



Integrated Sheathing Systems

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PA Building Contractor Outreach Survey

- **Take the survey today!** Your input is valuable and appreciated. **The survey will close after May 15.**
- The purpose is to assess building contractors' knowledge or & experience with weatherization; identify stakeholders; identify worker recruitment opportunities & challenges; and more.

<https://bit.ly/PABuildingSurvey>



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Description

With the extensive types of sheathing now available, typical installation methods may need to be revisited. In this session, we will review different types of integrated sheathing systems, their installation methods and how they may deviate from the installation of standard wood structural panels, and the critical installation details that must be followed to reduce the risk of building enclosure failure.



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Learning Objectives

1. Review the specific installation instructions for integrated sheathing systems related to the structural specifications.
2. Review the specific installation instructions for integrated sheathing systems related to the water resistive barrier specifications.
3. Identify how integrated sheathing systems can provide a comprehensive option to standard wood structural sheathing.
4. Understand how integrated sheathing systems can provide an alternative to conventional wood structural sheathing, air barrier, and WRB layers, which can provide a holistic approach to providing control layers with the installation of one product.



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Disclaimer

- No individual product or method is being promoted in this webinar. Products and methods should be selected based on the designed assembly.



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First Things First, Sheathing?



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Plywood

- **Composition:**

- Thin wood veneers (plies) glued together so that each layer of veneer is perpendicular to that of the adjacent layers (cross-lamination)

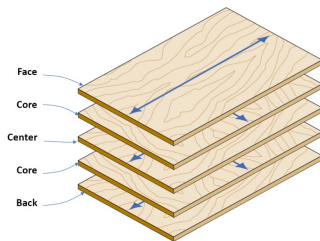
- **Common uses:**

- Sheathing
- Subfloor



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Plywood



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Oriented Strand Board (OSB)

- **Composition:**

- Wood strands bonded together under heat and pressure

- **Common uses:**

- Sheathing
- Subfloor



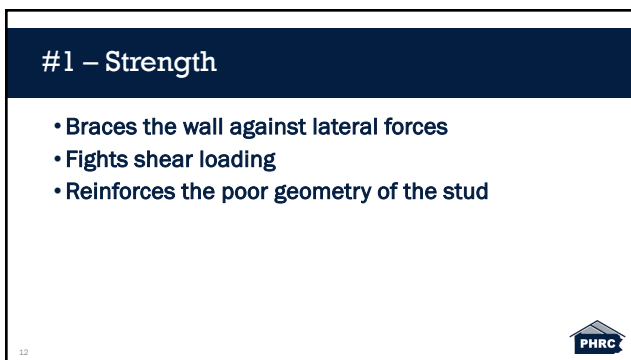
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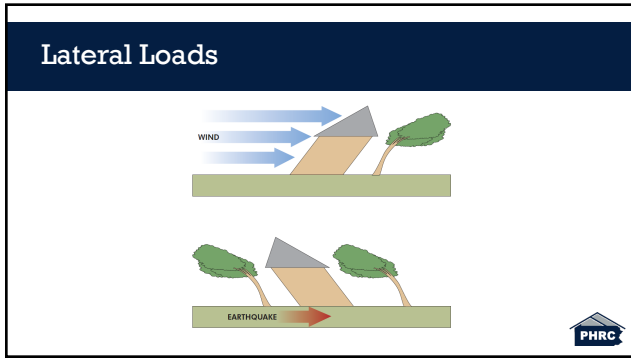
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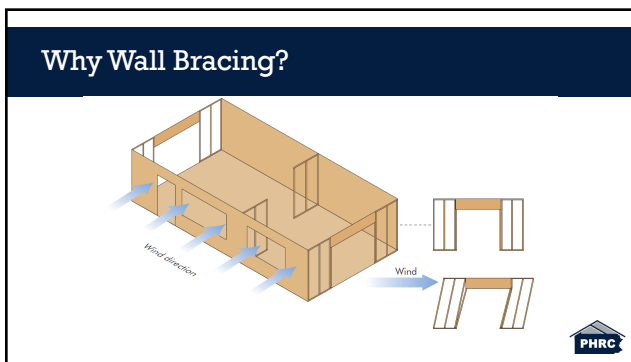
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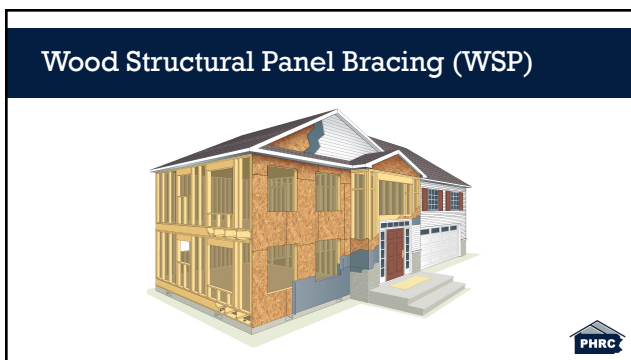
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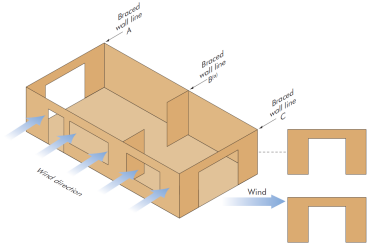


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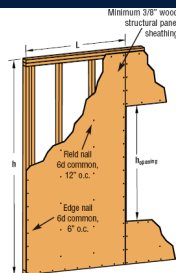
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Braced Wall Lines



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Wood Structural Panel



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#2 – Encloses the Building

- **Standard Wood Structural Sheathing**
 - Air Barrier?
 - Water Resistive Barrier?
- **Integrated Sheathings**
 - Air Barrier?
 - Water Resistive Barrier?

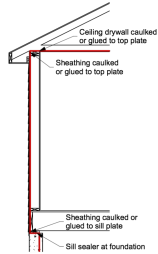


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Air Barrier - Sheathing Method

- Is the sheathing continuous?
- Where are the trouble spots?
- All sheathing joints taped or sealed by other means
- Seal or caulk at rough openings (windows/doors)



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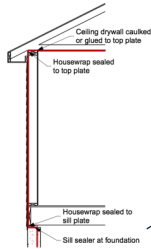
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Housewrap Method

- Housewrap installed with cap nails/cap staples
- All housewrap seams/joints taped or sealed
- Seal or caulk at rough openings (windows/doors)
- Continue housewrap over rim board/floor system
- Tape or seal housewrap to top plate and sill plate



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#3 Nailing Surface

- Rainscreens
- Siding
- Trim

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What is an Integrated Sheathing System?

- Wood structural panels with a built in, protective layer that can remove the need for an additional layer of house wrap or building paper under most circumstances. There may be installations of specific assemblies that can require additional control layers.

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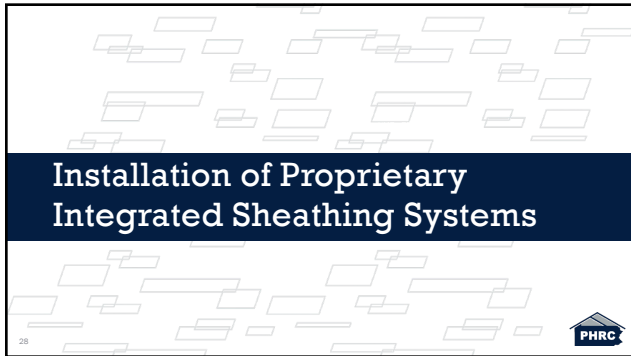


Looking at 3 Manufacturers

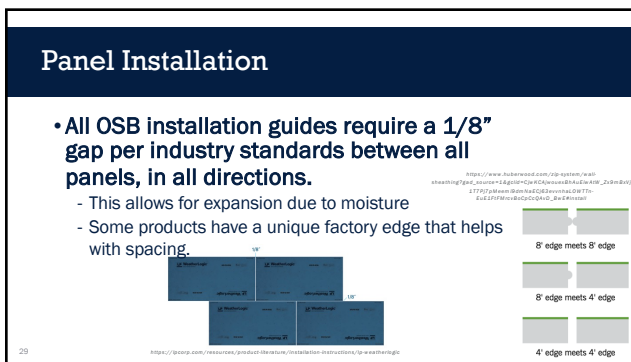
- Huber Zip System
- LP WeatherLogic
- GP ForceField



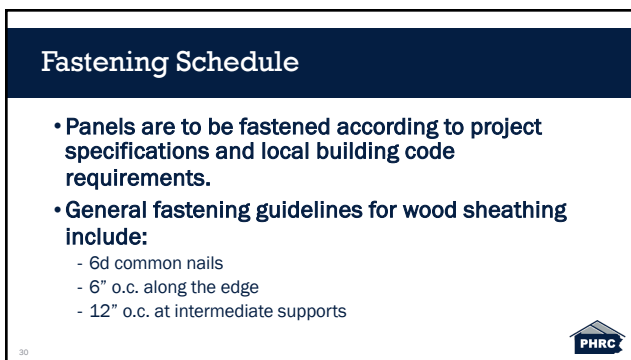
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Overdriven Fasteners (Zip)

• Structural concern?

How do overdriven fasteners affect the structural integrity of the sheathing?

The American Plywood Association (APA) and PFS TECO recommend either reducing allowable shear capacities or installing extra fasteners if any fastener is more than 1/8" overdriven or if more than 20% of fasteners are overdriven between 1/16" and 1/8".

• WRB concern?

Do overdriven fasteners void the ZIP System® sheathing warranty or need to be taped over?

Overdriven fasteners do not necessarily void the ZIP System® sheathing warranty. However, when a fastener misses the framing and results in a "shiner" or if a fastener penetrates roughly half way or more through the panel, steps must be taken to seal these penetrations. Shiners should be removed and holes should be covered with ZIP System™ tape or ZIP System™ liquid flash. Fasteners that penetrate roughly half way or more through the panel should also be covered with tape or liquid flash.

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https://www.robinswood.com/uploads/documents/technical/FastenerFAQsRegardingZIPSystemSheathingTechTipWebandRoofZIPSystem_2021-03-07-140844.pdf



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Overdriven Fasteners (WeatherLogic)

• Structural concern?

- Refer to APA Technical Topic: TT-012 "Effect of Overdriven Fasteners on Shear Capacity"

• WRB concern?

7. What do I do with overdriven fasteners?

Avoid overdriving fasteners. They lead to water intrusion and can reduce structural capacity when LP WeatherLogic panels are used in shear walls. If you see the white of the OSB beneath the surface of the WRB membrane, then the nail is overdriven and needs to be covered with LP WeatherLogic tape or with an AAMA 714-compliant liquid-applied flashing. For the effects on structural capacity, refer to APA Technical Topic TT-012 "Effect of Overdriven Fasteners on Shear Capacity" for guidance on when additional fasteners are required.

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<https://lpcorp.com/product literature/Products/WeatherLogic/101-126-Water+Barriers+Barriers>



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Overdriven Fasteners (ForceField)

• Structural concern?

- Refer to APA Technical Topic: TT-012 "Effect of Overdriven Fasteners on Shear Capacity"

• WRB concern?

- To help maintain a continuous air- and weather-resistive barrier, fasteners that have been driven more than 1/16 inch past the panel surface should be treated with an approved ForceField® tape or DensDefy® Liquid Flashing.



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<https://building.com/wp-content/uploads/2022/06/ForceField-Technical-Bulletin-Overdriven-Fasteners.pdf>



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APA Technical Topic: TT-012 "Effect of Overdriven Fasteners on Shear Capacity"

The following is a suggested guideline for determining if over driven fasteners will affect the shear capacity of diaphragm or shear wall construction

1. If any case described below is met, no reduction in shear capacity needs to be taken.

- All nails overdriven into panels by no greater than $1/16"$ during construction under dry conditions. ($<16\%$)
- If no more than 20% of the fasteners around the perimeter of panels are over driven by no greater than $1/8"$.
- If all fasteners around the perimeter of panels appear to be overdriven by the same amount, and it appears that the panels have been wetted during construction, it can be assumed that the fastener embedment is due to panel thickness swelling.
- If actual panels used in construction are thicker than the required minimum nominal panel thickness upon which the design shear capacity is based, and the overdriving is less than or equal to the difference between the two panel thicknesses.

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<https://www.apawood.org/publication-search?topic=012>


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APA Technical Topic: TT-012 "Effect of Overdriven Fasteners on Shear Capacity"

- If any case described below is met, no reduction in shear capacity needs to be taken.
- If more than 20% of the fasteners around the perimeter of panels are overdriven by over $1/16"$, or if any are overdriven by more than $1/8"$, an additional fastener must be driven to maintain the required shear capacity. For every two fasteners overdriven, one additional fastener must be driven.

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<https://www.apawood.org/publication-search?topic=012>


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Completing the WRB with Tape

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Integrated Sheathing Tape Installation

- Tape for all systems are required on all seams.
- Surface preparation is key.
 - Panel surface must be dry
 - Panel surface must be free from frost
 - Panel surface must be free from dirt, debris and sawdust
- Installation must be performed in a “shingle fashion” by starting at the bottom of the structure and move towards the top overlapping from above.

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Integrated Sheathing Tape Installation

- Most tapes are pressure sensitive; therefore, pressure must be applied to activate the adhesive.
- This can be accomplished by using a “J-roller” which can apply even pressure across the tape for proper adhesion.



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Propper Overlap of Intersections & Splices

- Refer to the manufacturer's installation instructions for seam tape overlap.
- Typically, this overlap can range from 1” at “T” intersections and up to 3” at overlapping splice joints.

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Vapor Permeance : Throttle of the Assembly

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What is a Throttle?

- **The material in a building enclosure assembly with the lowest vapor permeance**
 - This material will limit the overall amount of water vapor that can travel through the enclosure via diffusion
 - Example: vapor retarders are throttles by design



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Vapor Retarder Classifications - IRC

- **Class I Vapor Retarder:**
< 0.1 perm
- **Class II Vapor Retarder:**
0.1 perm – 1.0 perm
- **Class III Vapor Retarder:**
1.0 perm – 10.0 perm



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OSB Perm Rating

- OSB can remain fairly stable regarding its vapor permeance hovering around a class II - III Vapor Retarder.
- However, the vapor permeance can also change based on relative humidity (RH).

BSC Information
Vapor Permeance
of Some Building Materials

Vinyl siding	Approximately 40 perms due to the air leakage of the siding joints	Vapor permeable
Wood siding	Approximately 10 perms due to the air leakage of the siding joints	Vapor permeable
Brick veneer	Approximately 40 perms due to air leakage from the "back venting" of the brick veneer	Vapor permeable
Building paper/capath impregnated felt	Approximately 30 perms	Vapor permeable
Housewraps	Range between 5 perms and 50 perms	Vapor semi-permeable to vapor permeable
OSB sheathing	Approximately 2 perms	Vapor semi-permeable
Plywood sheathing	Approximately 10 perms	Vapor semi-permeable

<https://www.finehomebuilding.com/resources/perm-ratings>
<https://www.dryvit.com/products/tyvek-housewrap>



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WRB Per Rating

- **Examples of commonly used housewraps used as Water Resistive Barriers:**
 - Tytar Building Paper: 11.7 perm
<https://www.tytar.com/products/buildingpaper/>
 - Tyvek Housewrap: 54 perm
<https://www.dryvit.com/products/tyvek-housewrap>



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Perm Rating of Zip (WRB Layer)



7/16\", 1/2\" AND 5/8\" ZIP SYSTEM® SHEATHING				
PERFORMANCE CATEGORY	PANEL SIZE	PANEL COUNT	PS-2 SPAN RATING	VAPOR TRANSMISSION OF WRB LAYER
7/16	4' x 8'	80	24/16 Structural 1	12-16 perm ASTM E 96 Procedure B
1/2	4' x 8'	70	32/16 Structural 1	ASTM E 2178 <0.02 U/s m² @ 75 Pa
5/8	4' x 8'	55	40/20 Structural 1	ASTM E 2357 <0.2 U/s m² @ 75 Pa

ICC ESR-1473
ESR-1474
INFORM ESR
ER-424
PHRC

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Perm Rating of Zip Sheathing Panel

What's the permeability of ZIP System sheathing panels?

The permeability of the entire panel is based on the permeability of the OSB (1-3 perms depending on thickness), while the permeability of the integrated protective overlay alone is 12-16 perms.

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Perm Rating of ForceField

ForceField Weather Barrier System Performance Properties

System Properties	Test Method/Criteria	Results
Panel Exposure Durability Classification	DOC PS 2	Exposure 1
Panel Grade**	DOC PS 2	7/16 CAT
Water-Resistive Barrier	ICC ES AC 310	Meets/Exceeds requirements
Surface Bond of Overlay to Panel	ASTM D5651	>16 psi
Water Penetration	ASTM E331	Pass
Water Vapor Transmission	ASTM E96 (Water Method)	>2.75 Perms for Laminated Panel
Air Permeance of Assembly	ASTM E2357	.0009 cfm/ft²@75 pa
Surface Burning Characteristics	ASTM E84	Meets Class II
Drainage Efficiency	ASTM E2273	>80%

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Perm Rating of WeatherLogic



LP WeatherLogic® Air & Water Barrier
Louisiana-Pacific Corporation
 Products: LP WeatherLogic® Air & Water Barrier
 LP Building Solutions, Louisiana-Pacific Corporation, 1610 West End Ave., Nashville, TN 37203
 (666) 620-0325
www.lpcorp.com
 LP WeatherLogic Air & Water Barrier has been tested in accordance with ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials, and has the following characteristics:
 a) Vapor permeance of 1.27 perms and equivalent Water Vapor Transmission (WVT) rate of 8.84 g/(24h-m²) when tested in accordance with ASTM E96 (desiccant method) at 73.4 ± 1°F and 50 ± 2% relative humidity.
 b) Vapor permeance of 5.35 perms and equivalent WVT rate of 36.1 g/(24h-m²) when tested in accordance with ASTM E96 (water method) at 73.4 ± 1°F and 50 ± 2% relative humidity.

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Air Barrier Performance

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Air Barriers

- Air barrier defined by ABAA as maximum permeance of **0.004 cfm/ft² @ 1.57 psf (0.02L/sm² @ 75 Pa)**
- **Must be a continuous barrier**

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Air Barrier Performance for Zip

7/16", 1/2" AND 5/8" ZIP SYSTEM® SHEATHING					
PERFORMANCE CATEGORY	PANEL SIZE	PANEL COUNT	PS-2 SPAN RATING	VAPOR TRANSMISSION OF WEB LAYER	AIR BARRIER
7/16	4' x 8'	80	24/16 Structural 1	12-16 perm ASTM E 96 Procedure B	ASTM E 2178 <0.02 U/s·m²) @ 75 Pa
1/2	4' x 8'	70	32/16 Structural 1		ASTM E 2357 <0.2 U/s·m²) @ 75 Pa
5/8	4' x 8'	55	40/20 Structural 1		

ICC ESR-1473 ESR-1474

INFORM ESR-424

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Air Barrier Performance for WeatherLogic

LP WeatherLogic® Air & Water Barrier
Louisiana-Pacific Corporation
Products: LP WeatherLogic® Air & Water Barrier
LP Building Solutions, Louisiana-Pacific Corporation, 1610 West End Ave., Nashville, TN 37203
(888) 820-0325
www.lpcorp.com

LP WeatherLogic Air & Water Barrier has been evaluated for compliance with the IBC and IRC for use as a combination of wall sheathing, water-resistive barrier, and air barrier, and a combination of roof sheathing and roof underlayment. LP WeatherLogic Air & Water Barrier has also been evaluated in accordance with ASTM E2357, Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies, and ASTM E2273, Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies. LP WeatherLogic Air & Water Barrier exceeds the 75%.

PR-N138
Revised February 19, 2024

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Air Barrier Performance for ForceField

ForceField® Weather-Resistive Barrier OSB
Georgia-Pacific Wood Products LLC
Products: Georgia-Pacific ForceField® Weather-Resistive Barrier OSB
Georgia-Pacific Wood Products LLC, 133 Peachtree Street, NE, Atlanta, Georgia 30303
(404) 652-4000
www.builddap.com

Georgia-Pacific ForceField weather-resistive barrier OSB products have been evaluated for compliance with the International Building Code (IBC) and International Residential Code (IRC) for use as a combination of wall sheathing, water-resistive barrier, and air barrier, and a combination of roof sheathing and roof underlayment. Georgia-Pacific ForceField weather-resistive barrier OSB products have also been evaluated in accordance with ASTM D5651, Standard Test Method for Surface Bond Strength of Wood-Base Fiber and Particle Panel Materials, and ASTM E2357, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

PR-N136
Revised December 14, 2023

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Perm Rating of ForceField

ForceField Weather Barrier System Performance Properties

System Properties	Test Method/Criteria	Results
Panel Exposure Durability Classification	DOC PS 2	Exposure 1
Panel Grade**	DOC PS 2	7/16 CAT
Water-Resistive Barrier	ICC ES AC 310	Meets/Exceeds requirements
Surface Bond of Overlay to Panel	ASTM D5851	>16 psi
Water Penetration	ASTM E331	Pass
Water Vapor Transmission	ASTM E96 (Water Method)	>2.75 perms for Laminated Panel
Air Performance of Assembly	ASTM E2367	0009 cfm/12875 ps
Surface Burning Characteristics	ASTM E84	Meets Class II
Drainage Efficiency	ASTM E2273	>80%

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<https://buildipg.com/wp-content/uploads/2022/11/ForceField-Weather-Barrier-System-Technical-Guide-1.pdf>



Beyond Standard Wood Structural Sheathing

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Huber Zip Insulated R-Sheathing

- Structural backing – Zip Sheathing System
- Insulation - Polyiso Core (interior of WSP)
- Facing – No facing
- Available R-Values
 - 1" – R-3
 - 1 ½" – R-6
 - 2" – R-9
 - 2 ½" – R-12



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<https://www.hubersystems.com/zip-systems/insulated-r-sheathing>

LP NovaCore Thermal Insulated Sheathing

- Structural backing – OSB Sheathing
- Insulation – XPS (interior of WSP)
- Facing – No facing
- Available R-Values
 - ½" – R-3
 - 1" – R-5
 - 1 ½" – R-7.5



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Ox Engineered Products OX-IS

- Structural backing - Thermoply Sheathing
- Insulation - Polyiso Core (exterior of Thermoply sheathing)
- Facing - Non-reflective facer
- Available R-Values
 - .5" – R-3
 - 1" – R-6
 - 1.7" – R-10



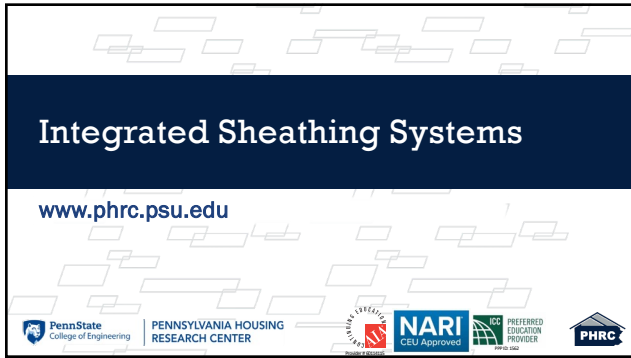
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Summary

- Not all integrated sheathing systems are created equal.
- Choose the materials that best fit your designed assembly.
- Overdriven fasteners aren't the end of the world and does not automatically mean the system will fail.
- Refer to the manufacturer's installation instructions for specific details.



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