



Designation: D7033 – 22

Standard Practice for Establishing Design Capacities for Oriented Strand Board (OSB) Wood-Based Structural-Use Panels¹

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INTRODUCTION

Oriented strand board (OSB) wood-based structural-use panels have been used in a variety of applications since the 1970s. OSB panels manufactured for use in North America generally comply with U.S. Department of Commerce Standard PS 2. Panels that comply with PS 2 are subjected to various kinds of qualification performance testing and ongoing quality assurance testing. While many panel applications are specified simply on the basis of meeting a given “span rating” as defined in PS 2, some construction and specialty applications may require a complete set of engineering design values. Based on the structural tests required by PS 2 (flexure), along with data for other properties, a set of baseline capacities has been available since 1988. As is customary for structural-use panels, design values will be discussed in this practice in terms of design capacities rather than design properties, where the difference is that a design property is expressed in units of stress (that is, pounds-per-square inch (newtons-per-square millimeter) and a design capacity is expressed in the engineering units of strength (that is, inch-pounds (newton-millimeters) of bending strength capacity, pounds (newtons) of tensile capacity, and so forth). The term “design values” will be used generically and can apply to either properties or capacities.

As uses for OSB wood-based structural-use panels extend into new applications, it becomes increasingly important that manufacturers, qualified agencies, and regulatory bodies reference a set of common, consensus-based procedures for establishment of design values. The purpose of this practice is to provide these common procedures.

1. Scope

1.1 This practice covers the basis for code recognition of design capacities for OSB structural-use panels. Procedures are provided to establish or re-evaluate design capacities for OSB structural-use panels in flatwise and axial applications. Design capacities for OSB structural-use panels in edgewise applications, such as rim board, are outside the scope of this standard. Procedures for sampling and testing are also provided. Design values stated as capacity per unit dimension are to be regarded as standard. Design capacities developed in accordance with this practice are applicable to panels intended for use in dry in-service conditions.

NOTE 1—This practice is based on ICC-ES Acceptance Criteria AC-182. Relative to the scope of AC-182, this practice is limited to OSB panels.

NOTE 2—While this practice makes reference to PS 2, this practice

applies similarly to products certified to other standards such as CAN/CSA O325.

NOTE 3—OSB produced under PS 2 is rated with the “Exposure 1” bond classification. Exposure 1 panels covered by PS 2 are intended for dry use applications where the in-service equilibrium moisture content conditions are expected to be less than 16 %. Exposure 1 panels are intended to resist the effects of moisture due to construction delays, or other conditions of similar severity. Guidelines on use of OSB are available from manufacturers and qualified agencies.

NOTE 4—PS 2-10 replaced the use of nominal thicknesses with a classification term known as Performance Category, which is defined in PS 2 as “A panel designation related to the panel thickness range that is linked to the nominal panel thickness designations used in the International Building Code (IBC) and International Residential Code (IRC).” Therefore, the PS 2 Performance Category should be considered equivalent to the term “nominal thickness” used within this standard.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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

¹ This practice is under the jurisdiction of ASTM Committee D07 on Wood and is the direct responsibility of Subcommittee D07.03 on Panel Products.

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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:²

- D9** Terminology Relating to Wood and Wood-Based Products
- D143** Test Methods for Small Clear Specimens of Timber
- D1037** Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
- D1761** Test Methods for Mechanical Fasteners in Wood and Wood-Based Materials
- D2718** Test Methods for Structural Panels in Planar Shear (Rolling Shear)
- D2719** Test Methods for Wood Structural Panels in Shear Through-the-Thickness
- D2915** Practice for Sampling and Data-Analysis for Structural Wood and Wood-Based Products
- D3043** Test Methods for Structural Panels in Flexure
- D3500** Test Methods for Wood Structural Panels in Tension
- D3501** Test Methods for Wood-Based Structural Panels in Compression
- D4442** Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials
- D4933** Guide for Moisture Conditioning of Wood and Wood-Based Materials
- D5456** Specification for Evaluation of Structural Composite Lumber Products
- D5457** Specification for Computing Reference Resistance of Wood-Based Materials and Structural Connections for Load and Resistance Factor Design
- D5764** Test Method for Evaluating Dowel-Bearing Strength of Wood and Wood-Based Products
- D6815** Specification for Evaluation of Duration of Load and Creep Effects of Wood and Wood-Based Products
- D7672** Specification for Evaluating Structural Capacities of Rim Board Products and Assemblies

2.2 Other Documents:

- ASD/LRFD Manual for Engineered Wood Construction**³
- CAN/CSA O325 Construction Sheathing**⁴
- CSA O86 Engineering Design in Wood**⁴
- ICC Evaluation Service Acceptance Criteria AC-182 Acceptance Criteria for Wood-Based Structural-Use Panels**⁵
- NDS ANSI/AWC National Design Specification for Wood Construction**³
- PS 2 Performance Standard for Wood Structural Panels, U.S.**

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.

³ Available from American Wood Council (AWC), 222 Catocin Circle SE, Suite 201, Leesburg, VA 20175, <https://www.awc.org>.

⁴ Available from Canadian Standards Association (CSA), 178 Rexdale Blvd., Toronto, ON Canada M9W1R3.

⁵ Available from ICC Evaluation Service, 3060 Saturn St. Suite 100, Brea, CA 92821.

Department of Commerce Voluntary Product Standard⁶

3. Terminology

3.1 *Definitions*—For definitions of terms related to wood, refer to Terminology **D9**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *baseline capacities, n*—capacities developed for OSB panels intended for use in applications that are not governed by building codes. As distinct from PS 2 and proprietary panels, documentation of baseline capacities is on the basis of test reports rather than evaluation reports or code reference. Example applications include, but are not limited to, concrete form and industrial panels.

3.2.2 *characteristic value, n*—a population mean, confidence interval, or tolerance limit estimated from the test data. The characteristic value is an intermediate value in the development of design values.

3.2.3 *design capacity, n*—a value that is a function of material design property and design section property.

3.2.4 *design property, n*—the stress-based design value derived by dividing design capacity by the design section property.

3.2.5 *oriented strand board (OSB), n*—a mat-formed panel product with oriented layers resulting in directional properties. Oriented strand board is comprised primarily of wood strands bonded with exterior adhesive formulations under heat and pressure. Design capacities are referenced to the primary and secondary structural axes, which typically correspond to the manufacturing machine and cross-machine directions, respectively. The primary direction is often referred to as the strength direction.

3.2.6 *primary axis, n*—the primary axis typically corresponds to the manufacturing machine direction and exhibits higher mechanical properties relative to the secondary axis. The primary axis typically corresponds to the eight-foot dimension of four-foot by eight-foot OSB.

3.2.7 *proprietary panels, n*—refers to OSB structural-use panels having proprietary design capacities as provided in an evaluation report issued by a code evaluation service.

3.2.8 *PS 2 panels, n*—refers to panels manufactured in accordance with PS 2.

NOTE 5—Design values for OSB certified to CAN/CSA O325 are published in CSA O86 Engineering Design in Wood. See CSA O86 for specific applications of OSB design values.

3.2.9 *secondary axis, n*—the secondary axis typically corresponds to the manufacturing cross-machine direction and exhibits lower mechanical properties relative to the primary axis. The secondary axis typically corresponds to the four-foot dimension of four-foot by eight-foot OSB.

3.2.10 *test cell, n*—the combined test data for a single span rating/property that is intended to characterize that sampling unit.

⁶ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401.