



Exterior Wall Drainage Requirements

FOR MULTIFAMILY AND COMMERCIAL PROJECTS

The information in this guide applies to any James Hardie® siding product installed flat-to-wall, including:

- **HardiePanel® vertical siding**
- **Cempanel® vertical siding**
- **Prevail® panel siding products**
- **Artisan® siding with lock joint system**

Flat-to-wall installation definition: Any siding product where the rear face of the product does not overlap the front face of the product when applied per James Hardie installation instructions.

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The guidance and instructions provided herein are only valid for and applicable to James Hardie® products. James Hardie Building Products Inc. makes no warranty or representation with respect to the information contained herein for any use other than with James Hardie products, including but not limited to use with fiber cement siding products made by other manufacturers or siding products made of other materials.

TECHNICAL SERVICES
888.542.7343

SECTION 1 EXTERIOR WALL DRAINAGE REQUIREMENTS

This document only covers James Hardie exterior wall drainage requirements. Always follow all applicable James Hardie installation instructions.

EXCEPTIONS

These requirements do not apply to the following:

- **Building Codes:** All national, state, and local building codes must be followed, and where they are more stringent than James Hardie Installation requirements, state and local requirements will take precedence.
- **Reveal® Panel System** is required to be installed over furring. The furring provides a rainscreen and the fastening base for Reveal® trims and panels. Refer to [Reveal Panel System installation instructions](#).
- **Vertically oriented Artisan Siding® with Lock Joint System** requires special moisture management details. Refer to James Hardie Multifamily Installation Instructions [[HZ5®](#)] [[HZ10®](#)].
- **Multiplexes and townhomes** classified as single family structures. See FAQ page 10.
- **Special design conditions** listed below:

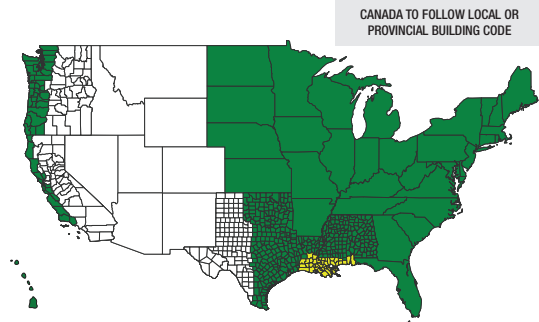
WALL DRAINAGE REQUIREMENTS FOR SPECIAL DESIGN CONDITIONS	MINIMUM REQUIREMENT
Weather protected balconies, breezeways, and corridors	WRB ¹
Columns	
Panel Infill for Lap Siding: 1) Panel does not extend beyond the window; and 2) Panel and the main wall share the same plane	

¹Water-resistive barrier and drainage requirements as defined by building code

²Drainage wrap is a WRB that scores 90% or better drainage efficiency under ASTM E 2273.

³WRB as defined by building code and a minimum 3/8 in. (10mm) air space between the WRB and the siding (formed by minimum 3/8-inch furring).

MINIMUM REQUIREMENTS BY REGION

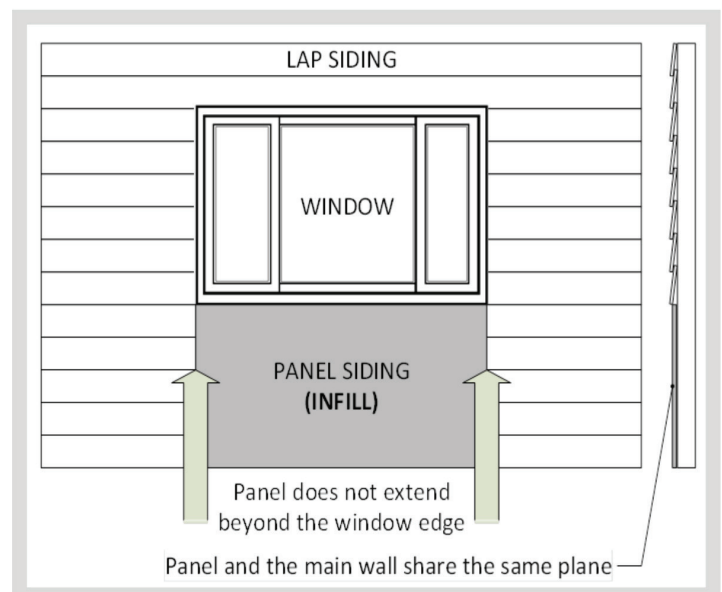


WRB¹ Dry Climates

DRAINAGE PLANE (E.G. DRAINABLE WRB)
WITH 90% DRAINAGE EFFICIENCY²
Moist and Marine Climates

RAINSCREEN (MIN. 3/8 IN. AIR GAP)³
Severe Wind Driven Rain Climate

See reverse for full map view



SECTION 1 EXTERIOR WALL DRAINAGE REQUIREMENTS

CANADA TO FOLLOW LOCAL OR PROVINCIAL BUILDING CODE

MINIMUM REQUIREMENTS BY STATE/COUNTY

WRB¹ Dry Climates

**DRAINAGE PLANE (E.G. DRAINABLE WRB)
WITH 90% DRAINAGE EFFICIENCY²**
Moist and Marine Climates

RAINSCREEN (MIN. 3/8 IN. AIR GAP)³
Severe Wind Driven Rain Climate

**DRAINAGE PLANE (E.G. DRAINABLE WRB)
WITH 90% DRAINAGE EFFICIENCY²**

CA

Alameda
Del Norte
Humboldt
Marin
Mendocino
Monterey
Napa
San Benito
San Francisco
San Luis Obispo
San Mateo
Santa Barbara
Santa Clara
Santa Cruz
Sonoma
Ventura

OR

Benton
Clackamas
Clatsop
Columbia
Coos
Curry
Douglas
Jackson
Josephine
Lane
Lincoln
Linn
Marion
Multnomah
Polk
Tillamook
Washington
Yamhill

WA

Clallam
Clark
Cowlitz
Grays Harbor
Island
Jefferson
King
Kitsap
Lewis
Mason
Pacific
Pierce
San Juan
Skagit
Snohomish
Thurston
Wahkiakum
Whatcom

RAINSCREEN (MIN. 3/8 IN. AIR GAP)³

LA

Acadia
Allen
Ascension
Assumption
Avoyelles
Beauregard
Calcasieu
Cameron
East Baton Rouge
East Feliciana
Evangeline
Iberia
Iberville

Jefferson
Jefferson Davis
Lafayette
Lafourche
Livingston
Orleans
Plaquemines
Pointe Coupee
Rapides
St. Bernard
St. Charles
St. Helena
St. James

St. John the Baptist
St. Landry
St. Martin
St. Mary
St. Tammany
Tangipahoa
Terrebonne
Vermilion
Washington
West Baton Rouge
West Feliciana

AL

Baldwin
Mobile

MS

Hancock
Harrison
Jackson
Pearl River
Stone

TX

Andrews
Armstrong
Bailey
Bandera
Baylor
Borden
Brewster
Briscoe
Callahan
Carson
Castro

Childress
Cochran
Coke
Coleman
Collingsworth
Concho
Cottle
Crane
Crockett
Crosby
Culberson

Dallam
Dawson
Deaf Smith
Dickens
Dimmit
Donley
Ector
Edwards
El Paso
Fisher
Floyd

Foard
Frio
Gaines
Garza
Glasscock
Gray
Hale
Hall
Hansford
Hardeman
Hartley

Haskell
Hemphill
Hockley
Howard
Hudspeth
Hutchinson
Irion
Jeff Davis
Jones
Kent
Kerr

Kimble
King
Kinney
Knox
La Salle
Lamb
Lipscomb
Loving
Lubbock
Lynn
Martin

Mason
Maverick
McCulloch
Medina
Menard
Midland
Mitchell
Moore
Motley
Nolan
Ochiltree

Oldham
Parmer
Pecos
Potter
Presidio
Randall
Reagan
Real
Reeves
Roberts
Runnels

Schleicher
Scurry
Shackelford
Sherman
Sterling
Stonewall
Sutton
Swisher
Taylor
Terrell
Terry

Throckmorton
Tom Green
Upton
Uvalde
Val Verde
Ward
Webb
Wheeler
Wilbarger
Winkler
Yoakum

OK

Beaver
Cimarron
Texas

¹Water-resistive barrier and drainage requirement as defined by building code

²Drainage wrap is a WRB that scores 90% or better drainage efficiency under ASTM E 2273.

³Water-resistive barrier (WRB) as defined by building code and a minimum 3/8 in. (10mm) air space between the WRB and the panel siding (formed by minimum 3/8-inch furring).

SECTION 2 DRAINAGE PLANE REQUIREMENTS DETAIL

WRB with 90% Efficiency Requirements Detail

Minimum drainage plane requirements:

- Complies with local building code as a water-resistive barrier
- Complies with minimum 90% drainage efficiency when tested to ASTM E2273

Drainage planes: water repellent materials (building paper, house wrap, sheet membranes, etc.) that are located behind the cladding and are designed and constructed to drain water that gets behind the cladding.

James Hardie recommends consulting with the specified drainage wrap manufacturer to determine compatibility and installation requirements for the project.

Drainage wrap products with a drainage efficiency of at least 90% when tested according to ASTM 2273 are listed below. The listed drainage efficiency is based on the manufacturer's published data. Consult the manufacturer to confirm compatibility with your project. James Hardie does not recommend using drainage mats or boards; they may compress during installation, impairing drainage or causing siding panels to appear wavy.

This table is not a comprehensive or exclusive list of drainage wraps. James Hardie does not endorse specific drainage wraps and makes no representation or warranty as to their performance. Please follow the manufacturer's instructions when installing the drainage wrap.

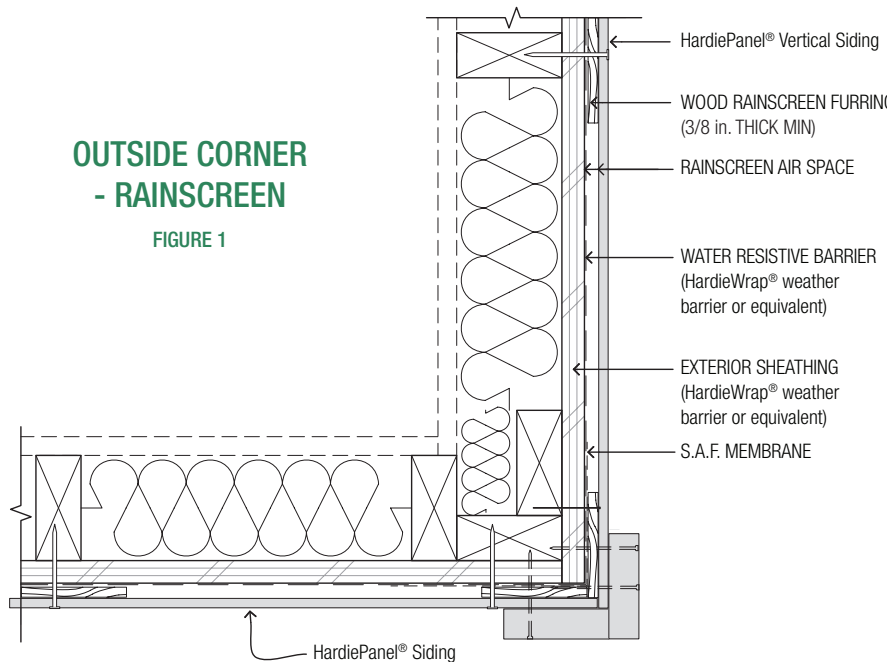
COMPANY	PRODUCT	MANUFACTURER CLAIMED DRAINAGE EFFICIENCY (ASTM E2273 test method)
DuPont	Tyvek® Stuccowrap®	>90%
DuPont	Tyvek® DrainWrap®	>90%
Barricade Building Products	Barricade Drainage Wrap®	95.4%
Fortifiber Building Systems Group	Two-Ply HydroTEX Drainable WRB	>95%
Fortifiber Building Systems Group	Weathersmart® Drainable	>95%
Tamlyn	TamlynWrap™ Drainable Housewrap	96%
Benjamin Obdyke	HYDROGAP® Drainable Housewrap	96%
National Shelter Products	DRYline® RainDrain® Commercial-Grade Building Wrap	95%
Kingspan	Kingspan GreenGuard® RainDrop® 3D Building Wrap	>90%
Kimberly-Clark	BLOCK-IT® House Wrap	>98%

® and TM in the table above denote trademarks or registered trademarks of their respective owners.

SECTION 3 :: RAINSCREEN REQUIREMENTS DETAIL

Drainage Principles and Best Practices

A rainscreen is an exterior cladding system featuring an air gap between the exterior cladding and the water-resistive barrier. The air gap is created by vertical furring attached to the wall, with the cladding fastened to framing or nailable substrate*, through the furring. James Hardie requires the drainage and ventilation cavity (air gap) to be 3/8 in. (10 mm) or greater.

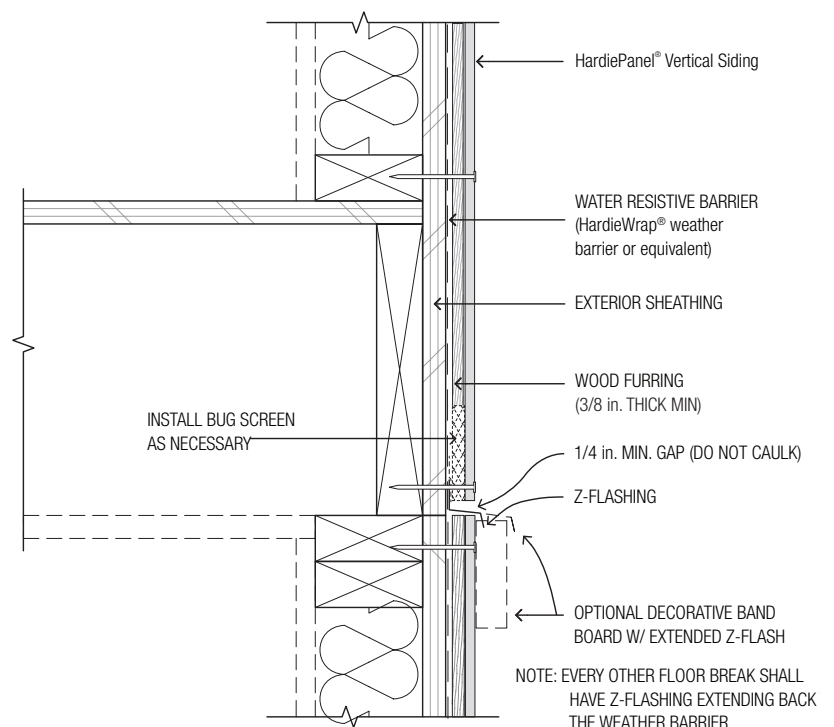


**NAILABLE SUBSTRATE. The 2018 IRC section 202 defines a Nailable Substrate as a product or material such as framing, sheathing, or furring, composed of wood or wood-based materials, or other materials and fasteners, providing equivalent fastener withdrawal resistance under transverse load.*

NOTE: Rainscreen CAD details can be found at JamesHardieCommercial.com

HORIZONTAL BREAK AT FLOOR TRANSITION - RAINSCREEN

FIGURE 2



Furring Material Specifications

Furring material may be steel (Z-girt, hat channel) or wood to create a minimum 3/8 in. air gap behind the fiber cement panel. Furring should be installed vertically to facilitate drainage and drying.

Steel Furring:

Material must be 20 gauge min (33 mil) to 16 gauge max (54 mil), with a dimension that satisfies the installation requirements. When installing steel Z-girts, be sure to nail close to the Z-girt spine when applying panel fasteners. This helps prevent deflection which can result in incomplete fastening and gaps between the panel and the furring.

Wood Furring:

If wood furring is not being used as a nailable substrate, there is no wood species or specific gravity requirement. Furring should be of sufficient width to assure adequate siding fastener connection; widths from 2 in. to 3.5 in. are recommended. Wall corner intersections may require wider furring to accommodate trim.

If wood furring is being used as a nailable substrate, material must be spruce, pine, fir or any other wood species with a specific gravity of 0.42 or greater in accordance with the American Forest and Paper Association (AFPA) and American Wood Council National Design Specification for Wood Construction (NDS).

Wood furring shall conform to building code for natural decay resistance or treated lumber (2012 IBC §718.2). Typical wood rainscreen furring includes treated 1/2 in., 3/4 in., 3/8 in. thick plywood, or treated nominal 1x4 in. lumber (actual 3/4 in. thick).

James Hardie recommends following expert advice and manufacturers' warnings against direct contact between aluminum flashing and accessories and copper-based preservative treated wood. In cases where such wood is used as furring, a non-permeable barrier placed between surfaces where contact occurs is recommended to avoid potential corrosion of aluminum materials. Barrier material options for use with copper-based preservative treated furring:

- 6 mil minimum polyethylene sheeting
- Neoprene or EPDM rubber
- Any material specifically called out by the preservative manufacturer

Alternative Furring:

Other non-wood or non-steel furring may be considered for use in rainscreen applications. These furring types are considered non-structural and subject to use per manufacturer's instructions. You and your design professional are responsible for determining the suitability and performance of alternative furring types. James Hardie makes no representation as to their performance or suitability.

SECTION 3 :: RAINSCREEN REQUIREMENTS DETAIL

Furring Attachment Over Wood Framing

WALL ASSEMBLY	SUBSTRATE REQUIREMENTS	FURRING OPTIONS	FURRING ATTACHMENT REFERENCE	PRODUCT ATTACHMENT TO WALL OVER FURRING REFERENCE	FASTENER GUIDANCE
Wood furring attached directly to wood framing**	Furring counts as part of nailable substrate; it is directly attached to wood sheathing & framing; it is SPF or equivalent wood species with specific gravity of 0.42 or greater	Plywood or dimensional lumber, minimum 3/8 in. thick	Technical Bulletin 19 Table A.4 James Hardie Tech Support	ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System	Use wood frame fastener selected per ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System
Wood furring attached through 1 in. or less non-nailable substrate**	Furring does not count as nailable substrate; it is attached to wood sheathing and framing through 1 in. or less of non-nailable substrate such as gypsum and/or rigid insulation	Plywood or dimensional lumber, minimum 3/8 in. thick	Technical Bulletin 19 Table A.4 James Hardie Tech Support	ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System	Extend fastener selected per ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System by the thickness of the furring and the total thickness of non-nailable substrate.
Wood furring attached through greater than 1 in. non-nailable substrate**	Furring counts as entire nailable substrate; it is structurally attached** to wood sheathing and framing through greater than 1 in. of non-nailable substrate such as gypsum and/or rigid insulation, it is SPF or equivalent wood species with specific gravity of 0.42 or greater	Dimensional lumber with thickness equal to ESR 1844 fastener embedment into wood	Technical Bulletin 19 Table A.4 James Hardie Tech Support	ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System	Use wood frame fastener selected per ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System. Fully embed fastener into furring
Metal furring attached to wood framing**	Furring counts as all of nailable substrate	16 to 20 ga steel hat channel	Technical Bulletin 19 James Hardie Tech Support	ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System	Use metal fastener selected per ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System

**Furring must be installed to resist code defined structural loads (such as wind load)

NOTE: The siding attachment system design is the responsibility of a design professional. The advice provided in this guide for building a nailable base for attachment over foam sheathing, gypsum sheathing, OSB sheathing, or any combination thereof, must be approved by the professionals engaged for your project, e.g., a builder, architect or engineer. James Hardie disclaims any and all liability for the use or misuse of the information contained in this guide.

NOTE: James Hardie recommends a siding mock-up prior to installation to review assembly details, and ensure the fastening practice and/or fastening tools are properly adjusted. Fasteners must be installed to avoid overdriving, but snug enough to remove gaps between connected parts. Adjust driving tools and installation practice accordingly.

SECTION 3 :: RAINSCREEN REQUIREMENTS DETAIL

Furring Attachment Over Steel Framing

WALL ASSEMBLY	SUBSTRATE REQUIREMENTS	FURRING OPTIONS	FURRING ATTACHMENT REFERENCE	PRODUCT ATTACHMENT TO WALL OVER FURRING REFERENCE	FASTENER GUIDANCE
Wood furring attached directly to steel framing**	Furring does not count as nailable substrate, it is directly attached to steel framing	Plywood or dimensional lumber, minimum 3/8 in. thick	Technical Bulletin 19 Table A.4 James Hardie Tech Support	ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System	Use steel frame fastener selected per ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System • 3 full threads past back of steel stud for screws • 1/4 in. past back of steel stud for pins
Wood furring attached through 1 in. or less non-nailable substrate**	Furring does not count as nailable-substrate; it is attached to steel framing over 1 in. or less of sheathing and/or rigid insulation	Plywood or dimensional lumber, minimum 3/8 in. thick	Technical Bulletin 19 Table A.4 James Hardie Tech Support	ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System	Use steel frame fastener selected per ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System. • 3 full threads past back of steel stud for screws • 1/4 in. past back of steel stud for pins
Wood furring attached through greater than 1 in. non-nailable substrate**	Furring counts as entire nailable substrate; it is attached** to steel framing through greater than 1 in. of sheathing and/or rigid insulation; it is SPF or equivalent wood species with specific gravity of .42 or greater.	2x4 dimensional lumber	Technical Bulletin 19 Table A.4 James Hardie Tech Support	ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System	Use wood frame fastener selected per ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System. Fully embed fastener into furring
Steel furring to steel framing**	Furring counts as nailable substrate; it is attached to steel framing	16 to 20 ga steel Z-girt or hat channel	Technical Bulletin 19 Table A.4 James Hardie Tech Support	ESR 1844 or the Technical Data Sheet for Artisan Lock Joint System	Use steel frame fastener per ESR 1844

**Furring must be installed to resist code defined structural loads (such as wind load)

NOTE: The siding attachment system design is the responsibility of a design professional. The advice provided in this guide for building a nailable base for attachment over foam sheathing, gypsum sheathing, OSB sheathing, or any combination thereof, must be approved by the professionals engaged for your project, e.g., a builder, architect or engineer. James Hardie disclaims any and all liability for the use or misuse of the information contained in this guide.

Note: James Hardie recommends a siding mock-up prior to installation to review assembly details, and ensure the fastening practice and/or fastening tools are properly adjusted. Fasteners must be installed to avoid overdriving, but snug enough to remove gaps between connected parts. Adjust driving tools and installation practice accordingly.

Why does James Hardie have exterior wall drainage requirements beyond local code requirements?

The building code is the minimum standard legally required to construct a building. James Hardie Building Products has always encouraged the adoption of good building practices based on sound science and testing. Building science experts have proven that efficient drainage plane assemblies maximize the service life of buildings.

Why do the exterior wall drainage requirements apply only to multifamily/commercial projects and not to single-family residential projects?

Multifamily/commercial structures tend to have larger expanses of flat wall (as tall as 7 stories) exposed to the weather, with more wall intersections and complex details. For single-family construction, James Hardie recommends installing a 90% efficient drainage plane or a 3/8 inch air gap (i.e. rainscreen) between flat-to-wall siding and the water-resistive barrier as a best practice. James Hardie recommends that you consult with your design professional if you have questions regarding exterior wall drainage on your single-family project.

Are there any applications exempt from the exterior wall drainage requirements policy?

See Section 1 of this guide detailing the below exceptions to our exterior wall drainage requirements:

- Weather protected balconies, breezeways, and corridors
- Columns
- Infill panel

Are gable portions and bump outs of a building included or excluded from the exterior wall drainage requirement?

Gables and bump outs follow the drainage requirement for the building they are on.

Are townhouses and multiplex building types (duplex, tri-plex, quad-plex etc.) subject to the James Hardie Exterior Wall Drainage Requirements for Multifamily And Commercial Projects?

No, provided the townhouse or multiplex building meets the US Census definition¹ of a single family structure:

Single-family structures include fully detached, semi-detached (semi-attached, side-by-side), row houses, duplexes, multiplex units, and townhouses.

In order for attached units to be classified as single-family structures, each unit must:

- Be separated by a ground-to roof wall,
- Have no units located above or below.

*Single-family structures meeting the above definition **are not** subject to James Hardie Exterior Wall Drainage Requirements for Multifamily And Commercial Projects.*

*Buildings with units built one on top of another or those built side-by-side that do not have ground-to-roof walls **are** subject to James Hardie Exterior Wall Drainage Requirements for Multifamily And Commercial Projects.*

¹US Census Bureau definition of single family homes:
<https://www.census.gov/construction/charts/definitions/#s>

Technical Requests

If you have questions or cannot find something, contact us using the information below:
888-J-HARDIE
(1-888-542-7343)
info@jameshardie.com

SECTION 4 FAQ

What drainage wraps are acceptable?

Please consult Section 2 of this guide. We always recommend you consult with the wrap manufacturer you would like to specify to determine that it meets the following minimum requirements:

- Complies with code as a water-resistive barrier
- Complies with minimum 90% drainage efficiency when tested to ASTM E2273

How do I handle transitions from rainscreen to non-rainscreen?

Rainscreen CAD details are available at www.jameshardiepros.com. The answer will depend on the desired transition aesthetic. Contact James Hardie Building Products technical line 888.542.7343 to discuss your project's needs.

Are the James Hardie panel products exterior wall drainage requirements and guidelines driven by James Hardie experiencing product failures?

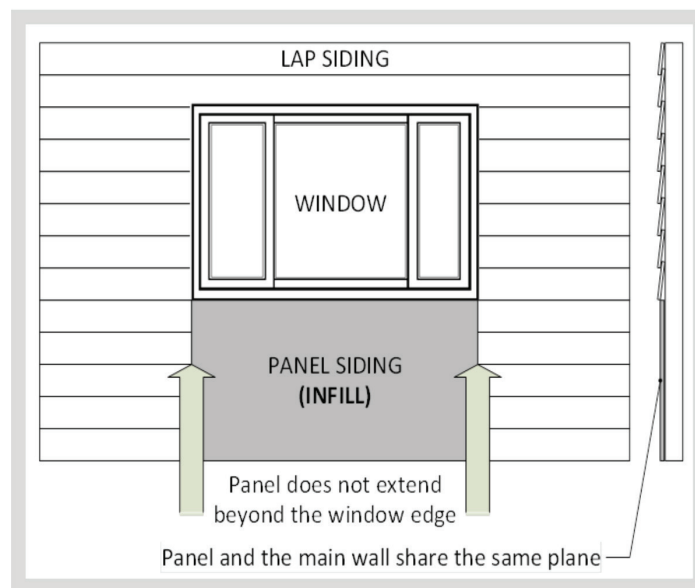
No. Building science experts have proven that efficient drainage plane assemblies maximize the service life of buildings. James Hardie is adopting better than minimum building code requirements in applications where we believe it will best benefit our customers.

What type of furring do you recommend using to form the minimum 3/8 in. air space?

Refer to the Furring Material Specification in Section 3 for further information.

How does the lap siding infill exemption work?

Panel installed to infill under a window on a wall that is otherwise surrounded by lap siding may be installed with WRB¹ as the minimum requirement under the following conditions.



Technical Requests

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¹Water-resistive barrier and drainage requirement as defined by building code.

How Drainage Plane Performance Is Evaluated

At this time, ASTM E2273 “Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies” is the industry standard used to evaluate EIFS drainage plane drainage efficiency. This consensus test method was developed with the participation of stakeholders with an interest in the development and use of drainable EIFS. Currently, there does not exist a universal test method to evaluate the drainage plane drainage efficiency when installed with non EIFS cladding types and materials. ASTM E2230 is therefore the only current industry standard test available to evaluate drainage plane drainage efficiency with other cladding systems installed over the drainage plane.

Most industry experts and building code officials agree that the ASTM E2273 test method provides good insight into the drainage performance of claddings. The 2017 Oregon Residential Specialty Code sets a precedent for using the ASTM E2273 test method when evaluating the drainage efficiency of a water-resistive barrier (drainage plane) installed under an exterior veneer that is not specifically a drainable EIFS cladding system (ref. 2017 Oregon State Residential Specialty Code Section R703.1.1).

Additionally, ICC-ES has also created an evaluation guideline, AC356 (revised December 2018), “Acceptance Criteria for Moisture Drainage Systems Used With Exterior Cement Plaster or Adhered Masonry Veneer Walls”. EG356 uses ASTM E2273 as the drainage test method.

The “90%” drainage efficiency performance specification reflects the 2018 International Building Code (IBC) section 1407.4.1 which requires EIFS with drainage to have an average minimum 90% drainage efficiency when tested in accordance with ASTM E2273. ICC-ES EG356 Section 3.1.5.1 also requires 90% drainage efficiency as a condition of acceptance.