

#0SB-4051

SPECIFIER'S GUIDE

# WEYERHAEUSER DIAMOND<sup>™</sup> FLOOR PANELS

With Patented Down Pore® Self-Draining Technology

- Quick and Easy Installation
- Strong and Stable
- Self-Gapping
- Warranted Against Delamination
- 500-day No-Sand Guarantee
- 24" o.c., <sup>23</sup>/<sub>32</sub>" Performance Category—Structural 1 Rated





#### WHY USE WEYERHAEUSER DIAMOND<sup>™</sup> FLOOR PANELS?

#### Here's why-

- Self-gapping, tongue-andgroove edges
- Easy installation—panels go down flat and stay flat
- Consistent, reliable
   performance
- Use in conjunction with Trus Joist<sup>®</sup> TJI<sup>®</sup> joists for additional TJ-Pro<sup>™</sup> Rating points.
- Limited product warranties

#### Code Evaluations: ICC ES ESR-4133

The products in this guide are readily available through our nationwide network of distributors and dealers. For more information on other applications or other Weyerhaeuser products, contact your Weyerhaeuser representative.



Certified Sourcing www.sfiprogram.org SFI-00008

## WEYERHAEUSER DIAMOND<sup>™</sup> FLOOR PANELS ARE A BUILDER'S BEST FRIEND





No delamination. No sanding. We guarantee it.

A diamond is one of the hardest and most impervious materials on earth. And our Weyerhaeuser Diamond<sup>™</sup> panel lives up to that reputation: it's strong, durable and forged using time and pressure.

Weyerhaeuser pioneered the manufacture of enhanced subfloor panels, and as technology progressed, our scientists kept pace to deliver a new benchmark in performance: a panel that is tough, highly resistant to weather, and engineered to save you time and money with our easy-fit T&G edges.

Weyerhaeuser Diamond<sup>™</sup> floor panels can help you build the best floors possible, in the toughest of conditions.

- Fully sanded face for uniform thickness
- Limited lifetime warranty and 500-day no sand guarantee
- Includes patented Down Pore® self-draining technology
- Stamped with fastener markings for fast nailing
- · Bundles delivered face-up for easy handling on the job site
- · Proprietary edge seal provides superior edge swell resistance

## A GOOD THING IS EVEN BETTER WITH DOWN PORE® Self-Draining Technology

U.S. Patent: 8,333,044

Diamond<sup>™</sup> floor panels include Down Pore<sup>®</sup> technology, a patented, self-draining feature that allows rainwater to drain from the floor. If your site sees a hard rain after Diamond<sup>™</sup> flooring is installed, the water is channeled through the panel and off the joists below. No more sweeping off water, no more drilling holes in the floor to let it through, and less time spent waiting for flooring to dry before installing finish material.



**DOWN PORE** SELF-DRAINING TECHNOLOGY

#### **Size and Availability**

²¾₂" Diamond™ floor panels are available at select Weyerhaeuser Distribution Centers. Contact your Weyerhaeuser representative for availability in your area.

#### **Product Specifications**

Diamond<sup>™</sup> floor panels are manufactured to meet the requirements of Voluntary Product Standard PS 2, which is recognized by the International Building Code (IBC) and the International Residential Code (IRC). They are also evaluated by ICC-ES for properties superior to those established under PS 2, and are Structural 1 Rated for 24" o.c., <sup>23</sup>/<sub>32</sub>" performance category panels.

Down Pore<sup>®</sup> drainage grooves do not affect the use of Diamond<sup>™</sup> floor panels in fire-rated assemblies.

Minimum quantities may be required for some orders. Contact your Weyerhaeuser representative for information.

# **DESIGN PROPERTIES**

In most applications, Diamond<sup>TM</sup> floor panels will be specified based on the span rating of the panel. However, in some uses, engineers will require actual design values to support application-specific engineering calculations. The **Design Values** table below provides proprietary code-evaluated properties superior to PS 2.

The panel design values do not need to be adjusted for panel grade or construction. However, they must be adjusted for duration of load (DOL) and creep when appropriate, and may also require other adjustments that are not shown in this guide. Refer to the current *ASD Manual for Engineered Wood Construction* for applications with elevated moisture or temperatures, applications that require preservative or fire-retardant treatment, or for panels less than 24" in width.

**Creep:** Under constant load, the deflection of wood-based products generally increases over time—a phenomenon known as creep. In typical applications, with relatively low dead loads, it is not necessary to consider creep in the design process. However, when the potential for creep exists—specifically, when a permanent or constant load will stress the panels to one-half or more of their design strength capacity—an adjustment to the deflection calculations should be made. For Diamond<sup>TM</sup> panels in dry-use conditions, apply the creep adjustment factor ( $C_c = 0.50$ ) to the panel stiffness.

#### **Design Values for Diamond<sup>™</sup> Floor Panels** (100% Load Duration)

	Span rating		=	24" o.c	Structural 1
	Performance Category		=	23	/32"
	Strength axis <sup>(1)</sup>		=	Primary	Secondary
Bending	Moment capacity (Ib-in./ft of width)	$F_bS$	=	1,360	790
Denuing	Stiffness (Ib-in.²/ft of width)	EI	=	395,000	170,000
	$\begin{array}{llllllllllllllllllllllllllllllllllll$	380	380		
Shear	Rigidity through-the-thickness (Ib/in. of panel depth)	$G_{\nu}t_{\nu}$	=	93,000	93,000
	Shear capacity through-the-thickness (Ib/in. of shear-resisting panel length)	$F_\nu t_\nu$	=	215	215
	Axial tension capacity (Ib/ft of width)	$F_tA$	=	3,350	2,550
Axial	Axial compression capacity (Ib/ft of width)	F <sub>c</sub> A	=	5,000	4,300
	Stiffness (Ib/ft of width x10 <sup>6</sup> )	EA	=	6.5	4.6

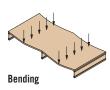
(1) The primary strength axis is the long direction of the panel unless otherwise noted. **Bold italic** values are proprietary design values. Refer to ICC ES ESR-4133

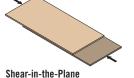
## Nail or Screw Design Values

- Design values for nails or screws used with Diamond<sup>™</sup> panels can be computed by engineers using the same NDS<sup>®</sup> procedures used for other structural wood products.
- For withdrawal, use equivalent Specific Gravity (SG) as follows: smooth- or screw-shank nails = 0.45, ring-shank nails = 0.70, wood screws = 0.45. Design values for nail or screw withdrawal resistance are shown in NDS® Table 12.2B (screws) and Table 12.2C (nails).
- For lateral resistance, use equivalent Specific Gravity (SG) = 0.51. Design values for nail or screw lateral resistance are found in NDS<sup>®</sup> Tables 11L (screws) and 12N (nails).

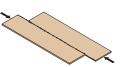
#### **Table General Notes**

- Value must be adjusted for duration of load, creep, elevated moisture or temperature, or for panels less than 24" in width when appropriate. Refer to the current *Manual for Engineered Wood Construction*.
- Values do not need to be adjusted for panel grade or construction.



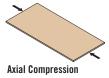


Snear-In-the-Plane (Rolling or Interlaminar Shear)



Shear-through-the-Thickness





# **APPLICATION ADJUSTMENT FACTORS**

## **Span Adjustments**

	2-Span to 1-Span	3-Span to 1-Span
Deflection	0.42	0.53
Moment	1.00	0.80
Shear	1.25	1.20

 When adjusting uniform loads based on strength from the Allowable Uniform Loads table on page 4, use the span adjustment factor for moment.

 When adjusting uniform loads calculated from the equations on page 5, use the appropriate corresponding factor.

#### **Duration of Load (CD)** (Applies to strength capacities)

Permanent load (over 10 years)	0.90
Occupancy live load	1.00
2 months, as for snow	1.15
7 days	1.25
Wind or earthquake	1.60
Impact	2.00

#### **Creep Adjustment Factor (C<sub>C</sub>)** (For permanent loads)

Moisture Condition	OSB
Dry	0.50

 When a permanent or constant load will stress a panel to ½ or more of its design strength capacity, adjust the deflection calculation by applying the creep adjustment factor (C<sub>c</sub>) to the panel stiffness (EI) found above.

### Panel Section Properties<sup>(1)</sup>

			<sup>23</sup> / <sub>32</sub> "
Approximate weight (psf)		=	2.6
Average Nominal thickness (in.)	t	=	0.73
Area (in.²/ft)	А	=	8.76
Moment of inertia (in.4/ft)	I	=	.389
Section modulus (in. <sup>3</sup> /ft)	S	=	1.066
Statical moment (in. <sup>3</sup> /ft)	Q	=	.799
Shear constant (in.²/ft)	Ib/Q	=	5.84

(1) Properties based on rectangular cross section of 1' width.

Geometric properties are calculated on a per-foot-of-panel width basis. These properties may be used to find design stresses when required. To do so, divide the design capacity by the applicable section property.

> Diamond<sup>™</sup> panels are intended for dry-use applications

## Allowable Uniform Loads (PSF) for Diamond<sup>™</sup> Floor Panels (100% Load Duration)

			Span												
Span Rating	Performance Category	Load Calculation Based on <sup>(1)(2)</sup>					Orientati pendicula							gth Axis Pa o Support	
		buoou on	12"	16"	19.2"	24"	30"	32"	36"	40"	48"	60"	12"	16"	24"
24" o.c.	23/32"	Deflection	1,718	646	354	171	84	68	60	43	28	14	740	278	94
24 0.0.	-9/32	Strength	724	524	429	283	181	159	101	82	57	36	658	370	132

(1) Deflection calculation based on L/360 deflection limit. The allowable load for other deflection limits can be computed as follows:

for L/240 limit, multiply by 1.5

- for L/180 limit, multiply by 2.0 - for L/480 limit, divide by 1.5

(2) Strength calculation based on the minimum of bending or shear.

## **General Notes**

- Table is based on:
  - Uniform loads. See PS 2 and local building codes for concentrated load and other requirements.
  - Untreated Exposure 1-rated panel in dry conditions.
  - Typical sheathing applications such as floors, walls, and roofs.
  - 2x supports for span configurations less than 48" on-center. Support width effects have been considered.
  - 4x supports for span configurations equal to or greater than 48" on-center. Support width effects have been considered for shear and deflection calculations. Moment calculations do not consider support width effects.

#### For Strength Axis Perpendicular to Supports:

- 3-span condition is assumed for spans of 32" or less.
- 2-span condition is assumed for spans greater than 32".
- -1-span condition requires the use of the span adjustment factor on page 3.
- For Strength Axis Parallel to Supports:
  - 3-span condition is assumed for spans of 16" or less.
  - 2-span condition is assumed for spans of 24".
  - -1-span condition requires the use of the span adjustment factor on page 3.

## A Note About Floor Performance

Floor panels are an important component in creating a floor that feels good to customers. The superior properties of a Diamond<sup>™</sup> floor can enhance floor performance when compared to an OSB floor of similar thickness. To meet higher customer expectations, floor performance can also be enhanced in other ways:

- Glue and nail flooring for improved connections to help resist vibrations, minimize nail pops, and transfer loads more evenly. Weyerhaeuser recommends using solvent-based subfloor adhesives that meet ASTM D3498 (AFG-01) performance standards. When latex subfloor adhesive is required, careful selection is necessary due to a wide range of performance between brands.
- Use stiffer joists or a narrower joist spacing.

Choosing the optimal combination of these parameters can be difficult. To predict floor performance and evaluate the relationship between the cost and the "feel" of a floor, use Trus Joist<sup>®</sup> TJ-Pro<sup>™</sup> Ratings.

#### About TJ-Pro<sup>™</sup> Ratings

A poor performing floor can harm a builder's image, compromise build efficiency, and cost money. That's why we developed TJ-Pro™ Ratings. For over 50 years builders have looked to the Trus Joist® name for guidance on floor performance, and our decades of proven success with TJ-Pro<sup>™</sup> Ratings is one of the biggest reasons why.

#### How Does TJ-Pro<sup>™</sup> Ratings Work?

Point values up to 65 are assigned using complex algorithms based on field and laboratory research conducted on over 600 floor system assemblies. It also considers other key factors that affect floor performance, including:

- Basic stiffness (a combination of joist depths and span)
- Joist spacing and deck stiffness
- · Wall support versus beam support, which tends to feel less stiff
- Composite action (careful nailing and adhesives can improve stiffness)
- Non-bearing partition walls, which can help dampen vibration
- Directly applied ceilings
- Use of bridging or blocking

Point ranges can then be regularly correlated to performance expectations for each type of customer.

> At a rating of 45 points, customer satisfaction is 84%. At 65 points, it's nearly 100%.



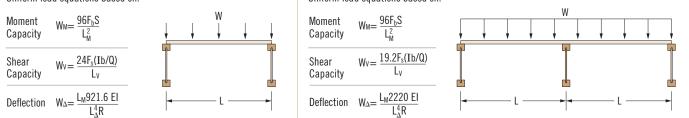
# **CALCULATING UNIFORM LOADS**

### **One-Span Equations**

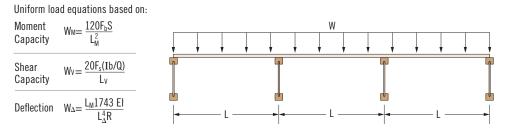
Uniform load equations based on:

## **Two-Span Equations**

Uniform load equations based on:



### **Three-Span Equations**



The equations above are based on one-way "beam" action. They are provided to help develop allowable uniform loads based on moment, shear, and deflection as applied to one-, two-, and three-span conditions. Loads derived from the equations provided are assumed to be applied over full-size panels in normal sheathing applications. The following definitions apply:

- $\Delta$  ..... deflection (in.)
- El ..... design bending stiffness capacity (lb-in.<sup>2</sup>/ft)
- $F_bS$   $\ldots\ldots$  design moment capacity (lb-in./ft)
- F<sub>s</sub>(Ib/Q)... design shear capacity (lb/ft)
- L ..... span (in.)
- $L_M$  ..... span, center-to-center of supports, used for moment calculation (in.)
- $L_V$  ..... clear span, used for shear calculation (in.)
- $L_\Delta$   $\hdots$  ..... clear span plus SW, used for deflection calculations (in.)
- R  $\ldots\ldots$  denominator of chosen deflection limit. Example: deflection limit = L/360 then R = 360

#### **Example Problem**

Find the maximum allowable uniform load (psf) for  $^{23}\!\!/_{2}$  " Diamond  $^{\rm TM}$  flooring over 16" on-center joists.

#### Assumptions

- 24" o.c. span-rated flooring
- Full 4'x8' panel
- $-\,$  Strength axis perpendicular to joists
- Use 3-span equations
- Joist Spacing = 16" o.c.
- Joist Width = 1.5"
- Deflection = L/360

Locate panel design values for moment, shear, and stiffness on page 3. Moment capacity (primary) =  $F_bS = 1,360$  lb-in./ft of width

Shear capacity (in-the-plane) =  $F_s(Ib/Q)$  = 380 lb/ft of width Stiffness = EI = 395,000 lb-in.<sup>2</sup>/ft of width

1 Calculate Allowable Uniform Load Based on Moment Capacity  $W_M = 120F_bS/L_M^2$ 

Calculate appröpriate span for moment (center-to-center),  $L_M = 16$ " Using:  $F_bS = 1,360$  lb-in./ft and  $L_M = 16$ "  $W_M = 120 \times 1,360/16^2$  $W_M = 638$  psf

#### SW .... support width factor:

- 0.25 for 2x nominal lumber
- 0.625 for 4x nominal lumber
- For additional information refer to the current *Manual for Engineered* Wood Construction
- W .... uniform load (psf)
- $W_{M} \ \ldots \ uniform$  load based on moment capacity (psf)
- $W_V \ \ldots \ uniform$  load based on shear capacity (psf)
- $W_\Delta$   $\ldots$  . uniform load based on deflection (psf)
- 2 Calculate Allowable Uniform Load Based on Shear Capacity  $W_V = 20F_S(Ib/Q)/L_V$

Calculate appropriate span for shear (clear span),  $L_V=16"\text{-}1.5"=14.5"$  Using:  $F_S(\mathrm{Ib}/\mathrm{Q})=380$  lb and  $L_V=14.5"$  Wy =20 x 380/14.5  $\textit{W}_V=524~\textit{psf}$ 

3 Calculate Allowable Uniform Load Based on Deflection  $\label{eq:W_a} = L_M \ 1743 \ El/L_{\Delta}^4 R$  SW = 0.25 (from above)

Calculate appropriate span for deflection (clear span + SW),  $L_{\Delta} = 14.5^{"} + 0.25^{"} = 14.75^{"}$ Using:  $L_{M} = 16^{"}$ , R = 360, and EI = 395,000 lb-in<sup>2</sup>/ft  $W_{\Delta} = (16 \times 1743 \times 395,000)/(14.75^{4} \times 360)$  $W_{\Lambda} = 646 \text{ psf}$ 

4 Compare Calculated Allowable Uniform Loads Calculated allowable uniform loads based on strength:  $W_M = 638 \text{ psf}$  $W_V = 524 \text{ psf}$  $W_V \text{ controls}$ 

Calculated allowable uniform load based on deflection:  $W_{\Delta} = 646 \mbox{ psf}$ 

# **PRODUCT STORAGE AND HANDLING**

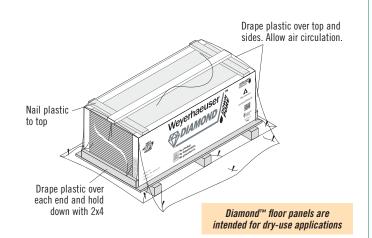
Like any wood product, wood-based panels are at risk of fungal decay or rot if exposed to repeated wetting or high-moisture environments. Panels that are exposed to such conditions may deteriorate, lose strength, or support mold growth, so protection from these conditions must be provided.

Use a platform made from cull panels and scrap lumber supported by stickers that extend across the width of the stack, and keep panels at least 4" from the ground. Put one sticker in the center of the load and the others approximately 12" from each end. When covering the panels, drape plastic over the ends of the stack and secure it. Then drape plastic over the top and sides of the stack; stake it to the ground, pulling the ends away from the product to allow air circulation along the sides of the stack.

Handle Diamond<sup>m</sup> floor panels in a flat orientation. Protect the edges and ends from damage, keep the load level, and lift the stack from the center.

#### **Exposure 1 Bond Classification**

Diamond<sup>™</sup> floor panels are manufactured to an Exposure 1 bond classification. Exposure 1 panels are suitable for uses where they are not permanently exposed to the weather; they are intended to resist the effects of moisture on structural performance due to construction delays or other conditions of similar severity.



WARNING: Drilling, sawing, sanding or machining wood products generates wood dust. The paint and/or coatings on this product may contain titanium dioxide. Wood dust and titanium dioxide are substances known to the State of California to cause cancer. For more information on Proposition 65, visit wy.com/inform.

# **PRODUCT WARRANTY**

LIMITED LIFETIME STRUCTURA	L & 500-DAY NO SAND WARRANTY
Weverhaeuser Diamon	dTM.
	u.
Floor Panels	
What is Covered?	For edge sanding covered by this warranty, Weyerhaeuser will pay for two
Weyerhaeuser Diamond <sup>14</sup> foor panels (Diamond panels), when properly	times (2k) the reasonable cost of sanding the affected area only, not to exceed reasonable labor and tool time costs. All claims must be made and
installed as single-layer fooring in a home, is warranted by Weyerhaeuser NR Company (Weyerhaeuser) against delamination for the lifetime of the	warranty work allowed to be completed prior to the installation of the initial
home. Further, Weverhamuser Diamond <sup>TM</sup> panels are warranted for five	foor covering.
hundred (500) days following delivery of the panels to the job site against the need for edge standing due to edge swell caused by water absorption.	Weyerhaeuser's total liability will not exceed the original cost of the foor and the reasonable cost for removal of existing fooring materials when a
This limited warranty is transferrable and applies to any current owner of a	valid delamination claim is made.
home in which the Weyerhaeuser Diamond™ panels are installed.	What You Must Do
Definition of Covered Conditions	You must notify Weyerhaeuser in writing of any claim under this warranty
Determination is defined as an extensive separation of strands within a panel, which results in a reduction of the structural capacity of the panel.	within thirty (20) days of the discovery of warranted delamination or edge swell requiring edge sanding at the following address:
Minor localized edge checking or loose strands on the surface of the	Weiverhamster Wood Products
panel does not constitute delamination. This warranty does not cover the performance of Weverhaeuser Diamond <sup>14</sup> panels outside the U.S. and	Atts: Product Assurance 220 Occidental Avenue South
Canada, or delamination due to:	
· Prolonged exposure to water before, during or after completion of	Email: Prodikesur0580Weyerhaeuser.com Upon mouest, vou must provide Weverhaeuser with reasonable proof of
construction. • Fire, floods, or man-made or natural disaster.	product identification in the form of a panel sample, a photograph of the
Hee, toode, or man-made or natural deaster.     Manufacturing or construction defects in the home.	large identifying stamp on each panel, or dated receipt.
Demage to or improper maintenance of the panel prior to or during	A Weyerhawware representative must be given the opportunity to inspect the floor prior to any alteration, change or regain.
installation.	
<ul> <li>Noncompliance with installation instructions, applicable building</li> </ul>	Incidental or Consequential Damages
cade, or generally accepted construction practices. Demage to or improper maintenance of the finished foor covering.	Weyerhaeuser's sole responsibility for detamination or edge standing is as set forth in this warranty and Weverhaeuser will not be responsible for
	incidental, indirect, or consequential damages. Some states and provinces
Note:	do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.
Delamination is not caused by wood fungal decay or not. Like any wood product, all wood-based panels may be at risk for fungal decay or not when	State Law Rights
exposed to repeated wetting or highmoleture environments, particularly Y	State Law Rights This warranty gives you specific legal rights, and you may also have other
not properly ventilated. For this reason, manufacturing design, and use features must ensure Weverhaeuser Diamond <sup>TM</sup> panels are protected from	rink warranty give you specific legal rights, and you may also have other rights, which vary from state to state and province to province.
such exposure by appropriate finish coverings for floor and wall systems.	
This warranty does not cover mold, fungal decay, or rst.	
What Weyerhaeuser Will Do	Weverhaeuser 1
For delamination covered by this warranty, Weyerhaeuser will pay for the repair or replacement of the single-laver flooring inxcluding removal and	weyennaeuser A
replacement of cabinetry). This includes the single-layer flooring and foor	₩ DIAMOND
covering at wholesale cost, and the reasonable cost of labor.	v6*
	a Diamondia a basismasi of Weambaryaw NR. 0 2017 Weambaryaw NR Company, Mirishis reserves.

Visit weyerhaeuser.com/woodproducts/warranty for copies of this and other Weyerhaeuser product warranties.

Contact your local representative or dealer at:

#### **CONTACT US**

1.888.453.8358 • weyerhaeuser.com/woodproducts/contact

October 2017 • Reorder OSB-4051

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