

## Additional Information

### ATTACHING JAMES HARDIE PRODUCTS TO INSULATED CONCRETE FORMS (ICF)

Considering the proprietary nature of Insulated Concrete Forms (ICF) and the number of ICF manufacturers currently selling product in the US and Canada, James Hardie Building Products cannot calculate or determine the proper fastener for each type of plastic or metal cross-tie flange being used in the field. James Hardie offers the following as a guide to determine the correct siding fastening to be used with the respective ICF system chosen for the project in question.

1. Determine the projects basic wind design, including basic wind speed, wind exposure category, and mean roof height.
2. Find the fastener and frame type within James Hardie's CCMC Report that will meet the project's basic wind design.

- a. Take note of the head diameter, shank diameter, and fastener length for the fastener.



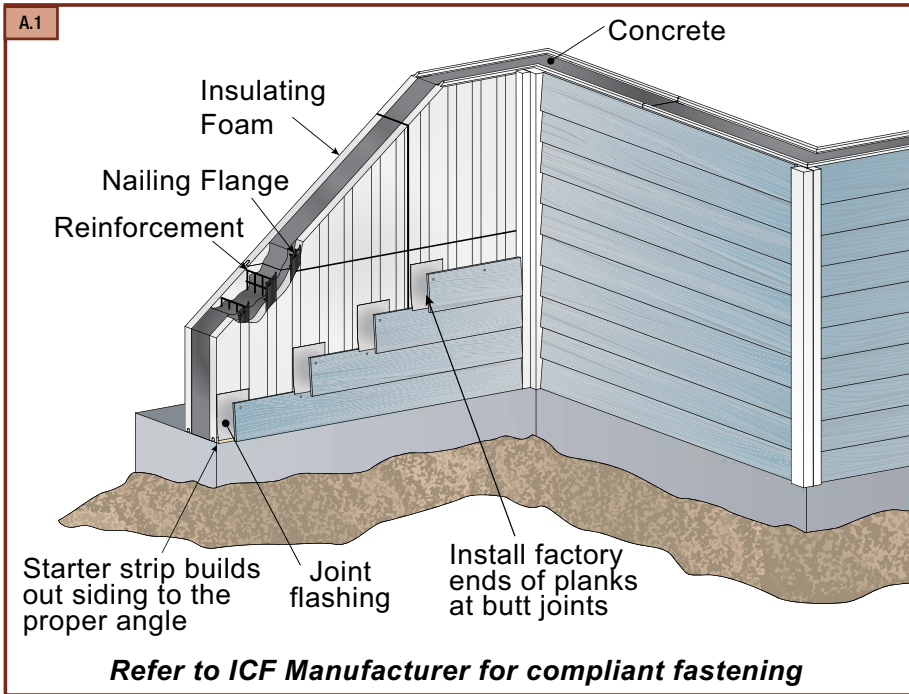
**Note: Fastener bearing area is equal to the head area less the shank area.**

- b. Take note of the frame type and frame spacing.

3. Go to the ICF system manufacturer and find a fastener that is similar in dimension to the fastener from step 2.1 above.
  - a. Basically, the bearing area under the ICF fastener head shall be the same as or greater than the bearing area under the James Hardie fastener head from step 2.
4. Since the James Hardie siding product has to be attached to a structural member, in this case the ICF cross-tie flange, the steps below shall be followed.
  - a. The onus is on the ICF system manufacturer to demonstrate that their ICF cross-tie flange holds fasteners, screws or nails, the same as wood or steel framing hold screws or nails.
  - b. ICF fastener allowable withdrawal load capacity (applicable factor of safety applied) may be found in an ICC-ES Product Evaluation for the given ICF manufacturer's products, OR
  - c. The ICF manufacturer may have testing that shows their fastener's allowable withdrawal load capacity (applicable factor of safety applied) from their cross-tie flange.
5. For the fastener from step 2, a registered design professional shall calculate the allowable withdrawal load (factor of safety applied) from the frame type noted in step 2.2.
6. A registered design professional shall then make an equivalency statement comparing the ICF fastener withdrawal (step 4.1.1 or step 4.1.2) versus the fastener withdrawal from step 5.
7. When the ICF cross-tie flange spacing differs from the James Hardie frame spacing in step 2.2, a registered design professional shall calculate the maximum siding fastener spacing into the cross-tie flange needed to resist the applicable basic wind speeds published in James Hardie's CCMC Report for the fastener and design from step 2.

# Additional Information (continued)

- When required by the code official and once in possession of the information gathered in the steps above it is the responsibility of the property owner, design professional, contractor, or installer to make his or her case to the Building Official.

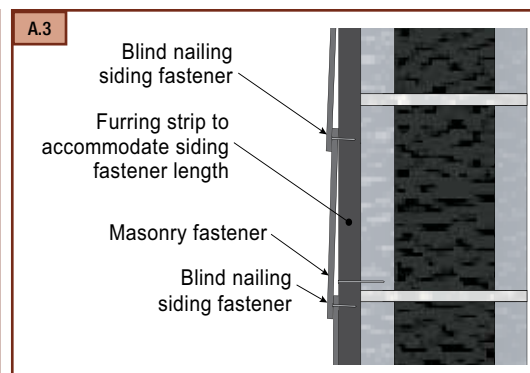
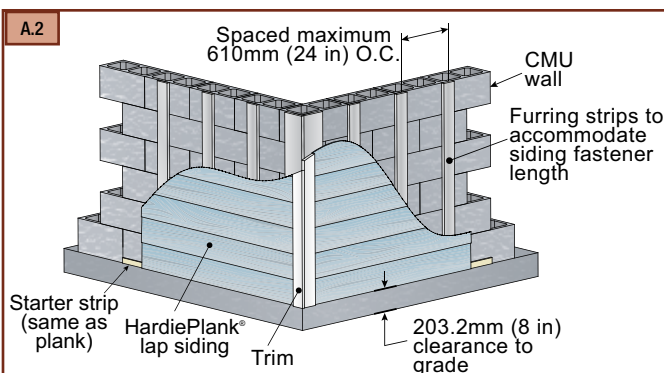


## ATTACHING HARDIEPLANK® LAP SIDING AND HARDIETRIM® PRODUCTS TO CONCRETE MASONRY UNITS (CMU)

The application of HardiePlank® Lap Siding and HardieTrim® boards to masonry construction complying with local building codes using Concrete Masonry Units (CMU) complying to ASTM C 90 can be achieved by using one of the following two methods of attachment. All other product specific installation requirements which are not outlined below must be followed.

### Method 1: Attachment Over Furring

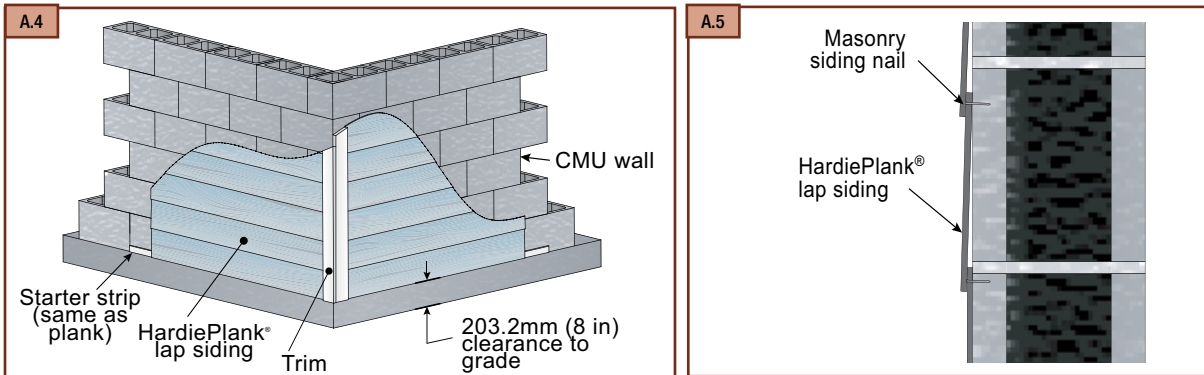
Attach over furring with adequate thickness to allow attachment with approved fastening methods according to local building codes and code compliance documentation. Furring must be attached to ensure it can transfer the wind loads and other necessary forces back to the structure. The mechanical connection of the furring to the structure is the responsibility of the Licensed Design Professional. James Hardie Building Products has no comment on the load carrying capacity of the furring to framing connections.



## Method 2: Attachment Directly to CMU

Attach directly to masonry with approved fastening method according to local building codes and code compliance documentation.

*Refer to and follow local building codes for water resistive barrier requirements*



## Attachment of HardieTrim® boards

HardieTrim boards can be fastened using hardened finish nails designed for masonry construction. For more information refer to the HardieTrim section of this guide.

# Additional Information (continued)

## ICC – IBC® & IRC®/2006 – ALLOWABLE FASTENER SPACING (in)

### HardiePlank® Lap Siding fastened to ASTM C 90 Concrete Wall

Basic Wind Speed	Building Height (feet)	<6½-inch wide			7¼- & 7½-inch wide			8- & 8¼-inch wide			9¼- & 9½-inch wide		
		Exposure			Exposure			Exposure			Exposure		
		B	C	D	B	C	D	B	C	D	B	C	D
161 kph	0-15	24	24	24	24	24	24	24	24	21	24	23	19
	20	24	24	24	24	24	23	24	24	20	24	21	18
	30	24	24	24	24	24	21	24	22	19	24	20	17
	40	24	24	23	24	24	20	24	21	18	24	19	16
	50	24	24	22	24	22	19	24	20	17	24	18	15
	60	24	24	22	24	22	19	24	19	17	24	17	15
177 kph	0-15	24	24	22	24	24	19	24	21	17	23	19	15
	20	24	24	21	24	22	18	24	20	16	23	18	15
	30	24	24	20	24	20	17	24	18	15	23	16	14
	40	24	22	19	24	19	16	23	17	15	21	15	13
	50	24	21	18	24	18	16	22	16	14	20	14	12
	60	24	20	18	23	18	15	21	16	14	19	14	12
193 kph	0-15	24	23	19	24	20	17	21	18	15	19	16	13
	20	24	22	18	24	19	16	21	17	14	19	15	12
	30	24	20	17	24	17	15	21	15	13	19	14	12
	40	24	19	16	22	16	14	20	14	12	18	13	11
	50	24	18	16	21	16	13	18	14	12	17	12	11
	60	23	17	15	20	15	13	18	13	11	16	12	10
209 kph	0-15	24	20	16	21	17	14	18	15	12	16	14	11
	20	24	19	15	21	16	13	18	14	12	16	13	11
	30	24	17	14	21	15	12	18	13	11	16	12	10
	40	22	16	14	19	14	12	17	12	11	15	11	9
	50	21	15	13	18	13	11	16	12	10	14	11	9
	60	20	15	13	17	13	11	15	11	10	13	10	9
225 kph	0-15	21	17	14	18	15	12	16	13	11	14	12	10
	20	21	16	13	18	14	12	16	12	10	14	11	9
	30	21	15	12	18	13	11	16	11	10	14	10	9
	40	19	14	12	16	12	10	15	11	9	13	9	8
	50	18	13	11	15	11	10	14	10	9	12	9	8
	60	17	13	11	15	11	10	13	10	9	12	9	8
241 kph	0-15	18	15	12	16	13	11	14	11	9	12	10	8
	20	18	14	12	16	12	10	14	11	9	12	10	8
	30	18	13	11	16	11	9	14	10	8	12	9	7
	40	16	12	10	14	10	9	13	9	8	11	8	7
	50	15	12	10	13	10	9	12	9	8	11	8	7
	60	15	11	10	13	10	8	11	8	7	10	8	7

#### Notes to Table:

- Fasteners shall be ET&F Fastening Systems, Inc. ET&F block Nail (ET & F No. ASM-144-125, head dia. = 0.30 in, shank dia. = 0.14 in, length = 1.25-in long) or Max System block Nail (CP-C 832 W7-ICC, head dia. = 0.30 in, shank dia. = 0.15 in, length = 1.3 in).
- Maximum basic wind speed shall be 250 kph.
- Interpolation to address building height and other plank widths is permitted.
- The lap conceals the fasteners of the previous course (Blind Nailed).
- 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mph = 0.44 m/s

**INSTALLING OVER RIGID FOAM INSULATION UP TO 25 MM (1 in) THICK**

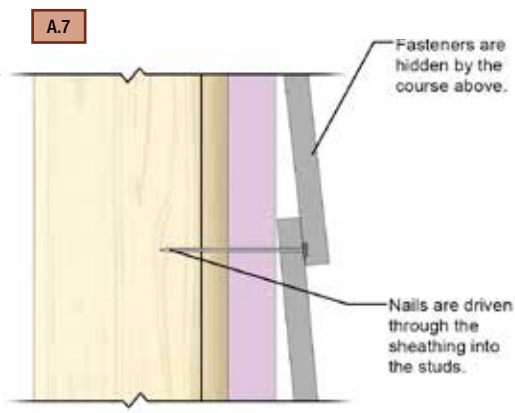
James Hardie does support the use of its exterior siding products installed over rigid foam insulation, but does not take responsibility for the entire wall assembly or system. James Hardie expects the designer or builder using our components as part of the insulated wall assembly to:

- Adhere to all the installation requirements listed in the relevant product installation instructions.
- Provide adequate details for water management.
- Make the decision about the use and type of rigid foam insulation.
- Understand the interaction between system components and how each of the components in the system interacts.
- Design the building envelope to account for both interior and exterior moisture control.



**General requirements and installation guidelines:**

- All James Hardie® product specific installation requirements must be followed.
- All national, state, and local building code requirements must be followed. Where they are more stringent than the James Hardie installation requirements, state and local requirements will take precedence.
- James Hardie siding and trim products can be installed over solid-foam insulation board up to 25 mm (1 in) thick. Caution should be taken as irregularities and unevenness in framing, sheathing, foam and other wall assembly components, including under driven nails, can telegraph through to the finished siding and trim. These irregularities should be corrected before the siding is installed.
- When reviewing the following details for attaching over foam, an important consideration is that the fastener chosen must be adequately encompassed by a wood substrate. The foam will not count as part of the necessary penetration, therefore the length of the chosen fastener must be extended by the thickness of the foam.



**Fastener Selection:**

- When attaching lap siding products over foam, the length of the chosen fastener must be extended in length by the thickness of the foam.

Normal Fastener	Fastener for an additional 12.7mm (1/2 in) of Foam
6d common 50mm (2 in) long	8d common 63.5mm (2 ½ in) long
11 ga. 32mm (1¼ in) long roofing nail	11 ga. 44.5mm (1 ¾ in) long roofing nail
8-18 x 41mm (1⅝ in) x 8.2mm (.323 in) HD ribbed bugle head screw	8-18 x 54mm (2⅛ in) x 8.2mm (.323 in) HD ribbed bugle head screw

Refer to the CCMC or other code compliant documentation for proper fastener selection based on specific product, stud spacing, building height, and exposure category.

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Tools for Cutting and Fastening

General Installation Requirements

General Fastener Requirements

Finishing and Maintenance

HardieTrim® Boards/Battens

HardieSoffit® Panels

HardiePlank® Lap Siding

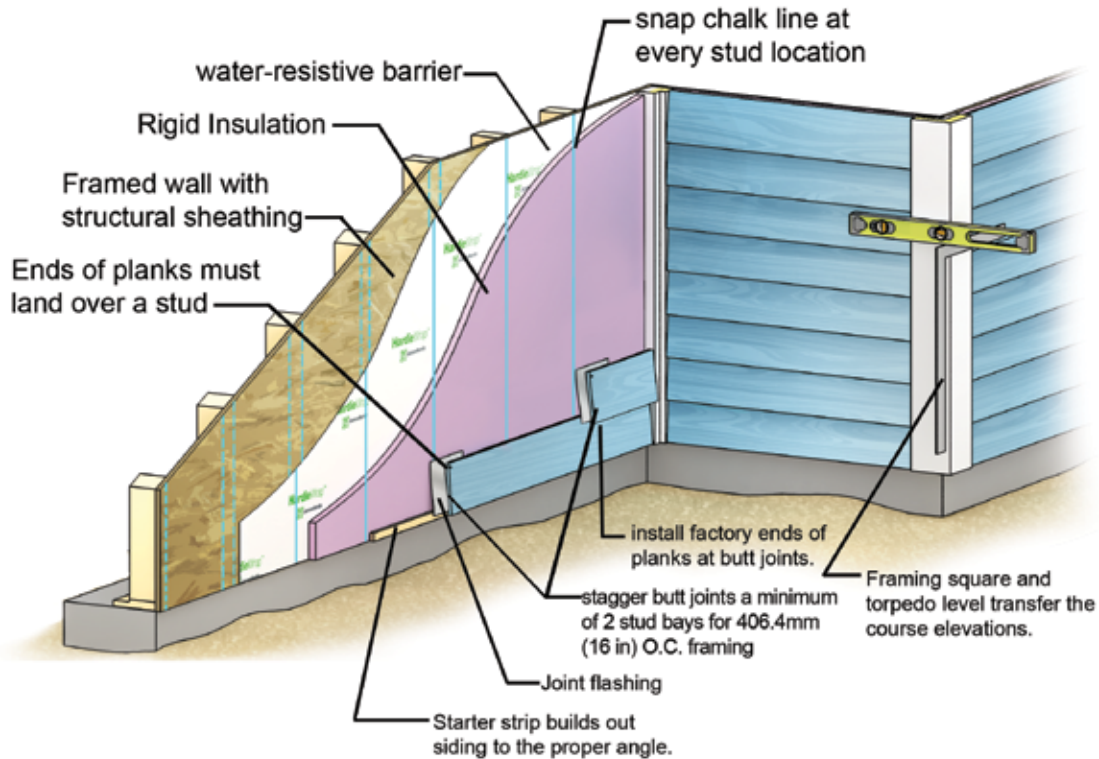
HardieShingle® Siding

HardiePanel® Vertical Siding

Appendix/Glossary

CCMC Report

A.8

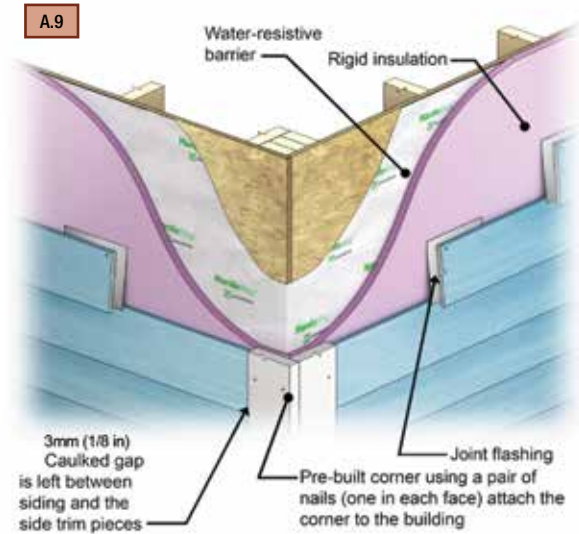


**TIP:** With some types of foam it is possible to use the rigid foam as the water resistive barrier by taping and sealing all of the joints. Refer to specific manufacturers installation requirements when considering this type of application.

**Note:** When attaching lap siding products over foam the length of the chosen fastener must be extended by the thickness of the foam to achieve the same required holding power.

## WEATHER BARRIER & RIGID FOAM

- When using a weather resistive barrier (WRB) in conjunction with rigid foam insulation, the WRB can be installed underneath the foam as shown, or over the top if more convenient
- Regardless of where the WRB is placed, all flashings must be incorporated into the WRB and drainage plane.
- Some rigid foam insulation products are manufactured with tongue & groove or shiplap joints and can be used as the WRB when properly installed and sealed. When using rigid foam insulation as the WRB refer to manufacturers installation instructions.

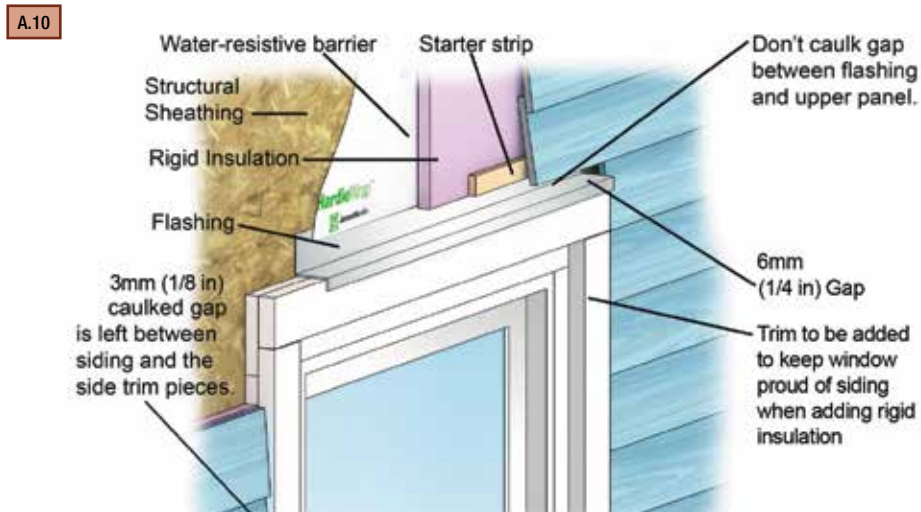


### Trim

Depending upon the reveal around windows, doors, and penetrations, the thickness of foam, and the type and thickness of trim used, there will be different techniques to install the siding and trim to ensure the foam is completely concealed.

### Flashings

The Z flashing above all horizontal trim must be incorporated into the WRB regardless of WRB position. If the foam is being used per manufacturers instructions as the WRB, all flashings must be incorporated into the drainage plane such that it allows moisture to drain down and out.



**Note:** It is recommended to layout the rigid foam insulation such that vertical joints do not occur at the corners of window and door openings or over window heads if possible.

# Additional Information (continued)

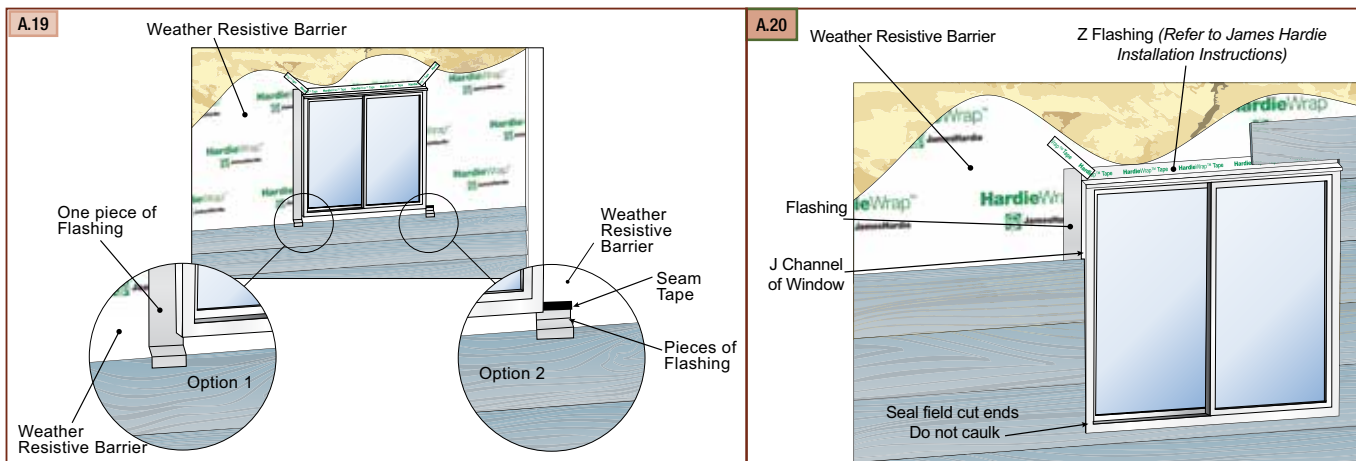
## INSTALLING HARDIEPLANK® LAP SIDING AROUND WINDOWS WITH AN INTEGRATED J-CHANNEL

When installing fiber cement around a window with a “J” channel there are a few guidelines which should be followed to control water flow:

- All windows must be installed per manufacturers installation instructions and must incorporate all necessary flashings.
- At the bottom sides of the window, a flashing must be installed that will redirect any water that runs down the inside of the “J” channel out and away so that it does not run down the wall assembly and behind the plank below the window.
  - This can be done by inserting a flashing that runs the entire length of the window (option 1) or by cutting the weather resistive barrier towards the bottom of the window and inserting a smaller flashing and taping with seam tape to reseal the weather resistive barrier (option 2).
  - This flashing would then be lapped over the last plank at the bottom of the window, similar to a joint flashing, to direct water down and out to the front of the cladding.
- A “z” flashing must be installed and integrated into the weather resistive barrier at the top of the window. The “z” flashing will allow water to be drained away from the window and wall, opposed to being captured in the “J” at the top of the window. (Refer to JamesHardie Installation Instructions for further “z” flashing details).
- Seal all field cut non factory ends with an exterior grade paint, primer, or sealer.
  - Insert ends of plank into the “J” channel of the window.
  - Do not try to squeeze caulk into the “J” channel.
  - Plank integrated into “J” channel must be primed, painted or caulked.



Typical “J” Channel Window



## JOINT FLASHING WITH HARDIEPLANK® LAP SIDING

One or more of the following joint treatment options are required by code (as referenced 2009 IRC R703.3.2)

- Joint Flashing (James Hardie recommended)
- Caulking\* (Caulking is not recommended for ColorPlus for aesthetic reasons as the Caulking and ColorPlus will weather differently. For the same reason, do not caulk nail heads on ColorPlus products.)
- “H” jointer cover Flashing behind butt joints provides an extra level of protection against the entry of water at the joint.

James Hardie recommends 6 in. wide flashing that overlaps the course below by 1 in. Some local building codes may require different size flashing. Joint-flashing material must be durable, waterproof materials that do not react with cement products. Examples of suitable material include finished coil stock and code compliant water-resistive barriers. Other products may also be suitable.



**The reasons for this are:**

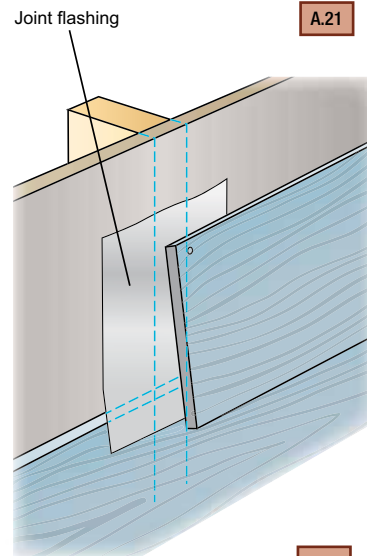
1. The use of joint flashing behind field butt joints is an approved joint treatment method as described in the 2006 International Building Code and is recognized by James Hardie and experts across the building industry to be a superior method.

**“1405.17.2 Horizontal lap siding.** Lap siding shall be lapped a minimum of 1 1/4 inches (32 mm) and shall have the ends sealed with caulking, covered with an Hsection joint cover or located over a strip of flashing.”

Experts across the industry recognize flashings as an effective and responsible method for draining a wall system:

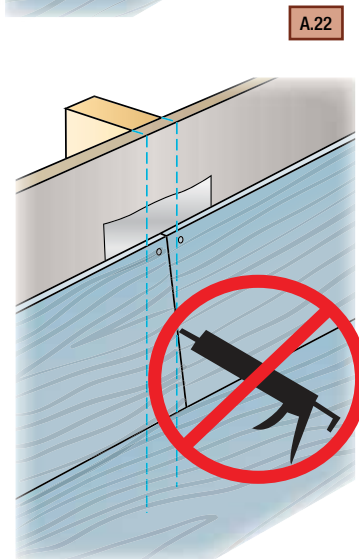
*“The fundamental principle of water management is to shed water by layering materials in such a way that water is directed downwards and outwards out of the building or away from the building. The key to this fundamental principle is drainage. The most elegant expression of this concept is a flashing. Flashings are the most under-rated building enclosure component and arguably the most important.”*

EEBA (Energy & Environmental Building Association™) Water Management Guide By Joseph W. Lstriburek, Ph.D., P.eng. June 2004.



2. Reduced maintenance required by the home owner – It is recognized by James Hardie, several caulking manufacturers, experts across the industry, and experienced home owners that when caulking is used at field butt joints, maintenance will be required. Depending on the specific product and the application, caulked field butt joints will need to be maintained to guarantee continued performance over the life of the building. In addition, several sealant/caulking manufacturers recommend against using their products at butt joints in fiber cement siding for many of the reasons discussed here.

3. Improved appearance – When installed properly, flashing at a field butt joint can create a better looking joint. James Hardie recommends butting field joints together in moderate contact which achieves a more continuous looking joint. When utilizing a caulked butt joint, a gap specified by the caulk manufacturer must be left at the joint. Over time as the caulk ages, this joint can become pronounced on the wall and stand out.



Do not use caulk on HardiePlank® lap siding with ColorPlus® technology

**JAMES HARDIE REQUIREMENTS FOR ALTERNATE FASTENERS AND METHODS OF FASTENING**

The fastening requirements for each product are stated in one or more of the following technical documents and in some cases fastener products may be referenced. Below are the steps that can be used to demonstrate an alternate fastener’s equivalency to the James Hardie published fastening requirements.

1. It is the responsibility of either the property owner, design professional, contractor, or installer to consult:
  - a. The fastener Manufacturer for a Product Listing Specification or Code Compliance report that covers the installation method in question, or;
  - b. A licensed Architect or Professional Engineer to make an equivalency statement linking the alternate fastener (or fastening method) to the fastening requirements published within the relevant James Hardie technical document;
2. Once in possession of the information gathered in step one it is the responsibility of the property owner, design professional, contractor, or installer to make his or her case to the Building Official<sup>1</sup>

<sup>1</sup> The Building Official reserves the right to approve alternate materials, design and methods of construction, 2006 International Building Code® Section 104.11, 2006 International Residential Code Section R104.11, and 1997 Uniform Building Code Section 104.2.8.

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.

# Appendix B

## Estimating

### Siding

All houses can be broken down to triangles, rectangles, and squares. Using these simple shapes it is very easy to estimate the amount of siding required.

1. Break down the portions of the house to be sided into the simple shapes (squares, rectangles, triangles) Figures 12.1 - 12.4.
2. Determine the height and width of each shape.
3. Multiply height x width to determine square footage. For triangles divide the total by 2.
4. Add all of the square footage numbers together.
5. Subtract large items such as garage doors, large doors, large windows, and banks of windows from total. Do not remove small windows, doors, vents, or other small areas not being sided.
6. Total all numbers. This gives you the total covered area.
7. Use the coverage charts located in this section to determine the number needed.
8. Add a minimum of 5% for waste. If there are multiple (3 or more) gables, chases, bump outs, or dormers add 10%.\*

\* Material for starter strip is included in the calculation for waste.

### Trim

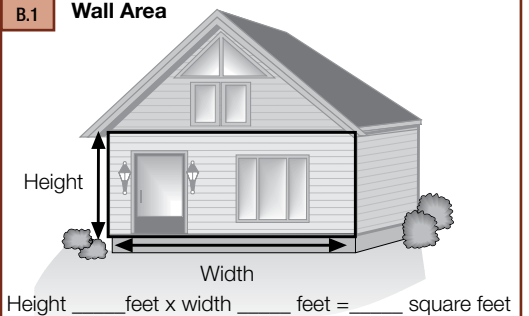
Number of HardieTrim® Boards:

Trim is applied to corners and around doors and windows. Trim is also used for fascia board, rake board, band board, frieze board and other details.

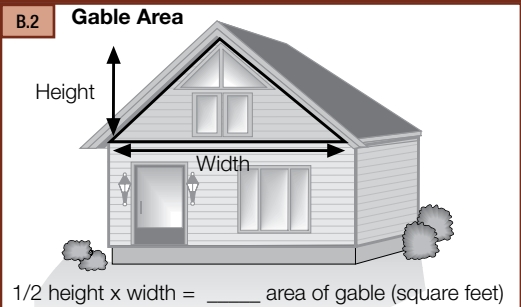
1. Determine which areas are to be trimmed.
2. Measure all openings to be trimmed including doors, windows, vent openings, corners (inside and outside), and other areas.
3. Measure for fascia, rakes, and frieze boards.
4. Add the lengths for corners, fascia, rakes, and frieze and add 5% for waste.
5. Add the lengths for window and door trim and add 10% for waste.
6. Add the total from lines 4 and 5 to determine the amount of trim needed.

*Disclaimer: The estimation methods in this section are meant as a guide. James Hardie does not assume responsibility for over or under ordering of product.*

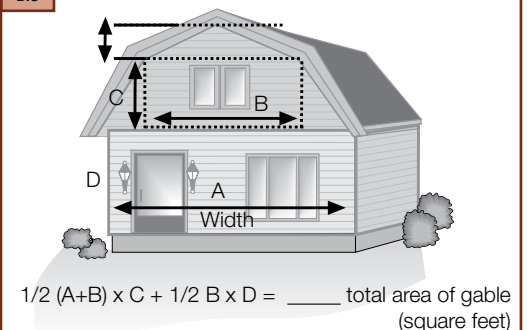
B.1 Wall Area



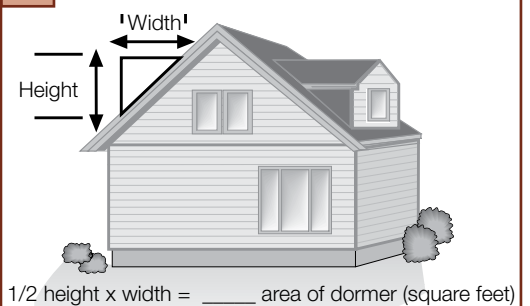
B.2 Gable Area



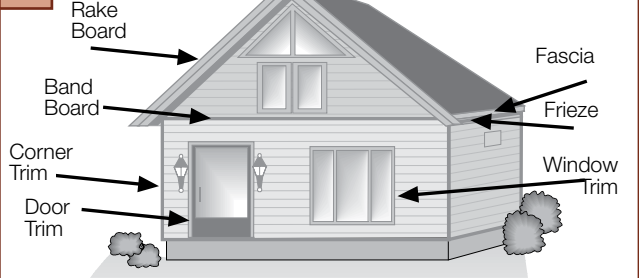
B.3 Gambrel Roof House



B.4 Dormer Area



B.5



## HardiePlank® Lap Siding Coverage Chart\* (number of planks)

Coverage Area (square feet)	Plank Width (in)						
	Width (in) Exposure (in)	5.25 4	6.25 5	7.25 6	8.25 7	9.25 8	12 10.75
100		25	20	17	14	13	9
200		50	40	33	29	25	19
300		75	60	50	43	38	28
400		100	80	67	57	50	37
500		125	100	83	71	63	47
600		150	120	100	86	75	56
700		175	140	117	100	88	65
800		200	160	133	114	100	74
900		225	180	150	129	113	84
1000		250	200	167	143	125	93
1100		275	220	183	157	138	102
1200		300	240	200	171	150	112
1300		325	260	217	186	163	121
1400		350	280	233	200	175	130
1500		375	300	250	214	188	140
1600		400	320	267	229	200	149
1700		425	340	283	243	213	158
1800		450	360	300	257	225	167
1900		475	380	317	271	238	177
2000		500	400	333	286	250	186
2100		525	420	350	300	263	195
2200		550	440	367	314	275	205
2300		575	460	383	329	288	214
2400		600	480	400	343	300	223
2500		625	500	417	357	313	233
2600		650	520	433	371	325	242
2700		675	540	450	386	338	251
2800		700	560	467	400	350	260
2900		725	580	483	414	363	270
3000		750	600	500	429	375	279



## Nail Coverage Chart\*\* (number of nails)

Coverage Area (square feet)	Plank Width (in)						
	Width (in) Exposure (in)	5.25 4	6.25 5	7.25 6	8.25 7	9.25 8	12 10.75
100		250	200	166	143	125	93
500		1250	1000	830	715	625	465
1000		2500	2000	1660	1430	1250	930

### Disclaimer

The estimation methods in this section are meant as a guide. James Hardie does not assume responsibility for over or under ordering of product.

\* Coverage chart does not include waste. \*\* Number of nails given are for building framed 16 in. o.c.

# Estimating (continued)

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HardieTrim® Boards/Battens

HardieSoffit® Panels

HardiePlank® Lap Siding

HardieShingle® Siding


HardiePanel® Vertical Siding

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CCMC Report

**HardiePanel® Vertical Siding Coverage Chart\*** (number of panels)

Coverage Area (square feet)	Panel Size (ft.)		
	4 ft x 8 ft (32SF)	4 ft x 9 ft (36SF)	4 ft x 10 ft (40SF)
100	4	3	3
200	7	6	5
300	10	9	8
400	13	12	10
500	16	14	13
600	19	15	15
700	22	20	18
800	25	23	20
900	29	25	23
1000	32	28	25
1100	35	31	28
1200	38	34	30
1300	41	37	33
1400	44	39	35
1500	47	42	38
1600	50	45	40
1700	54	48	43
1800	57	50	45
1900	60	53	48
2000	63	56	50
2100	66	59	53
2200	69	62	55
2300	72	64	58
2400	75	67	60
2500	79	70	63
2600	82	73	65
2700	85	75	68
2800	88	78	70
2900	91	81	73
3000	94	84	75



Disclaimer

The estimation methods in this section are meant as a guide. James Hardie does not assume responsibility for over or under ordering of product. Chart reflects footages rounded up to next full panel.

\* Coverage chart does not include waste.

## HardieShingle® Siding

### HardieShingle Staggered Edge Notched Panel Coverage

Panels are available in 48 in. lengths. Pieces needed for one square (100 sq. ft.) of product coverage = approximately 50, (depending on ratio of length to height of wall) based on maximum exposure of 6 in..

### HardieShingle Straight Edge Notched Panels Coverage

Panels are available in 48 in. lengths. Pieces needed for one square (100 sq. ft.) of product coverage = approximately 43, (depending on ratio of length to height of wall) based on maximum exposure of 7 in..

### HardieShingle Half-round Notched Panel Coverage

Panels are available in 48 in. lengths. Pieces needed for one square (100 sq. ft.) of product coverage = approximately 43, based on a maximum exposure of 7 in..

### HardieShingle Individual Shingle Coverage\*

Shingles are available in 4 3/16 in., 5 1/2 in., 6 3/4 in., 7 1/4 in., 10 in. widths, Bundles needed for one square (100 sq. ft.) of product coverage:

Shingle Width	Number of Bundles	Pieces per Bundle
4- <sup>3</sup> / <sub>16</sub> in	3	15
5- 1/2 in	6	15
6- <sup>3</sup> / <sub>4</sub> in	3	15
7- <sup>1</sup> / <sub>4</sub> in	6	15
10 in	3	15



\* Individual shingles are not available in all areas. Check you local dealer for availability.

### HardieSoffit® Panels

- For 12 in. and 16 in. width soffits: Divide total lineal footage of soffit and/or eaves by 12.
- For 24 in. width soffits: Divide total lineal footage of soffit and/or eaves by 8.

#### Disclaimer

The estimation methods in this section are meant as a guide. James Hardie does not assume responsibility for over or under ordering of product. Chart reflects footages rounded up to next full panel.

\* Coverage chart does not include waste.

# Appendix C

## Glossary of Building Terms

**Back Roll** - To roll over a freshly spray painted surface with a roller.

**Back Sealing/Priming** - Back sealing and back priming are used interchangeably in the field and refer to the act of applying a sealer or primer to the back of a cladding material to minimize the potential for water absorption through the backside of the product.

**Band Board** - A decorative piece of trim placed between two floors along the rim joist.

**Bevel Cut** - See weather cut

**Blind Nailing** - The action of placing a fastener through the top edge of lap siding that will be covered by the next course of siding.

**Bump Out** - A built out protrusion from a building.

**Butt Joint** - To place materials end-to-end or end-to-edge without overlapping. Also known as a field joint.

**Caulk** - A compound used to fill cracks, gaps, seams and joints.

**Chase** - A framed enclosed space around a flue pipe or a channel in a wall, or through a ceiling for something to lie in or pass through.

**Course** - A row of planks, one plank wide running the length of the house.

**Dormer** - A gabled extension built out from a sloping roof to accommodate a vertical window.

**Drip Cap** - A molding or metal flashing placed on the exterior topside of a door or window frame to cause water to drip beyond the outside of the frame.

**Drip Edge** - A metal or vinyl flashing placed on the top edge of the roof sheathing which directs water away from the structure to prevent seepage under or behind the exterior trim or fascia.

**Eave** - The lower part of the roof that projects over the exterior wall assembly.

**Electro-Galvanized** - Covered with zinc using a plating process.

**Face** - The side of the siding, trim, or soffit showing once the product has been installed.

**Face Nailing** - The action of placing a fastener through the overlap of a plank. The fastener will be visible.

**Fascia Board** - A trim board attached to the ends of the rafters.

**Finished Grade** - The level at which the ground surface meets the foundation of a building.

**Flashing** - A thin flat metal positioned under/behind roofing, windows, doors, corner posts, etc. to keep draining water from penetrating the house.

**Frieze Board** - A horizontal member connecting the top of the siding with the soffit

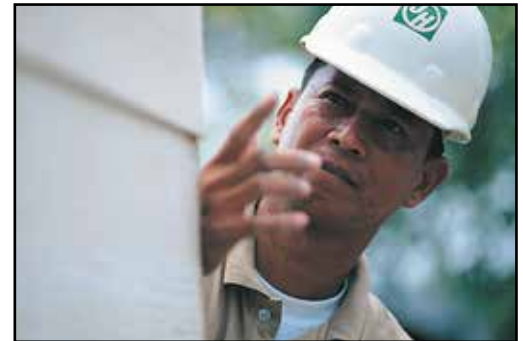
**Furring/Furring Strip** - Furring strips are long, thin strips of wood, metal or Fiber Cement used to make backing surfaces to support the finished surfaces.

**Gable** - The end of a wall that is created when a roof line is pitched and slopes in two directions.

**Galvanized** - Covered with zinc. Either hot-dipped or electro-plated.

**Grade** - The height of the ground on which something stands.

**Horizontal** - Parallel to the horizon; on a level.



**Joint Flashing** - An additional weather resistive barrier placed behind a butt joint.

**Lap** - To over lap a course of siding with another course of siding.

**Level** - A position of measurement truly and exactly horizontal, 90° from a plumb surface.

**Light Block** - Decorative trim item placed under light fixtures and other exterior fixtures.

**Miter** - To make a diagonal cut, beveled to a specific angle 45° and 22 1/2 ° are common.

**Mud Sill** - A building member resting and normally attached to the foundation of a building running around the perimeter of the building. Also known as sill plate.

**OSB** - Oriented Strand Board. A common type of structural panel sheathing.

**PEL** - Personal Permissible Exposure Limit. The maximum daily exposure level to respirable silica. OSHA's Personal Exposure Limit is 0.1 mg/m<sup>3</sup>.

**Plumb** - A position of measurement truly and exactly vertical, 90° from a level surface.

**Plunge Cut** - The act of driving a saw into the body of a material.

**Rafter Tail** - The end of a rafter extending past the wall assembly.

**Rain Screen Wall** - Consists of an exterior cladding, a cavity behind the cladding typically created through the use of furring strips for the purpose of drainage and venting to the outside; an inner wall plane incorporating a weather resistive barrier.

**Rake Board** - Decorative trim placed at an angle.

**Rigid Sheathing** - Plywood or OSB.

**Rim Joist** - The board that the rest of the joists are nailed to. It runs the entire perimeter of the house.

**Rip Cut** - Cut along the grain, usually lengthwise on a board.

**Scroll Work** - Decorative trim work.

**Sheathing** - Sheets of plywood, gypsum board, or other material nailed to the outside face of studs as a base for exterior siding.

**Shim** - A building material, usually wood, used to even a surface.

**Silica** - Mineral that is composed of silicon dioxide, SiO<sub>2</sub>.

**Speed Square** - Triangle shaped measuring device used in a variety of framing and siding applications.

**Stage** - To deliver, stack, or store material in a specific location.

**Starter Strip** - An accessory used under the first course of siding to provide a consistent plank angle.

**Sub-Fascia** - Framing member attached to the rafter tails used to support the fascia or used to pad out the fascia.

**T-Shed** - A shed with a single vertical wall and a roof that hangs off that wall on either side. The cross section of the shed is shaped like a 'T'.

**Vertical** - Being or situated at right angles to the horizon; upright.

**Weather Cut**- 15° to 45° cut used to join two boards.

**Weather-Resistive Barrier**- A building paper that protects building materials from exterior water penetration.

**Z-Flashing**- A piece of flashing bent into the shape of a "z". Used over window trim, band boards, panel intersections, and other vertical surfaces.



## Evaluation Report CCMC 12678-R

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# **HardiePanel® HZ5™ Vertical Siding, HardiePlank® HZ5™ Lap Siding, HardieShingle® HZ5™ Notched Panel, and HardieShingle® HZ5™ Individual Shingle**

## **1. Opinion**

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “HardiePanel® HZ5™ Vertical Siding, HardiePlank® HZ5™ Lap Siding, HardieShingle® HZ5™ Notched Panel, and HardieShingle® HZ5™ Individual Shingle” when used as an exterior cladding applied to vertical walls of masonry or concrete, as well as cementitious and wood sheathing boards that are attached to wood or steel framing, in new and retrofit construction in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code 2005:

- Clause 1.2.1.1.(1)(a), Division A, using the following acceptable solutions from Division B:
  - Article 3.1.5.1. Noncombustible Materials
  - Sentence 5.6.1.1.(1) Required Protection from Precipitation
  - Sentence 9.27.1.1.(1) General (cladding)
  - Clause 9.27.2.2.(1)(a) Minimum Protection from Precipitation Ingress (when installed in coastal areas)
  - Sentence 9.27.2.2.(2) Minimum Protection from Precipitation Ingress
  - Sentence 9.27.2.2.(5) Minimum Protection from Precipitation Ingress
  - Article 9.27.2.3. First and Second Planes of Protection
  - Article 9.27.3.1. Elements of the Second Plane of Protection
- Clause 1.2.1.1.(1)(b), Division A, as an alternative solution that achieves at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the following applicable acceptable solutions:
  - Sentence 9.27.2.1.(1) Minimizing and Preventing Ingress and Damage

This opinion is based on CCMC's evaluation of the technical evidence in Section 4.1 provided by the Report Holder.

Ruling No. 95-17-36 (12678-R) authorizing the use of this product in Ontario, subject to the terms and conditions contained in the Ruling, was made by the Minister of Municipal Affairs and Housing on 1995-11-29 pursuant to s.29 of the Building Code Act, 1992 (see Ruling for terms and conditions). This Ruling is subject to periodic revisions and updates.

## **2. Description**

The products are fibre-cement boards mainly made of hydraulic cement, silica, and other additives and reinforced integrally with cellulose fibres. The products are manufactured using the Hatschek process and steam autoclaved. They are intended for use as an exterior cladding applied to vertical walls of masonry or concrete, as well as cementitious and wood sheathing boards that are attached to wood or steel framing, in new and retrofit construction subject to the



conditions stated in Section 3 of this report. These products may be supplied unprimed or primed for subsequent application of appropriate coatings.

#### **“HardiePanel® HZ5™ Vertical Siding”**

“HardiePanel® HZ5™ Vertical Siding” are manufactured in 2438-mm- to 3658-mm-long, 1219-mm-wide, and 8-mm-thick panels. The panels are available in smooth, stucco pattern, or wood grain face texture.

Additional product lengths and widths may be available by special order from the manufacturer.

The panels are installed over wood strapping that is attached to the framing members via corrosion resistant nails. Vertical joints of the panels shall butt over studs. See manufacturer's installation instructions, dated April 2009, for details and restrictions.

#### **“HardiePlank® HZ5™ Lap Siding”**

“HardiePlank® HZ5™ Lap Siding ” are manufactured in 3658-mm-long, 102-mm- to 305-mm-wide, and 8-mm-thick planks. The planks are available in smooth or wood grain face texture.

Additional product lengths and widths may be available by special order from the manufacturer.

The planks are installed beginning from the bottom of the wall with a minimum overlap of 32 mm. Vertical joints of the planks shall butt over the framing members (studs) (see manufacturer's installation instructions, dated April 2009, for details and restrictions). The lap siding is fastened either through the overlapping planks (face-nailed) with corrosion resistant nails or screws, or through the top edge of the shingle planks (blind-nailed).

#### **“HardieShingles® HZ5™ Notched Panel”**

“HardieShingles® HZ5™ Notched Panel” is manufactured in 356-mm- to 483-mm-long, 1219-mm-wide, and 6-mm-thick panels. The panels are available in a wood grain texture.

Additional product lengths and widths may be available by special order from the manufacturer.

See manufacturer's installation instructions, dated April 2009, for details and restrictions.

#### **“HardieShingles® HZ5™ Individual Shingles”**

“HardieShingles® HZ5™ Individual Shingles” are manufactured in 457-mm-long, 152-mm- to 305-mm-wide, and 6-mm-thick cladding shingles. The shingles are available in a wood grain texture.

Additional product lengths and widths may be available by special order from the manufacturer.

See manufacturer's installation instructions, dated April 2009, for details and restrictions.

### ***3. Conditions and Limitations***

CCMC's compliance opinion in Section 1 is bound by the “HardiePanel® HZ5™ Vertical Siding, HardiePlank® HZ5™ Lap Siding, HardieShingle® HZ5™ Notched Panel, and HardieShingle® HZ5™ Individual Shingle” being used in accordance with the conditions and limitations set out below.

- These cladding products are permitted in the construction of buildings required to be of combustible or noncombustible construction in accordance with Article 3.1.5.1. of Division B of the NBC 2005.
- At least one layer of wall sheathing membrane conforming to Article 9.27.3.2., Sheathing Membrane Material Standard, of Division B of the NBC 2005 must be applied beneath the cladding products.

- For applications in coastal areas as defined by Sentence 9.27.2.2.(5) of Division B of the NBC 2005, all listed products must be installed over wood strapping in conformance with Clause 9.27.2.2.(1)(a), Sentences 9.27.2.2.(2), and 9.27.5.7.(2), Penetration of Fasteners, and Articles 9.27.5.3., Furring, and 9.27.5.4., Size and Spacing of Fasteners, of Division B of the NBC 2005.
- “HardiePanel® HZ5™ Vertical Siding” must be installed over wood strapping in conformance with Clause 9.27.2.2.(1)(a), Sentences 9.27.2.2.(2), and 9.27.5.7.(2), Penetration of Fasteners, and Articles 9.27.5.3., Furring, and 9.27.5.4., Size and Spacing of Fasteners, of Division B of the NBC 2005, in all areas (coastal and non-coastal areas).
- For applications in coastal areas defined by Sentence 9.27.2.2.(5) of Division B of the NBC 2005, the drained and vented air space described in Clause 9.27.2.2(1)(a) of Division B of the NBC 2005 must remain unobstructed.
- The installation of the products must be limited to geographical areas where the hourly wind pressures based on a probability of being exceeded in any one year of 1 in 50 is less than 0.6 kPa ( $Q_{50} < 0.6$  kPa).
- For direct applications in non-coastal areas, the air space between the substrate and the products that is created as a result of the overlap of the cladding boards must remain unobstructed.
- For direct application of “HardiePlank® HZ5™ Lap Siding ” in non-coastal areas, the butt joint must consist of factory-finished ends in conjunction with a joint flashing behind the joint, which consists of 150-mm-wide code-prescribed sheathing membrane that overlaps the course below by 25 mm. The butt joint must load on a stud.
- Installation of the cladding products must meet the requirements of Article 9.27.3.8., Flashing Installation, and Subsections 9.27.4., Caulking, and 9.27.5., Attachment of Cladding, of Division B of the NBC 2005.
- The cladding products must be installed in conjunction with materials conforming to Articles 9.27.3.2. and 9.27.3.7., Flashing Materials, and Subsections 9.27.4. and 9.27.5. of Division B of the NBC 2005.
- The possibility of moisture accumulation within the wall construction is mainly a function of the level of workmanship related to the elements constituting the second plane of protection as defined in Article 9.27.2.3. of Division B of the NBC 2005, such as wall sheathing membrane, flashing, caulking and attachment of siding. A high level of quality control at all stages of the exterior wall construction is imperative for obtaining an acceptable performance.
- The requirements of Article 9.10.16.1, Required Fire Stops in Concealed Spaces, of Division B of the NBC 2005 must be met.
- This evaluation covers primed/unprimed/textured, uncoated or painted products. Low permeance coatings may affect the drying potential of the product as well as the substrate on which it is installed. Such a situation could lead to premature deterioration of the substrate and other elements in the wall assembly. The manufacturer’s recommendations for type and characteristics of coatings to be used in conjunction with the cladding must be followed.
- The product must be installed in accordance with the manufacturer’s current instructions dated April 2009.
- This Evaluation Report is applicable only to products identified with the following: “CCMC 12678-R.”

#### 4. Technical Evidence

CCMC's Technical Guide for “HardiePanel® HZ5™ Vertical Siding, HardiePlank® HZ5™ Lap Siding, HardieShingle® HZ5™ Notched Panel, and HardieShingle® HZ5™ Individual Shingle” sets out the nature of the technical evidence required by CCMC to enable it to evaluate a product as an acceptable or alternative solution in compliance with the NBC 2005. The Report Holder has submitted test results and technical data for CCMC's evaluation. Testing was conducted at independent laboratories recognized by CCMC. The corresponding test results for “HardiePanel® HZ5™ Vertical Siding, HardiePlank® HZ5™ Lap Siding, HardieShingle® HZ5™ Notched Panel, and HardieShingle® HZ5™ Individual Shingle” are summarized below.

4.1 NBC 2005 Compliance Data for “HardiePanel® HZ5™ Vertical Siding, HardiePlank® HZ5™ Lap Siding, HardieShingle® HZ5™ Notched Panel, and HardieShingle® HZ5™ Individual Shingle” on which CCMC Based its Opinion in Section 1

4.1.1 General

HardiePanel® HZ5™ Vertical Siding, HardiePlank® HZ5™ Lap Siding, HardieShingles® HZ5™ Notched Panel, and HardieShingles® HZ5™ Individual Shingles

Table 4.1.1.1 Test results for Material and Physical Properties

Properties	Requirements	Results
Dimensional tolerance:		
• length (mm)	± 3.0	0.1
• width (mm)		0.1
Thickness tolerance (mm)	± 1.6	0.1
Squareness (mm/m)	± 4.0	0.1
Water absorption (%) (by mass)	< 40	34.5
Density (kg/m <sup>3</sup> )	> 950	1385

Table 4.1.1.2. Test results for Performance Requirements

Properties	Requirements	Results
Dimensional change at 50 - 90% RH (%)	< 0.20	0.09 <sup>(1)</sup>
Flexural strength (MPa):	> 7.0	11.1
• machine direction (wet)		7.8
• cross direction (wet)		
Fastener pull resistance (N):	> 28 Z <sup>(2)</sup>	313
• 50 mm (2 in) 6D common		357
• 63.5 mm (2.5 in) 8D common		352
• 38 mm (1.5 in) 4D corrosion resistant		555
• 32 mm (1.25 in) 11ga electro galvanized		469
• 50 mm (2 in) ET&F knurled ballistic		657
• #8 bulge head screw		
Freeze-Thaw Cycling	Loss of mass <3%	0.4%
(100 cycles as per ASTM C 666/C 666M-92 Method B)	Loss in flexural strength <15%	2%

General Product Information

Working Safely

Tools for Cutting and Fastening

General Installation Requirements

General Fastener Requirements

Finishing and Maintenance

HardieTrim® Boards/Battens

HardieSoffit® Panels

HardiePlank® Lap Siding

HardieShingle® Siding

HardiePanel® Vertical Siding

Appendix/Glossary

CCMC Report

**Table 4.1.1.2. Test results for Performance Requirements (cont'd)**

Properties	Requirements	Results
Watertightness	No formation of drops of water on underside	Passed
Warm water resistance	No visible cracks & Reduction in flexural strength <15%	Passed

Notes to Table 4.1.1.2:

- (1) After 7 days immersion.
- (2) Z is the board thickness in millimetres.

**Table 4.1.1.3 Test results for Impact Resistance**

Impact Body	Dynamic Mass (kg)	Energy (N·m)	Result
<b>Safety impact</b>			
Large soft	50	100	Passed
Hard	1	10	Passed
<b>Retention of performance impact</b>			
Large soft	50	34	Passed
Small soft	3	60	Passed
Hard	1	10	Passed

Report Holder: James Hardie Building Products, Inc.  
 26300 La Alameda, Suite 250  
 Mission Viejo, CA 92691  
 U.S.A.  
 Tel: 909-356-6366  
 Fax: 909-427-0634

Plant(s): Plant City, FL, U.S.A.  
 Peru, IL, U.S.A.  
 Cleburne, TX, U.S.A.  
 Waxahachie, TX, U.S.A.  
 Pulaski, VA, U.S.A.  
 Tacoma, WA, U.S.A.  
 Sparks, NV, U.S.A.  
 Santiago, Chile

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