when determined in accordance with 8.5.

6.5 *Color*—Color shall be as specified by the purchaser and uniform throughout the sheet when examined in accordance with 8.6.

6.6 *Impact Resistance*—Impact resistance shall be as agreed upon between the purchaser and manufacturer prior to purchase.

6.7 *Ignition Properties*—All panels shall have a minimum self-ignition temperature of 650°F (343°C) when tested in accordance with Test Method D1929.

6.8 All composite wall and ceiling liners shall have a USDA acceptance for incidental food contact.

#### 7. Workmanship

7.1 The composite shall conform to the nominal dimensions, shall be fully cured, and shall not contain major visual cracks, pinholes, foreign inclusions, or surface wrinkles that would impact or otherwise affect serviceability.

#### 8. Test Methods

8.1 *Conditioning*—Condition the test specimens in accordance with Procedure A of Method D618 where conditioning is required.

8.2 *Length and Width*—Lay the panel on the flat surface and measure with a steel tape. Measure the length on both sides and the center to the nearest 0.0625 in. (1.59 mm) and average the three measurements. Measure the width at each end and in the center to the nearest 0.0625 in. and average the three measurements.

8.3 *Squareness*—Any type of jig that has two rails perpendicular to one another, each length at least equal to the length of the side of the panel in contact with the rail, may be used to determine squareness. Place the panels in the jig so that the longest edge of the panel touches the horizontal rail along the entire length, and the vertical edge (shorter edge) touches the vertical rail at some point along the entire length. Measure the maximum distance between the vertical rail and the short edge of the panel at the corner opposite the one touching the rail. Measure to the nearest 0.0625 in. (1.6 mm). Rotate the panel 180° on the axis perpendicular to the face of the panel and repeat the test.

8.4 *Thickness*—Thickness readings shall be taken every 6 in. (152 mm) across the width and along the length of the panel. Measurements shall be taken with a large foot micrometer, having an anvil size of 0.5 in. (12.7 mm) minimum and accurate to 0.0001 in. (0.003 mm). Refer to Test Methods **D374**. Average all measurements for a final value.

8.5 *Camber*—Lay the longest edge of the panel beside a straightedge on a flat surface with both ends touching the straight edge. If necessary, rotate the panel 180°. Measure the greatest distance between the panel and the straightedge to the nearest 0.0625 in. (1.59 mm).

8.6 *Color*—Examine the panel visually from a distance of 10 ft (3 m) for color uniformity. Color tolerance may be checked using outdoor lighting or, in critical applications, a colorimeter using the Hunter L, a, b scale. Refer to Test Method **D2244**. Color tolerance shall be agreed upon between the purchaser and manufacturer.

8.7 *Impact Resistance*—Impact resistance shall be in accordance with Test Method **D3029**, Method G. Impact resistance shall be agreed upon between the purchaser and manufacturer.

8.8 *Burning Characteristics*—Determine burning characteristics and smoke development values in accordance with Test Method **E84**.

## 9. Inspection

9.1 Inspection and quality levels of the panels shall be as agreed upon between the purchaser and manufacturer.

## 10. Retest and Rejection

10.1 If any panel fails to meet the agreed upon requirements, a second set of specimens may be taken for retesting to establish conformity in accordance with the agreement.

## 11. Certification

11.1 Manufacturers shall supply certification of compliance with this specification in the form of a statement appended or affixed to invoices, or of labels affixed to panels or to wrappings, or other means agreed upon between the purchaser and manufacturer. In any form, the certification shall state as follows:

- 11.1.1 The name of the manufacturer,
- 11.1.2 The fact of conformance with this specification by number designation: ASTM D5319,
- 11.1.3 The nominal weight per square foot (square metre) or nominal thickness,
- 11.1.4 Type, and
- 11.1.5 Grade.

## 12. Packaging and Package Marking

12.1 *Packaging*—The panels shall be packed in containers so constructed as to ensure acceptance by common or other carriers for safe transportation to the point of delivery.

### 12.2 Marking:

- 12.2.1 Shipping containers shall be marked as agreed upon between the purchaser and manufacturer.
- 12.2.2 Labels on individual panels shall include Specification D5319, type, and grade.

## 13. Keywords

13.1 building construction; composite panels glass-fiber-reinforced polyester; laminates; wall and ceiling panels

## APPENDIX

### (Nonmandatory Information)

#### X1. SUPPLEMENTARY INFORMATION

X1.1 *Chemical Resistance*—Generally, glass-fiber-reinforced polyester plastic panels will provide satisfactory service for long periods of time. However, exposure to chemical atmospheres may cause greater color change and greater fiber exposure than exposure to normal conditions. Since it is impossible to describe all of the possible conditions of exposure to chemical atmospheres, it is recommended that specific exposure conditions be discussed with the panel manufacturer prior to purchase.

X1.2 *Impact Resistance*—Work is presently underway to develop a test method for impact resistance. Since there are many methods in determining the impact resistance of glass-fiber-reinforced polyester plastic panels, it is recommended that Test Method **D3029**, Method G, be used and the values be

**TABLE X1.1 Typical Physical Properties for Interior Wall and Ceiling Liner<sup>A</sup>**

| Property             | Value <sup>B</sup> , psi     | ASTM Test Method |
|----------------------|------------------------------|------------------|
| Flexural strength    | 8 000 to 10 000              | D790             |
| Flexural modulus     | 0.3 to 0.5 × 10 <sup>6</sup> | D790             |
| Tensile strength     | 6 000 to 8 000               | D638             |
| Compressive strength | 13 000 to 16 000             | D695             |

<sup>A</sup> This table is for reference purposes only. The values shown in **Table X1.1** reflect the typical performance criteria for application on smooth solid-wall surfaces, for example, plaster, gypsum board, poured concrete, concrete block, etc. Specialized applications may require values other than those stated in **Table X1.1**. For example, interior liner for cold storage may require higher values to minimize possible product failure in extreme conditions.

<sup>B</sup> For specific product values, refer to the manufacturers' published literature. All published physical property data shall report the test methods used to obtain the specific data.

agreed upon between the purchaser and manufacturer prior to purchase until the new method is developed.

X1.3 *Installation Practice*—The method of installation has a bearing on the performance of the composite in use. Consult the manufacturer’s recommendation for their products. In addition, a document *Fiber Glass Reinforced Panel Council*

*Installation Guide for On-Site Application of Wall and Ceiling Panels*<sup>4</sup> may be used.

X1.4 *Physical Properties*—See **Table X1.1**.

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<sup>4</sup> Developed by the SPI Composites Institute, 355 Lexington Ave., New York, NY 10017, April 1985.

## SUMMARY OF CHANGES

Committee D20 has identified the location of selected changes to this standard since the last issue (D5319–97(2008)) that may impact the use of this standard.

(1) Removed D4968 reference in Section 2.

Committee D20 has identified the location of selected changes to this standard since the last issue (D5319–92(2001)) that may impact the use of this standard.

(1) Revised the ISO equivalency note per Guide D4968.

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