



Designation: D8484 – 23

# Standard Specification for Plastic Lumber Materials and Wood-Plastic Composite Materials Used as Exterior Wall Coverings<sup>1</sup>

This standard is issued under the fixed designation D8484; 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 is applicable to the use of plastic lumber materials and of wood-plastic composite materials, and no other plastic composite materials, used as exterior wall coverings, as part of an exterior wall assembly.

1.2 This specification is not applicable to the use of plastic lumber materials or of wood-plastic composite materials contained in exterior wall assemblies when not used as part of the exterior wall covering.

1.3 This specification is not applicable to the use of any of the following types of materials:

(a) poly(vinyl chloride) (PVC) siding (see Specification D3679, for standard vinyl siding, or Specification D7793, for insulated vinyl siding),

(b) polypropylene siding (see Specification D7254),

(c) wood (including lumber, plywood, engineered wood, coated wood, or painted wood).

1.4 This specification is not applicable to the use of plastic lumber materials or of wood-plastic composite materials in any application other than the one addressed in 1.1. In particular, this specification is not applicable to the use of plastic lumber materials or of wood-plastic composite materials as exterior deck boards, stair treads, handrails, guards, or soffits.

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

1.6 *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.*

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

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.20 on Plastic Lumber.

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*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:<sup>2</sup>

D570 Test Method for Water Absorption of Plastics

D618 Practice for Conditioning Plastics for Testing

D883 Terminology Relating to Plastics

D3679 Specification for Rigid Poly(Vinyl Chloride) (PVC) Siding

D5206 Test Method for Windload Resistance of Rigid Plastic Siding

D6341 Test Method for Determination of the Linear Coefficient of Thermal Expansion of Plastic Lumber and Plastic Lumber Shapes Between –30 and 140°F (–34.4 and 60°C)

D6662 Specification for Polyolefin-Based Plastic Lumber Decking Boards

D7032 Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards, and Handrails

D7254 Specification for Polypropylene (PP) Siding

D7793 Specification for Insulated Vinyl Siding

E84 Test Method for Surface Burning Characteristics of Building Materials

E119 Test Methods for Fire Tests of Building Construction and Materials

E136 Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C

E176 Terminology of Fire Standards

### 2.2 Other Documents:

ASCE/SEI 7-2022 Minimum Design Loads and Associated Criteria for Buildings and Other Structures<sup>3</sup>

IBC 2024 International Building Code, 2024 Edition (IBC)<sup>4</sup>

<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> Available from American Society of Civil Engineers (ASCE), 1801 Alexander Bell Dr., Reston, VA 20191, <http://www.asce.org>.

<sup>4</sup> Available from International Code Council (ICC), 500 New Jersey Ave., NW, 6th Floor, Washington, DC 20001, <http://www.iccsafe.org>.

IRC 2024 International Residential Code, 2024 Edition (IRC)<sup>4</sup>

ICC-ES AC524 “Wood-plastic Composite Products Used as Exterior Siding”<sup>4</sup>

NFPA 268-2022 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source<sup>5</sup>

NFPA 285-2023 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components<sup>5</sup>

### 3. Terminology

#### 3.1 Definitions of Terms:

3.1.1 For definitions of terms used in this specification and associated with plastics issues refer to the terminology contained in Terminology D883. For definitions of terms used in this specification and associated with fire issues refer to the terminology contained in Terminology E176.

3.1.2 *plastic composite, n*— a material consisting of two or more distinct immiscible materials, at least one of which is a plastic. (Terminology D883)

3.1.2.1 *Discussion*—Codes identify plastic lumber and wood-plastic composites as plastic composites, for application as materials for exterior decking, stair treads, handrails, and guardrails. Codes define plastic composite as “a generic designation that refers to wood-plastic composites and plastic lumber.” Outside of code use, a wide variety of plastic composites exist, which are used for many applications. Such plastic composites can contain multiple types of fibrous fillers other than wood fibers (including glass reinforcements) or even contain no fibrous components. Plastic composites have in common only that they are composed of two or more constituent materials, one of which is a plastic. (Terminology D883)

3.1.3 *plastic lumber, n*—a manufactured product made primarily from plastic materials (filled or unfilled), typically used as a building material for purposes similar to those of traditional lumber, which is usually rectangular in cross-section. (Terminology D883)

3.1.3.1 *Discussion*—Plastic lumber is typically supplied in sizes similar to those of traditional lumber board, timber, and dimension lumber; however the tolerances for plastic lumber and for traditional lumber are not necessarily the same. (Terminology D883)

#### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *exterior wall assembly, n*—a system, including the exterior wall covering, framing and components, such as weather-resistive barriers, air barriers, and insulating materials, which provides protection of the building structural members, and conditioned interior space, from the detrimental effects of the exterior environment.

3.2.2 *exterior wall covering, n*—a material or assembly of materials applied on the exterior side of exterior walls for the purpose of providing a weather-resisting barrier, insulation or for aesthetics, including, but not limited to, veneers, siding, architectural trim, and embellishments.

3.2.3 *wood-plastic composite (WPC), n*—a composite made primarily from wood- or cellulose-based materials and plastic(s) (Specification D7032).

### 4. Significance and Use

4.1 Applicable codes or regulations contain the requirements for materials used in various applications. That typically includes performance requirements for the use of a variety of materials when used as exterior wall coverings, or when used as part of exterior wall assemblies.

4.2 This specification is intended to address the properties required for plastic lumber materials or for wood-plastic composite materials when intended to be used as exterior wall coverings, as part of exterior wall assemblies.

4.3 This specification does not apply to materials specifically identified in scope 1.2 through 1.4.

NOTE 2—This specification covers exclusively plastic lumber materials and wood-plastic composite materials used in exterior wall coverings. However, it is possible that some materials covered by this specification will have the same composition as some materials either identified by codes or regulations with other designations or used for other applications.

4.4 For the purposes of this specification a material that passes the requirements of Test Method E136 shall be considered noncombustible. This specification does not require materials to be tested for noncombustibility.

### 5. Performance Requirements

5.1 The material shall consist of a plastic lumber material or of a wood-plastic composite material.

5.1.1 Table 1 contains a listing of specific performance requirements for these materials.

5.2 *Conditioning*—Prior to testing, all specimens of plastic lumber materials or of wood-plastic composite materials shall be conditioned in accordance with Practice D618, Procedure A.

5.3 The plastic lumber material and the wood-plastic composite material shall comply with the wind load resistance requirements of the applicable code or regulation.

5.3.1 The allowable wind load resistance shall be based on the average ultimate test pressure determined from testing in accordance with Test Method D5206, divided by a minimum safety factor, The safety factor shall be:

(a) 2.5 where ultimate strength limit state is due to bending failure in the plastic lumber material or wood-plastic composite material and

(b) 3.0 where ultimate strength limit state is due to fastener pull-through, fastener withdrawal, or other connection-based failure. Strength reductions for end use conditions shall be applied, as applicable, in addition to the safety factor to determine the allowable wind load resistance. The allowable wind load resistance shall not exceed that associated with the allowable design values for fastener withdrawal.

NOTE 3—ICC-ES AC524 provides detailed guidance on determination of allowable wind load resistance, including applicability of strength reductions to account for use conditions.

5.3.2 Allowable design wind design pressures shall not exceed the allowable wind load resistance contained in the manufacturer’s published installation instructions.

<sup>5</sup> Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

**TABLE 1 Requirements for Plastic Lumber Materials and Wood-Plastic Composite Materials**

Property	Criterion	Source	Section
Conditioning	Report	Practice <b>D618</b> , Procedure A	<b>5.2</b>
Wind Load Resistance <sup>A</sup>	IBC or IRC	Test Method <b>D5206</b>	<b>5.3</b>
Coefficient of Linear Thermal Expansion <sup>B</sup>	Report only	Test Method <b>D6341</b>	<b>5.4</b>
Moisture and Temperature Effects	Pass	Subsection 4.5 of Specification <b>D7032</b>	<b>5.5</b>
Weatherability (UV Resistance)	Pass	Subsection 6.3 of Specification <b>D6662</b> or Subsection 4.6 of Specification <b>D7032</b>	<b>5.6</b>
Freeze-Thaw Resistance	Pass	Subsection 4.7 of Specification <b>D7032</b>	<b>5.7</b>
Biodeterioration <sup>C</sup>	Pass	Subsection 4.8 of Specification <b>D7032</b>	<b>5.8</b>
Flame Spread Index	Not to exceed 200	Test Method <b>E84</b>	<b>5.9</b>
Ignitability <sup>D</sup>	No sustained flaming	NFPA 268	<b>5.10</b>
Exterior Wall Assembly Fire Performance <sup>E</sup>	Pass	NFPA 285	<b>5.11</b>
Fire Resistance Rating <sup>F</sup>	No decrease in fire resistance rating of existing wall	ASTM <b>E119</b> or acceptable alternative analytical method	<b>5.12</b>

<sup>A</sup>The IBC and the IRC provide guidance on the selection of allowable design wind pressure. Chapters 26-30 of ASCE 7 provide guidance for determining wind loads for buildings or structures. Manufacturer's published installation instructions shall be followed.

<sup>B</sup>The coefficient of linear thermal expansion shall be determined and reported.

<sup>C</sup>Biodeterioration tests associated with termite exposure are not required if the material is not used within 6 in. of the ground and/or if the material contains no cellulosic components.

<sup>D</sup>The ignitability test requirement for sustained flaming shall apply only if required by the applicable code for the relevant fire separation distance.

<sup>E</sup>The NFPA 285 test requirements shall apply to the exterior wall assembly, but only if required by the applicable code. The exterior wall covering is not required to be tested for compliance to NFPA 285.

<sup>F</sup>If the exterior wall is required to exhibit a fire resistance rating, the exterior wall covering shall maintain the fire resistance rating requirement of the exterior wall. The exterior wall covering is not required to be tested for its fire resistance rating. The use of analytical methods to assess fire resistance rating is permitted.

NOTE 4—The International Building Code (IBC) and the International Residential Code (IRC), as applicable, provide guidance on the selection of allowable design wind pressure.

5.4 The plastic lumber material and the wood-plastic composite material shall be tested to determine the coefficient of linear thermal expansion in accordance with Test Method **D6341**. The coefficient of linear thermal expansion determined shall be reported.

5.5 The plastic lumber material and the wood-plastic composite material shall comply with the temperature and moisture effects requirements of Specification **D7032** (4.5).

NOTE 5—ICC-ES AC 524 specifies that the plastic lumber materials and the wood-plastic composite materials meet the moisture, temperature, UV resistance, and freeze-thaw requirements from Specification **D7032**. It states that the reductions discussed in 4.5, 4.6, and 4.7 of Specification **D7032** are to be applied, in addition to the appropriate safety factor, to determine allowable wind pressures.

5.6 The plastic lumber material and the wood-plastic composite material shall comply with the weatherability (UV resistance) requirements of Specification **D6662** (6.3) and with those of Specification **D7032** (4.6).

NOTE 6—Specification **D7032** requires accelerated weathering in accordance with Specification **D6662**.

5.7 The plastic lumber material and the wood-plastic composite material shall be evaluated for freeze-thaw resistance in accordance with **5.7.1** and **5.7.2**.

5.7.1 If the plastic lumber material or the wood-plastic composite material absorbs water as measured by Test Method **D570**, after a 24-hour room temperature immersion, and shows

(a) more than 5 % weight increase or

(b) warping or cracking, the plastic lumber material and the wood-plastic composite material shall comply with the requirements for freeze-thaw resistance of Specification **D7032** (4.7).

5.7.2 If the plastic lumber material or the wood-plastic composite material does not absorb water, warp, or crack, in accordance with **5.7.1**, freeze-thaw testing shall not be required.

5.8 The plastic lumber material and the wood-plastic composite material shall comply with the requirements for biodeterioration (termite and fungal decay resistance) of Specification **D7032** (4.8). The termite species to be assessed shall be Formosan termites, unless otherwise specified for a specific application. If the plastic lumber material does not contain any cellulosic components, these requirements do not apply.

5.8.1 Biodeterioration measurements associated with termite exposure are not required if the material is not used within 6 in. of the ground.

NOTE 7—Formosan termites are considered the types of termites with the most severe effects. When a species other than Formosan termites is used for the assessment, materials are not generally permitted to be used in areas subject to Formosan termite attack.

5.9 *Flame Spread Index*—The plastic lumber material and the wood-plastic composite material shall exhibit a flame spread index not exceeding 200 when tested in accordance with Test Method **E84** with the test specimen remaining in place ahead of the flame front during the test. The smoke developed index of the materials shall not be limited.

5.10 *Ignitability*—Where required by the applicable code, the exterior wall covering containing the plastic lumber material or the wood-plastic composite material shall not exhibit sustained flaming when tested to NFPA 268, for the relevant fire separation distance.

5.11 *Assembly Fire Testing*—Where required by the applicable code, when a plastic lumber material or a wood-plastic composite material, or both, is used as an exterior wall