PROJECT RIO-2578-15

ENGINEERING EVALUATION REPORT FOR ATTACHING JAMES HARDIE® BRAND FIBER-CEMENT PANELS TO WOOD FURRING SOLUTIONS

JAMES HARDIE BUILDING PRODUCTS, INC.
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AS PRODUCT EVALUATOR, THE UNDERSIGNED CERTIFIES THAT THE LISTED PRODUCTS ARE IN COMPLIANCE WITH THE REQUIREMENTS OF THE ASCE 7-10, THE 2014 FLORIDA BUILDING CODE, AND THE 2012 INTERNATIONAL BUILDING CODE.

PREPARED BY:

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EVALUATION SUBJECT

HardiePanel® Siding

James Hardie Product Trade Names covered in this evaluation:
HardiePanel® Siding, Cempanel® Siding, Prevail™ Panel Siding

EVALUATION SCOPE:

ASCE 7-10
2014 Florida Building Code
2012 International Building Code
2012 International Residential Code

EVALUATION PURPOSE:

This analysis is to determine the maximum design 3-second gust wind speed to be resisted by an assembly of HardiePanel (Cempanel, Prevail Panel) siding fastened to wood furrings on either wood or metal framing with nails or screws.

REFERENCE REPORTS:

1. Intertek Report 102024363COQ-001A, Transverse load test on HardiePanel.

TEST RESULTS:

Table 1a. Results of Transverse Load Testing

Report Number	Test Agency	Thickness (in.)	Width (in.)	Frame Type [1]	Frame Spacing (in.)	Fastener Spacing (in.)	Fastener Type and Dimensions	Ultimate Load (PSF)	Allowable Design Load[2] (PSF)	Failure Mode
102024363COQ-001A	Intertek	0.3125	48	2X4 wood stud, 3/4" thick by 3.5" wide SPF furring	16	6	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	-160.7	-53.6	pull through /fracture
102024363COQ-001A	Intertek	0.3125	48	2X4 wood stud, 3/4" thick by 3.5" wide SPF furring	16	8	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	-131.4	-43.8	pull through
102024363COQ-001A	Intertek	0.3125	48	2X4 wood stud, 3/4" thick by 3.5" wide SPF furring	16	12	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	-106.1	-35.4	pull through
102024363COQ-001A	Intertek	0.3125	48	2X4 wood stud, 3/4" thick by 3.5" wide SPF furring	16	6	0.090" shank X 0.215" HD x 1.5" long ring shank nail	-147.6	-49.2	pull through /fracture
102024363COQ-001A	Intertek	0.3125	48	2X4 wood stud, 3/4" thick by 3.5" wide SPF furring	24	8	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	-82.7	-27.6	pull through /fracture

1. All fasteners were installed on furring without penetration into the framing members.
2. Allowable load is determined from ultimate load divided by a factor of safety of 3.
3. HardiePanel Siding complies with ASTM C1186, *Standard Specification for Grade II, Type A Non-asbestos Fiber-Cement Flat Sheets.*

Table 1b. Analysis of Allowable Load for #8 Screw at 10" O.C.

	#8 Screw Spacing		
Fastener Spacing (in.)	8	12	10
Frame spacing (in.)	16	16	16
Fastener Tributary area (ft^2)	0.89	1.33	1.11
Allowable load (psf)	43.8	35.4	**38.8**
Individual fastener load (lb.)	38.9	47.2	43.1

The fastener load for #8 screw at 10" O.C. was calculated as the average of the test results for 8" and 12" O.C.

The allowable load for #8 screw at the spacing of 10" O.C. into furring can be calculated by interpolating the results of same fastener at 8" and 12" O.C., since both tests had same failure mode of fastener pull through from the panels. As shown in the table, the allowable load for #8 screws installed at 10" O.C. to wood furring is **38.8 psf**.

Justification of Using the Results on Light Gauge Steel Framing

In the subject configurations, all fasteners were attached to furring only, so whether the furring is attached to wood or steel framing does not affect panels' transverse load capacity. It's the project engineer's responsibility to ensure the furring attachment and framing memebers to have sufficient load capacities.

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DESIGN WIND LOAD PROCEDURES:

Fiber-cement siding transverse load capacity (wind load capacity) is determined via compliance testing to transverse load national test standards. Via the transverse load testing an allowable design load is determined based on a factor of safety of 3 applied to the ultimate test load.

Equation 1, $q_z=0.00256*K_z*K_{zt}*K_d*V^2$ *{ref. ASCE 7-10 equation 30.3-1}*

q_z , velocity pressure at height z
K_z , velocity pressure exposure coefficient evaluated at height z
K_{zt} , topographic factor

K_d , wind directionality factor
V , basic wind speed (3-second gust MPH) as determined from 2012 IBC Figures 1609A, B, or C; ASCE 7-10 Figures 26.5-1A, B, or C

Equation 2,

$V=V_{ult}$ *{ref. 2012 IBC Section 1602.1 definitions}*

V_{ult} , ultimate design wind speeds (3-second gust MPH) determined from 2012 IBC Figures 1609A, B, or C; ASCE 7-10 Figures 26.5-1A, B, or C

Equation 3, $p=q_z*(GC_p-GC_{pi})$ *{ref. ASCE 7-10 equation 30.6-1}*

GC_p , product of external pressure coefficient and gust-effect factor
GC_{pi} , product of internal pressure coefficient and gust-effect factor
p , design pressure (PSF) for siding (allowable desgn load for siding)

To determine design pressure, substitute q_z into Equation 3,
Equation 4, $p=0.00256*K_z*K_{zt}*K_d*V_{ult}^{2*}(GC_p-GC_{pi})$

Allowable Stress Design, ASCE 7-10 Section 2.4.1, load combination 7
Equation 5, 0.6D + 0.6W *{ref. ASCE 7-10 section 2.4.1, load combination 7}*

D , dead load
W , wind load

To determine the Allowable Stress Design Pressure, apply the load factor for W (wind) from Equation 4 to p (design pressure) determined from equation 4
Equation 6, $p_{asd} = 0.6*[p]$
Equation 7, $p_{asd} = 0.6*[0.00256*K_z*K_{zt}*K_d*V_{ult}^{2*}(GC_p-GC_{pi})]$

Equation 7 is used to populate Table 3, 4, and 5.

To determine the allowable ultimate basic wind speed for Hardie Siding in Table 6, solve Equation 7 for V_{ult},
Equation 8, $V_{ult} = (p_{asd}/0.6*0.00256*K_z*K_{zt}*K_d*(GC_p-GC_{pi}))^{0.5}$

Applicable to methods specified in Exceptions 1 through 3 of 2012 IBC Section 1609.1.1., to determine the allowable nominal design wind speed (Vasd) for Hardie Siding in Table 6, apply the conversion formula below,
Equation 9, $V_{asd} = V_{ult} * (0.6)^{0.5}$ *{ref. 2012 IBC Section 1609.3.1}*
{ref. 2012 IBC Section 1602.1}

V_{asd} , Nominal design wind speed (3-second gust mph)

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Table 2, Coefficients and Constants used in Determining V and p,

	K_z						Wall Zone 5	
Height (ft)	Exp B	Exp C	Exp D		K_{zt}	K_d	GC_p	GC_{pi}
0-15	0.7	0.85	1.03	h≤60	1	0.85	-1.4	0.18
20	0.7	0.9	1.08		1	0.85	-1.4	0.18
25	0.7	0.94	1.12		1	0.85	-1.4	0.18
30	0.7	0.98	1.16		1	0.85	-1.4	0.18
35	0.73	1.01	1.19		1	0.85	-1.4	0.18
40	0.76	1.04	1.22		1	0.85	-1.4	0.18
45	0.785	1.065	1.245		1	0.85	-1.4	0.18
50	0.81	1.09	1.27		1	0.85	-1.4	0.18
55	0.83	1.11	1.29		1	0.85	-1.4	0.18
60	0.85	1.13	1.31		1	0.85	-1.4	0.18
100	0.99	1.26	1.43	h>60	1	0.85	-1.8	0.18

Table 3, Allowable Stress Design - Component and Cladding (C&C) Pressures (PSF) to be Resisted at Various Wind Speeds - Wind Exposure Category B,

Wind Speed (3-second gust)	100	105	110	115	120	130	140	150	160	170	180	190	200	210
Height (ft)	B	B	B	B	B	B	B	B	B	B	B	B	B	B
0-15	-14.4	-15.9	-17.5	-19.1	-20.8	-24.4	-28.3	-32.5	-37.0	-41.7	-46.8	-52.1	-57.8	-63.7
20	-14.4	-15.9	-17.5	-19.1	-20.8	-24.4	-28.3	-32.5	-37.0	-41.7	-46.8	-52.1	-57.8	-63.7
25	-14.4	-15.9	-17.5	-19.1	-20.8	-24.4	-28.3	-32.5	-37.0	-41.7	-46.8	-52.1	-57.8	-63.7
30	-14.4	-15.9	-17.5	-19.1	-20.8	-24.4	-28.3	-32.5	-37.0	-41.7	-46.8	-52.1	-57.8	-63.7
35	-15.1	-16.6	-18.2	-19.9	-21.7	-25.4	-29.5	-33.9	-38.6	-43.5	-48.8	-54.4	-60.2	-66.4
40	-15.7	-17.3	-19.0	-20.7	-22.6	-26.5	-30.7	-35.3	-40.1	-45.3	-50.8	-56.6	-62.7	-69.1
45	-16.2	-17.9	-19.6	-21.4	-23.3	-27.4	-31.7	-36.4	-41.5	-46.8	-52.5	-58.5	-64.8	-71.4
50	-16.7	-18.4	-20.2	-22.1	-24.1	-28.2	-32.7	-37.6	-42.8	-48.3	-54.1	-60.3	-66.8	-73.7
55	-17.1	-18.9	-20.7	-22.6	-24.7	-28.9	-33.6	-38.5	-43.8	-49.5	-55.5	-61.8	-68.5	-75.5
60	-17.5	-19.3	-21.2	-23.2	-25.2	-29.6	-34.4	-39.5	-44.9	-50.7	-56.8	-63.3	-70.1	-77.3
100	-25.6	-28.2	-31.0	-33.8	-36.9	-43.3	-50.2	-57.6	-65.5	-74.0	-82.9	-92.4	-102.4	-112.9

Table 4, Allowable Stress Design - Component and Cladding (C&C) Pressures (PSF) to be Resisted at Various Wind Speeds - Wind Exposure Category C,

Wind Speed (3-second gust)	100	105	110	115	120	130	140	150	160	170	180	190	200	210
Height (ft)	C	C	C	C	C	C	C	C	C	C	C	C	C	C
0-15	-17.5	-19.3	-21.2	-23.2	-25.2	-29.6	-34.4	-39.5	-44.9	-50.7	-56.8	-63.3	-70.1	-77.3
20	-18.6	-20.5	-22.5	-24.6	-26.7	-31.4	-36.4	-41.8	-47.5	-53.7	-60.2	-67.0	-74.3	-81.9
25	-19.4	-21.4	-23.5	-25.6	-27.9	-32.8	-38.0	-43.6	-49.6	-56.0	-62.8	-70.0	-77.6	-85.5
30	-20.2	-22.3	-24.5	-26.7	-29.1	-34.2	-39.6	-45.5	-51.8	-58.4	-65.5	-73.0	-80.9	-89.2
35	-20.8	-23.0	-25.2	-27.6	-30.0	-35.2	-40.8	-46.9	-53.3	-60.2	-67.5	-75.2	-83.3	-91.9
40	-21.5	-23.7	-26.0	-28.4	-30.9	-36.3	-42.0	-48.3	-54.9	-62.0	-69.5	-77.4	-85.8	-94.6
45	-22.0	-24.2	-26.6	-29.1	-31.6	-37.1	-43.1	-49.4	-56.2	-63.5	-71.2	-79.3	-87.9	-96.9
50	-22.5	-24.8	-27.2	-29.7	-32.4	-38.0	-44.1	-50.6	-57.6	-65.0	-72.9	-81.2	-89.9	-99.2
55	-22.9	-25.2	-27.7	-30.3	-33.0	-38.7	-44.9	-51.5	-58.6	-66.2	-74.2	-82.7	-91.6	-101.0
60	-23.3	-25.7	-28.2	-30.8	-33.6	-39.4	-45.7	-52.4	-59.7	-67.4	-75.5	-84.1	-93.2	-102.8
100	-32.6	-35.9	-39.4	-43.1	-46.9	-55.0	-63.8	-73.3	-83.4	-94.1	-105.5	-117.6	-130.3	-143.6

Table 5, Allowable Stress Design - Component and Cladding (C&C) Pressures (PSF) to be Resisted at Various Wind Speeds - Wind Exposure Category D,

Wind Speed (3-second gust)	100	105	110	115	120	130	140	150	160	170	180	190	200	210
Height (ft)	D	D	D	D	D	D	D	D	D	D	D	D	D	D
0-15	-21.2	-23.4	-25.7	-28.1	-30.6	-35.9	-41.6	-47.8	-54.4	-61.4	-68.8	-76.7	-85.0	-93.7
20	-22.3	-24.6	-27.0	-29.5	-32.1	-37.7	-43.7	-50.1	-57.0	-64.4	-72.2	-80.4	-89.1	-98.2
25	-23.1	-25.5	-28.0	-30.6	-33.3	-39.0	-45.3	-52.0	-59.1	-66.8	-74.9	-83.4	-92.4	-101.9
30	-23.9	-26.4	-29.0	-31.6	-34.5	-40.4	-46.9	-53.8	-61.3	-69.2	-77.5	-86.4	-95.7	-105.5
35	-24.5	-27.1	-29.7	-32.5	-35.3	-41.5	-48.1	-55.2	-62.8	-70.9	-79.5	-88.6	-98.2	-108.3
40	-25.2	-27.7	-30.5	-33.3	-36.2	-42.5	-49.3	-56.6	-64.4	-72.7	-81.5	-90.9	-100.7	-111.0
45	-25.7	-28.3	-31.1	-34.0	-37.0	-43.4	-50.3	-57.8	-65.7	-74.2	-83.2	-92.7	-102.7	-113.3
50	-26.2	-28.9	-31.7	-34.6	-37.7	-44.3	-51.3	-58.9	-67.1	-75.7	-84.9	-94.6	-104.8	-115.5
55	-26.6	-29.3	-32.2	-35.2	-38.3	-45.0	-52.2	-59.9	-68.1	-76.9	-86.2	-96.1	-106.4	-117.4
60	-27.0	-29.8	-32.7	-35.7	-38.9	-45.7	-53.0	-60.8	-69.2	-78.1	-87.6	-97.6	-108.1	-119.2
100	-37.0	-40.8	-44.7	-48.9	-53.2	-62.5	-72.5	-83.2	-94.6	-106.8	-119.8	-133.4	-147.9	-163.0

Tables 3, 4, and 5 are based on ASCE 7-10 and consistent with the 2012 IBC, 2012 IRC

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Table 6, Allowable Wind Speed (mph) for HardiePanel Siding *(Analytical Method in ASCE 7-10 Chapter 30 C&C Part 1 and Part 3)*[6]

							2012 IBC, 2014 FBC			2012 IBC, 2014 FBC												
							Allowable, Ultimate Design Wind, Speed, V_{ult}[3], (3-second gust mph)			Allowable, Nominal Design Wind, Speed, V_{asd}[4,5], (3-second gust mph)												
							Applicable to methods specified in [2012 IBC, 2014 FBC] Section 1609.1.1. as determined by [2012 IBC, 2014 FBC] Figures 1609A, B, or C.			Applicable to methods specified in Exceptions 1 through 3 of [2012 IBC, 2014 FBC] Section 1609.1.1.												
							Wind exposure category			Wind exposure category												
Product	Minimum Thickness (in.)	Width (in.)	Fastener Type	Fastener Spacing (in.)	Frame Type	Stud Spacing (in.)	Building Height[2, 8] (ft.)	B	C	D	B	C	D	Siding Allowable Design Load (psf)	K_z Exp B	K_z Exp C	K_z Exp D		K_{zt}	K_d	GC_p	GC_{pi}
HardiePanel®	5/16	48	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	6" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	16	0-15	193	175	159	149	135	123	-53.6	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	193	170	155	149	132	120	-53.6	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	193	166	152	149	129	118	-53.6	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	193	163	150	149	126	116	-53.6	0.70	0.98	1.16		1	0.85	-1.4	0.18
							35	189	160	148	146	124	114	-53.6	0.73	1.01	1.19		1	0.85	-1.4	0.18
							40	185	158	146	143	122	113	-53.6	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	172	150	140	133	116	108	-53.6	0.68	1.15	1.33		1	0.85	-1.4	0.18
							50	179	154	143	139	120	111	-53.6	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	177	153	142	137	119	110	-53.6	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	175	152	141	135	117	109	-53.6	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	145	128	120	112	99	93	-53.6	0.99	1.26	1.43	hs>60	1	0.85	-1.8	0.18
HardiePanel®	5/16	48	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	8" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	16	0-15	174	158	144	135	122	111	-43.8	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	174	154	140	135	119	109	-43.8	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	174	150	138	135	116	107	-43.8	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	174	147	135	135	114	105	-43.8	0.70	0.98	1.16		1	0.85	-1.4	0.18
							35	171	145	134	132	112	103	-43.8	0.73	1.01	1.19		1	0.85	-1.4	0.18
							40	167	143	132	129	111	102	-43.8	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	164	141	131	127	109	101	-43.8	0.79	1.07	1.25		1	0.85	-1.4	0.18
							50	162	140	129	125	108	100	-43.8	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	160	138	128	124	107	99	-43.8	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	158	137	127	122	106	99	-43.8	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	131	116	-	101	90	-	-43.8	0.99	1.26	1.43	hs>60	1	0.85	-1.8	0.18
HardiePanel®	5/16	48	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	10" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	16	0-15	164	149	135	127	115	105	-38.8	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	164	145	132	127	112	102	-38.8	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	164	141	130	127	110	100	-38.8	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	164	139	127	127	107	99	-38.8	0.70	0.98	1.16		1	0.85	-1.4	0.18
							35	161	136	126	124	106	97	-38.8	0.73	1.01	1.19		1	0.85	-1.4	0.18
							40	157	134	124	122	104	96	-38.8	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	155	133	123	120	103	95	-38.8	0.79	1.07	1.25		1	0.85	-1.4	0.18
							50	152	131	122	118	102	94	-38.8	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	151	130	121	117	101	94	-38.8	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	149	129	120	115	100	93	-38.8	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	123	-	-	95	-	-	-38.8	0.99	1.26	1.43	hs>60	1	0.85	-1.8	0.18
HardiePanel®	5/16	48	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	12" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	16	0-15	157	142	129	121	110	100	-35.4	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	157	138	126	121	107	98	-35.4	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	157	135	124	121	105	96	-35.4	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	157	132	122	121	103	94	-35.4	0.70	0.98	1.16		1	0.85	-1.4	0.18
							35	153	130	120	119	101	93	-35.4	0.73	1.01	1.19		1	0.85	-1.4	0.18
							40	150	128	119	116	100	92	-35.4	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	148	127	117	115	98	91	-35.4	0.79	1.07	1.25		1	0.85	-1.4	0.18
							50	146	125	116	113	97	90	-35.4	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	144	124	115	111	96	89	-35.4	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	142	123	114	110	95	89	-35.4	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	118	-	-	91	-	-	-35.4	0.99	1.26	1.43	hs>60	1	0.85	-1.8	0.18
HardiePanel®	5/16	48	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	8" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	24	0-15	138	125	114	107	97	88	-27.6	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	138	122	111	107	94	86	-27.6	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	138	119	-	107	92	-	-27.6	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	138	117	-	107	91	-	-27.6	0.70	0.98	1.16		1	0.85	-1.4	0.18
							35	135	115	-	105	89	-	-27.6	0.73	1.01	1.19		1	0.85	-1.4	0.18
							40	133	113	-	103	88	-	-27.6	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	131	112	-	101	87	-	-27.6	0.79	1.07	1.25		1	0.85	-1.4	0.18
							50	129	111	-	100	86	-	-27.6	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	127	-	-	98	-	-	-27.6	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	125	-	-	97	-	-	-27.6	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	-	-	-	-	-	-	-27.6	0.99	1.26	1.43	hs>60	1	0.85	-1.8	0.18
HardiePanel®	5/16	48	0.090" shank X 0.215" HD x 1.5" long ring shank nail	6" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	16	0-15	185	168	152	143	130	118	-49.2	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	185	163	149	143	126	115	-49.2	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	185	159	146	143	123	113	-49.2	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	185	156	143	143	121	111	-49.2	0.70	0.98	1.16		1	0.85	-1.4	0.18
							35	181	154	142	140	119	110	-49.2	0.73	1.01	1.19		1	0.85	-1.4	0.18
							40	177	151	140	137	117	108	-49.2	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	174	150	138	135	116	107	-49.2	0.79	1.07	1.25		1	0.85	-1.4	0.18
							50	172	148	137	133	115	106	-49.2	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	170	147	136	131	114	105	-49.2	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	168	145	135	130	113	105	-49.2	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	139	123	115	107	95	89	-49.2	0.99	1.26	1.43	hs>60	1	0.85	-1.8	0.18

1. Furring attachment to structural framing members or alternative furring width shall be designed by an engineer.
2. Building height = mean roof height (in feet) of a building, except that eave height shall be used for roof angle Θ less than or equal to 10° (2-12 roof slope).
3. V_{ult} = ultimate design wind speed.
4. V_{asd} = nominal design wind speed
5. Linear interpolation of building height (≤ 60 ft) and wind speed is permitted.
6. Wind speed design assumptions per Analytical Method in ASCE 7-10 Chapter 30 C&C Part 1 and Part 3: K_e=1, K_d=0.85, GC_p=-1.4 (hs60), GC_p=-1.8 (h>60), GC_{pi}=0.18.
7. For 2009 IBC/IRC, 2006 IBC/IRC, Importance Factor, I = 1, was used for calculations.
8. Wood furring shall be preservative treated per AWPA.
9. Wood furring shall be specific gravity of 0.42 or greater per AFPA/NDS; or wood structural panel, conforming to DOC PS-1 or DOC PS-2 or APA PRP-108.

LIMITATIONS OF USE:

1) In High Velocity Hurricane Zones (HVHZ) install per Miami-Dade County Florida, NOA 15-0122.04.

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Table 6, Allowable Wind Speed (mph) for HardiePanel Siding *(Analytical Method in ASCE 7-10 Chapter 30 C&C Part 1 and Part 3)*[6]

Product	Minimum Thickness (in.)	Width (in.)	Fastener Type	Fastener Spacing (in.)	Frame Type	Stud Spacing (in.)	Building Height[2, 5] (ft.)	2012 IBC, 2014 FBC — Allowable, Ultimate Design Wind, Speed, V_{ult}[3] (3-second gust mph) — Applicable to methods specified in [2012 IBC, 2014 FBC] Section 1609.1.1. as determined by [2012 IBC, 2014 FBC] Figures 1609A, B, or C. — Wind exposure category: B	C	D	2012 IBC, 2014 FBC — Allowable, Nominal Design Wind, Speed, V_{asd}[4,5] (3-second gust mph) — Applicable to methods specified in Exceptions 1 through 3 of [2012 IBC, 2014 FBC] Section 1609.1.1. — Wind exposure category: B	C	D	Siding Allowable Design Load (psf)	Coefficients used in Table 6 calculations for V_{ult}: K_z Exp B	Exp C	Exp D		K_{zt}	K_d	GC_p	GC_{pi}
HardiePanel®	5/16	48	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	6" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	16	0-15	193	175	159	149	135	123	-53.6	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	193	170	155	149	132	120	-53.6	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	193	166	152	149	129	118	-53.6	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	193	163	150	149	126	116	-53.6	0.70	0.98	1.16		1	0.85	-1.4	0.18
							35	189	160	148	146	124	114	-53.6	0.73	1.01	1.19		1	0.85	-1.4	0.18
							40	185	156	146	143	122	113	-53.6	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	172	150	140	133	116	108	-53.6	0.88	1.15	1.33		1	0.85	-1.4	0.18
							50	179	154	143	139	120	111	-53.6	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	177	153	142	137	119	110	-53.6	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	175	152	141	135	117	109	-53.6	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	145	128	120	112	99	93	-53.6	0.99	1.26	1.43	hs60	1	0.85	-1.4	0.18
																		h>60	1	0.85	-1.8	0.18
HardiePanel®	5/16	48	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	8" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	16	0-15	174	158	144	135	122	111	-43.8	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	174	154	140	135	119	109	-43.8	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	174	150	138	135	116	107	-43.8	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	174	147	135	135	114	105	-43.8	0.70	0.98	1.16		1	0.85	-1.4	0.18
							35	171	145	134	132	112	103	-43.8	0.73	1.01	1.19		1	0.85	-1.4	0.18
							40	167	143	132	129	111	102	-43.8	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	164	141	131	127	109	101	-43.8	0.79	1.07	1.25		1	0.85	-1.4	0.18
							50	162	140	129	125	108	100	-43.8	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	160	138	128	124	107	99	-43.8	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	158	137	127	122	106	99	-43.8	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	131	116	-	101	90	-	-43.8	0.99	1.26	1.43	h>60	1	0.85	-1.8	0.18
HardiePanel®	5/16	48	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	10" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	16	0-15	164	149	135	127	115	105	-38.8	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	164	145	132	127	112	102	-38.8	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	164	141	130	127	110	100	-38.8	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	164	139	127	127	107	99	-38.8	0.70	0.98	1.16		1	0.85	-1.4	0.18
							35	161	136	126	124	106	97	-38.8	0.73	1.01	1.19		1	0.85	-1.4	0.18
							40	157	134	124	122	104	96	-38.8	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	155	133	123	120	103	95	-38.8	0.79	1.07	1.25		1	0.85	-1.4	0.18
							50	152	131	122	118	102	94	-38.8	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	151	130	121	117	101	94	-38.8	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	149	129	120	115	100	93	-38.8	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	123	-	-	95	-	-	-38.8	0.99	1.26	1.43	h>60	1	0.85	-1.8	0.18
HardiePanel®	5/16	48	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	12" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	16	0-15	157	142	129	121	110	100	-35.4	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	157	138	126	121	107	98	-35.4	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	157	135	124	121	105	96	-35.4	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	157	132	122	121	103	94	-35.4	0.70	0.98	1.16		1	0.85	-1.4	0.18
							35	153	130	120	119	101	93	-35.4	0.73	1.01	1.19		1	0.85	-1.4	0.18
							40	150	128	119	116	100	92	-35.4	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	148	127	117	115	98	91	-35.4	0.79	1.07	1.25		1	0.85	-1.4	0.18
							50	146	125	116	113	97	90	-35.4	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	144	124	115	111	96	89	-35.4	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	142	123	114	110	95	89	-35.4	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	118	-	-	91	-	-	-35.4	0.99	1.26	1.43	h>60	1	0.85	-1.8	0.18
HardiePanel®	5/16	48	No. 8 X 1.25" long X 0.323" HD ribbed bugle head screws	6" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	24	0-15	138	125	114	107	97	88	-27.6	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	138	122	111	107	94	86	-27.6	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	138	119	-	107	92	-	-27.6	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	138	117	-	107	91	-	-27.6	0.70	0.98	1.16		1	0.85	-1.4	0.18
							35	135	115	-	105	89	-	-27.6	0.73	1.01	1.19		1	0.85	-1.4	0.18
							40	133	113	-	103	88	-	-27.6	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	131	112	-	101	87	-	-27.6	0.79	1.07	1.25		1	0.85	-1.4	0.18
							50	129	111	-	100	86	-	-27.6	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	127	-	-	98	-	-	-27.6	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	125	-	-	97	-	-	-27.6	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	-	-	-	-	-	-	-27.6	0.99	1.26	1.43	h>60	1	0.85	-1.8	0.18
HardiePanel®	5/16	48	0.090" shank X 0.215" HD x 1.5" long ring shank nail	6" O.C. into furring only	2X4 wood or 20 ga. steel framing, 3/4" thick by 3.5" wide wood furring [1,8,9]	16	0-15	185	168	152	143	130	118	-49.2	0.70	0.85	1.03	hs60	1	0.85	-1.4	0.18
							20	185	163	149	143	126	115	-49.2	0.70	0.90	1.08		1	0.85	-1.4	0.18
							25	185	159	146	143	123	113	-49.2	0.70	0.94	1.12		1	0.85	-1.4	0.18
							30	185	156	143	143	121	111	-49.2	0.70	0.98	1.16		1	0.85	-1.4	0.18
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							40	177	151	140	137	117	108	-49.2	0.76	1.04	1.22		1	0.85	-1.4	0.18
							45	174	150	138	135	116	107	-49.2	0.79	1.07	1.25		1	0.85	-1.4	0.18
							50	172	148	137	133	115	106	-49.2	0.81	1.09	1.27		1	0.85	-1.4	0.18
							55	170	147	136	131	114	105	-49.2	0.83	1.11	1.29		1	0.85	-1.4	0.18
							60	168	145	135	130	113	105	-49.2	0.85	1.13	1.31		1	0.85	-1.4	0.18
							100	139	123	115	107	95	89	-49.2	0.99	1.26	1.43	h>60	1	0.85	-1.8	0.18

1. Furring attachment to structural framing members or alternative furring width shall be designed by an engineer.
2. Building height = mean roof height (in feet) of a building, except that eave height shall be used for roof angle Θ less than or equal to 10° (2-12 roof slope).
3. V_{ult} = ultimate design wind speed.
4. V_{asd} = nominal design wind speed
5. Linear interpolation of building height (≤ 60 ft) and wind speed is permitted.
6. Wind speed design assumptions per Analytical Method in ASCE 7-10 Chapter 30 C&C Part 1 and Part 3: K_{zt}=1, K_d=0.85, GC_p=-1.4 (hs60), GC_p=-1.8 (h>60), GC_{pi}=0.18.
7. For 2009 IBC/IRC, 2006 IBC/IRC, Importance Factor, I = 1, was used for calculations.
8. Wood furring shall be preservative treated per AWPA.
9. Wood furring shall be specific gravity of 0.42 or greater per AFPA/NDS; or wood structural panel, conforming to DOC PS-1 or DOC PS-2 or APA PRP-108.

LIMITATIONS OF USE:

1) In High Velocity Hurricane Zones (HVHZ) install per Miami-Dade County Florida, NOA 15-0122.04.

TEST REPORT

REPORT NUMBER: 102024363COQ-001A
ORIGINAL ISSUE DATE: April 1, 2015
REVISION DATE: April 30, 2015

EVALUATION CENTER

INTERTEK TESTING SERVICES NA LTD.
1500 BRIGANTINE DRIVE
COQUITLAM, BC V3K 7C1

RENDERED TO

JAMES HARDIE BUILDING PRODUCTS, INC.
10901 ELM AVENUE
FONTANA, CA 92337

PRODUCT EVALUATED: HardiePanel®
EVALUATION PROPERTY: Transverse Load Testing

Report of HardiePanel® tested in accordance with ASTM E330-2002/2014, *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

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