



James Hardie

Exterior Wall Drainage Requirements

FOR MULTI-FAMILY AND COMMERCIAL PROJECTS*

effective December 1, 2015



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

HardiePanel® vertical siding

Cempanel® vertical siding

Prevail® Panel siding products

Artisan® V-Rustic siding

Reveal® Panel

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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TECHNICAL SERVICES
888.542.7343

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 use of 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.

SECTION 1 EXTERIOR WALL DRAINAGE REQUIREMENTS

All national, state, and local building code requirements must be followed and where they are more stringent than the James Hardie installation requirements, state and local requirements will take precedence.



		EXTERIOR WALL DRAINAGE REQUIREMENTS						
		With a Minimum 12 in. Eave Overhang		Without a minimum 12 in. Eave Overhang				
		Vertical Joints formed by: Board and Batten; Moderate Contact; Caulk	Vertical Joints formed by Expressed Seam Joints	Vertical Joints formed by: Board and Batten; Moderate Contact; Caulk	Vertical Joints formed by Expressed Seam Joints			
James Hardie flat-to-wall products > 30% of Building's Total Exterior Wall Covering	7 story building	Rainscreen (min. 3/8-inch air gap)						
	6 story building							
	5 story building							
	4 story building							
	3 story building							
	2 story building							
1 story building	WRB ¹							
James Hardie flat-to-wall products ≤ 30% of Building's Total Exterior Wall Covering	7 story building	Rainscreen (min. 3/8-inch air gap) ³						
	6 story building							
	5 story building							
	4 story building					Drainage Plane (e.g. drainable WRB) with 90% drainage efficiency ²		
	3 story building							
	2 story building							
1 story building	WRB ¹							

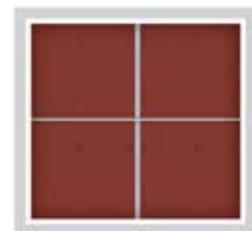
¹ Water-resistive Barrier and drainage requirements as defined by building code.

² Water-resistive Barrier as defined by local building code that is manufactured to meet minimum 90% drainage efficiency when tested in accordance with ASTM E2273 or other recognized national standards.

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

Eave Overhang: A projecting edge of a roof that extends beyond the supporting wall a minimum of 12 inches.

Expressed Seam Joints: Fiber-cement panel siding joints formed by 3rd party aluminum trims or brake formed metal resulting in a reveal joint or expressed joint aesthetic.



SECTION 1 EXTERIOR WALL DRAINAGE REQUIREMENTS

WALL DRAINAGE REQUIREMENTS FOR SPECIAL WALL DESIGN CONDITIONS

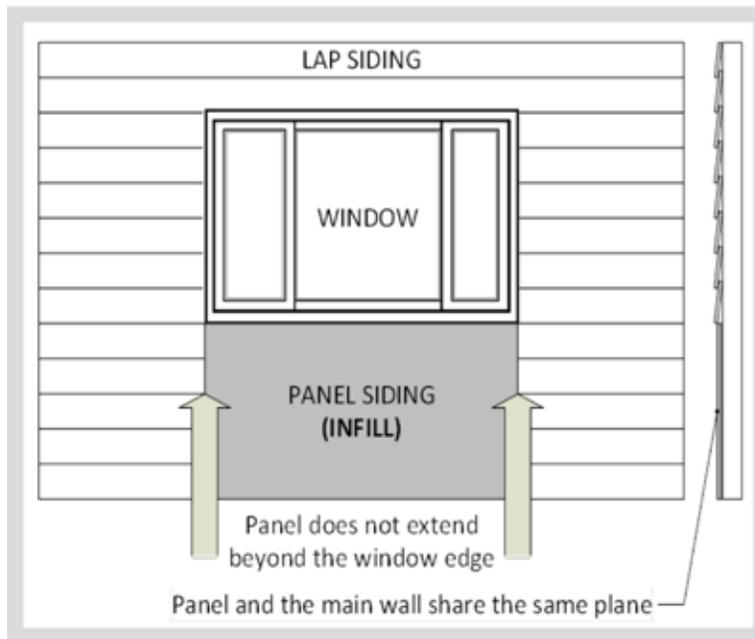
Design Condition	Minimum Requirement	Better Practice	Best Practice
Weather Protected Balconies, Breezeways, and Corridors	WRB ¹	Drainage Plane (e.g. drainable WRB) with 90% drainage efficiency ²	Rainscreen (min. 3/8 in. air gap) ³
Columns			
Infill: 1) Panel does not extend beyond the window; and 2) Panel and the main wall share the same plane			

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

² Water-resistive Barrier as defined by local building code that is manufactured to meet minimum 90% drainage efficiency when tested in accordance with ASTM E2273 or other recognized national standards.

³ Water-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).

Infill Panel Example:



SECTION 1 ■ EXTERIOR WALL DRAINAGE REQUIREMENTS

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%

SECTION 2 REQUIREMENT DETAILS AND FAQ'S

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 MULTI-FAMILY/COMMERCIAL PROJECTS, AND NOT TO SINGLE-FAMILY RESIDENTIAL PROJECTS?

Multi-family/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.

DOES THE 30% FIBER-CEMENT PANEL RULE APPLY TO ENTIRE JOB OR INDIVIDUAL BUILDINGS?

Individual buildings

WHAT IS INCLUDED IN THE 30% OF TOTAL BUILDING EXTERIOR WALL COVERING CALCULATION?

All exterior cladding products, including hard siding, brick, stone, stucco, and vinyl. Exterior cladding on balconies, breezeways, and columns are also included. Windows and doors are not included

WHO IS RESPONSIBLE FOR CALCULATING THE FIBER-CEMENT PANEL TO EXTERIOR WALL COVERING PERCENTAGE?

The customer is responsible (typically the contractor, architect or party responsible for submitting plans through plan check with the local jurisdiction).

ARE THERE ANY EXCEPTIONS TO THE EXTERIOR WALL DRAINAGE REQUIREMENTS POLICY?

See "**Wall Drainage Requirements for Special Design Conditions**" on page 3 of this guide detailing the below exceptions to our exterior wall drainage requirements:

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

WHAT IF A BUILDING HAS WALLS WITH BOTH AN EAVE OVERHANG AND NO EAVE OVERHANG?

Each wall of a building is subject to the eave overhang guidelines. Thus, if one wall has no eave overhang and panels, it would require minimum 3/8 inch furring.

WHAT IS CONSIDERED AN EAVE OVERHANG?

A projecting edge of a roof that extends beyond the supporting wall a minimum of 12 inches.

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

For technical inquiries of a more complex nature, including information/applications and structural requirements that are not published in our available technical literature, please use this form. Providing the correct information for your project on the attached form will reduce the number of clarifying questions required to provide a suitable response to your inquiry for your project. Please note that James Hardie does not provide a plan review service. [Click Here for Technical Services Request Form](#)

SECTION 2 REQUIREMENT DETAILS AND FAQ'S

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 and elevation they are on. Gables are not considered to be an additional story.

IF ANY COMBINATION OF FLOORS 1-4 HAVE PANEL, AND THE BUILDING IS 5-6 STORIES, IS FURRING REQUIRED FOR THE PANEL?

Yes. The drainage requirement is based on building height in stories above grade.

DOES A FIFTH FLOOR PANEL APPLICATION UNDER AN EAVE OVERHANG, WITH 4 STORIES OF A DIFFERENT SIDING PRODUCT BELOW REQUIRE FURRING?

Yes.

WHAT IF A BUILDING HAS MULTIPLE ELEVATIONS THAT VARY IN NUMBER OF STORIES ABOVE GRADE?

Building elevations are subject to the requirement on an individual basis. Maximum story height per elevation dictates the exterior wall drainage requirement.

WHAT ABOUT TRANSITION AREAS WHERE BUILDING HEIGHT IN STORIES VARIES FROM FINISHED GRADE?

Use the maximum story height from grade to determine the exterior wall drainage requirement.

ARE TOWNHOMES INCLUDED IN THE REQUIREMENT?

Yes. Per IBC Section 202, "TOWNHOUSE. A single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space on at least two sides." Duplexes are not subject to this requirement.

WHAT DRAINAGE WRAPS ARE ACCEPTABLE?

Please consult Page 3 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
- Manufactured in a manner to enhance drainage
- Complies with minimum 90% drainage efficiency when tested to ASTM E2273

HOW DO I HANDLE TRANSITIONS FROM RAINSCREEN TO NON-RAINSREEN?

Rainscreen CAD details are available at www.jameshardiecommercial.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 page 7 of this guide for furring specifications.

Technical Requests

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Furring Material Specification

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.

FURRING ATTACHMENT OVER WOOD FRAMING

WALL ASSEMBLY	SUBSTRATE REQUIREMENTS	FURRING OPTIONS	FURRING ATTACHMENT REFERENCE	PANEL 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 JH Tech Support	ESR-1844 or Technical Data Sheet, HardiePanel Siding fastened to wood furring	Use wood frame fastener selected per ESR 1844
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 JH Tech Support	ESR 1844	Extend fastener selected per ESR 1844 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 JH Tech Support	ESR 1844	Use wood frame fastener selected per ESR 1844. 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 JH Tech Support	ESR 1844	Use metal fastener selected 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.

FURRING ATTACHMENT OVER STEEL FRAMING

WALL ASSEMBLY	SUBSTRATE REQUIREMENTS	FURRING OPTIONS	FURRING ATTACHMENT REFERENCE	PANEL 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 JH Tech Support	ESR-1844 or Technical Data Sheet, HardiePanel siding fastened to wood furring	Use steel frame fastener selected per ESR 1844. <ul style="list-style-type: none"> • 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 JH Tech Support	ESR 1844	Use steel frame fastener selected per ESR 1844. <ul style="list-style-type: none"> • 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 JH Tech Support	ESR 1844	Use wood frame fastener selected per ESR 1844. 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 A4 JH Tech Support	ESR 1844	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.

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.

What is minimum drainage plane performance for flat-to-wall James Hardie siding in Multifamily/Commercial construction?

Minimum drainage plane requirements:

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

How to evaluate drainage plane performance?

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. The best industry can do is to use the ASTM E2273 method as a model test method to evaluate drainage plane drainage efficiency with other cladding systems installed over the drainage plane.

Industry and building codes agree that the ASTM E2273 test method provides good insight into the drainage performance of claddings. The 2011 Oregon Residential Specialty Code sets a precedent for using the ASTM E2273 test method when evaluating the drainage efficiency a water-resistive barrier (drainage plane) installed under an exterior veneer that is not specifically a drainable EIFS cladding system (ref. 2011 Oregon State Residential Specialty Code Section R703.1.1).

Additionally, ICC-ES has also created an evaluation guideline, EG356 (published in November 2006), “*Evaluation Guideline for a Moisture Drainage System used with Exterior Wall Veneers*”. EG356 uses ASTM E2273 as the drainage test method.

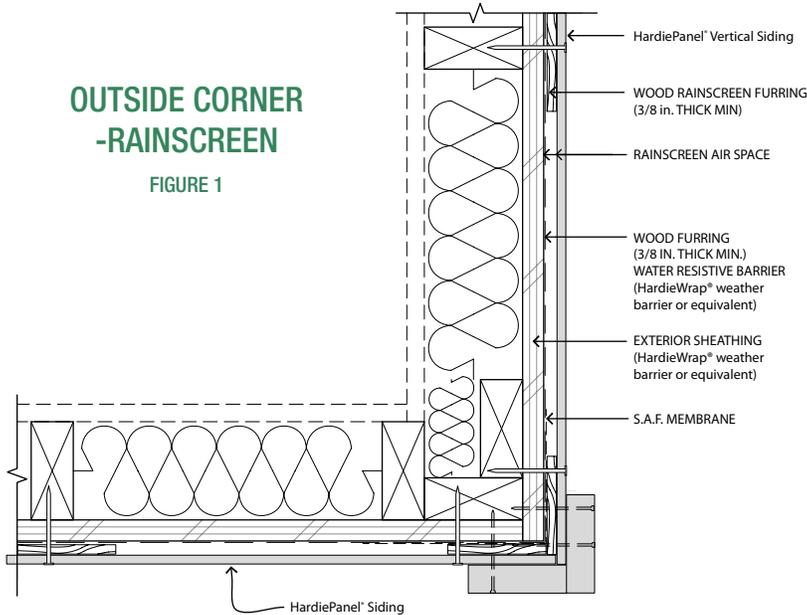
The “90%” drainage efficiency performance specification is built off of the 2012/2015 International Building Code (IBC) section 1408.4.1 which requires EIFS with drainage to have an average minimum 90% drainage efficiency when tested in accordance with ASTM E2273. ICC-ES EG356 Section 3.1.5.1 also requires 90% drainage efficiency as a condition of acceptance.

SECTION 3 DRAINAGE PRINCIPLES & 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.

OUTSIDE CORNER -RAINSCREEN

FIGURE 1



* NAILABLE SUBSTRATE. The IRC 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

