



EVALUATION SUBJECT

Hardie® Architectural Panel

James Hardie Product Trade Names covered in this evaluation:
Hardie® Architectural Panel

EVALUATION SCOPE:

ASCE 7-22 (ref. in the 2023 FBC)
2023 Florida Building Code (8th Edition)

EVALUATION PURPOSE:

This analysis is to determine the maximum design 3-second gust wind speed to be resisted by an assembly of Hardie® Architectural Panel fastened to wood or metal framing with nails or screws.

REFERENCE REPORTS:

- Intertek Report 3067913 (ASTM C1186) Material properties HardiePanel Siding
- Ramtech Laboratories Report IC-1270-94 (ASTM E330) Transverse Load Test, 5/16" Thick by 48 inch wide HardiePanel Siding installed on 2X4 Hem-Fir wood studs spaced at 16 inches on center with a 6d common galvanized nail
- Ramtech Laboratories Report IC-1271-94 (ASTM E330) Transverse Load Test, 5/16" Thick by 48 inch wide HardiePanel Siding installed on 2X4 Hem-Fir wood studs spaced at 24 inches on center with a 6d common galvanized nail
- Ramtech Laboratories, Inc. Report 10868-97/1475 (ASTM E330) Transverse Load Test, 5/16" Thick by 48 inch wide HardiePanel Siding installed on 2X4 Group III SG=0.36 wood studs spaced at 16 inches on center with a 4d, 0.091 inch shank by 0.225 inch head diameter by 1.5 inch long ring shank nail
- Ramtech Laboratories, Report IC-1054-89 (ASTM E330) Transverse Load Test, 1/4" Thick by 48 inch wide HardiePanel Siding installed on 20gauge Metal studs spaced at 16 inches on center with a No 8 X 1 in. long X 0.323 in head diameter ribbed bugle head screw
- Ramtech Laboratories, Report IC-1055-89 (ASTM E330) Transverse Load Test, 1/4" Thick by 48 inch wide HardiePanel Siding installed on 20gauge Metal studs spaced at 24 inches on center with a No 8 X 1 in. long X 0.323 in head diameter ribbed bugle head screw
- Ramtech Laboratories, Report 11149-98/1554d (ASTM E330) Transverse Load Test, 1/4" Thick by 48 inch wide HardiePanel Siding installed on 20gauge Metal studs spaced at 16 and 24 inches on center with a ET&F 0.100 in. knurled shank X 1.5 in. long X 0.25 in. head diameter pin fastener
- Ramtech Laboratories Report IC-1273-94 (ASTM E72) Racking Shear Test, 5/16" Thick by 48 inch wide HardiePanel Siding installed on 2X4 Hem-Fir wood studs spaced at 16 inches on center with a 6d common galvanized nail
- Ramtech Laboratories Report IC-1274-94 (ASTM E72) Racking Shear Test, 5/16" Thick by 48 inch wide HardiePanel Siding installed on 2X4 Hem-Fir wood studs spaced at 24 inches on center with a 6d common galvanized nail
- Ramtech Laboratories, Inc. Report 10868-97/1475 (ASTM E72) Racking Shear Test, 5/16" Thick by 48 inch wide HardiePanel Siding installed on 2X4 Group III SG=0.36 wood studs spaced at 16 inches on center with a 4d, 0.091 inch shank by 0.225 inch head diameter by 1.5 inch long ring shank nail
- Ramtech Laboratories Report IC-1057-89 (ASTM E72) Racking Shear Test, 5/16" Thick by 48 inch wide HardiePanel Siding installed on 2X4 Hem-Fir wood studs spaced at 16 and 24 inches on center with a No 8 X 1 in. long X 0.323 in head diameter ribbed bugle head screw
- Ramtech Laboratories Report 11284-99/1580 (ASTM E72) Racking Shear Test, 5/16" Thick by 48 inch wide HardiePanel Siding installed on 2X4 Hem-Fir wood studs spaced at 16 and 24 inches on center with a ET&F 0.100 in. knurled shank X 1.5 in. long X 0.25 in. head diameter pin fastener
- Intertek Report 3148104COQ-002, revision date March 29, 2012 (ASTM E330) Transverse Load for HardiePanel installed onto Wood Structural Panel
- QAI Report RJ7504P-1, Negative Pressure Test on EasyTex Panel Sidings per ASTM E330
- QAI Report RJ7839P-1, Negative Pressure Test on Product X Panel Sidings per ASTM E330
- QAI Report RJ8073P-1, Negative Pressure Test on Hardie Multi-Groove Panel Sidings per ASTM E330, dated 7/2/21
- QAI Report RJ8259P-1, Negative Pressure Test on Hardie Textured XM Multi-Groove Panel Siding per ASTM E330, dated 10/6/21
- CAE Report 2101-5-R1, Wind Load Analysis for Hardie Textured Smooth Sand Panel, dated 8/20/21
- CAE Report 2101-6, Wind Load Analysis for Hardie Textured Smooth Sand Panel, dated 11/4/21
- QAI Report RJ8073P-2-R1, Negative Pressure Test on Hardie Textured Multi-Groove Panel Sidings per ASTM E330, revision date 1/20/22
- QAI Report RJ7876P-2, Negative Pressure Test XM-S Hardie Multi-Groove Panel Sidings per ASTM E330, dated 3/17/21
- CAE Report 2101-3, Hardie Multi-Groove Panel Qualification Assembly, dated 5/17/21

TEST RESULTS:

Table 1A - Results of Transverse Load Testing										
Report Number	Test Agency	Siding Thickness (in.)	Width (in.)	Frame Type	Frame Spacing (in.)	Fastener Spacing		Fastener Type	Ultimate Load (PSF)	Allowable Design Load ¹ (PSF)
						Perimeter Supports	Field Supports			
IC-1270-94	Ramtech	0.3125	48	2X4 wood Hem-Fir	16	6	6	6d common	-149	-49.7
IC-1270-94	Ramtech	0.3125	48	2X4 wood Hem-Fir	16	4	4	6d common	-236	-78.7
IC-1271-94	Ramtech	0.3125	48	2X4 wood Hem-Fir	24	6	6	6d common	-94	-31.3
IC-1271-94	Ramtech	0.3125	48	2X4 wood Hem-Fir	24	4	4	6d common	-143	-47.7
10868-97/1475	Ramtech	0.3125	48	2X4 wood, SG ≥ 0.36	16	4	8	4d ring shank nail, 0.091 in. shank x 0.225 in. HD x 1.5 in. long	-90	-30.0
IC-1054-89	Ramtech	0.25	48	Min. No. 20 gauge X 3.625 in. X 1.375 in metal stud	16	6	6	No. 8, 1 in. long x 0.323 HD ribbed bugle head screw	-169.9	-56.6
IC-1055-89	Ramtech	0.25	48	Min. No. 20 gauge X 3.625 in. X 1.375 in metal stud	24	6	6	No. 8, 1 in. long x 0.323 HD ribbed bugle head screw	-91.9	-30.6
11149-98/1554d	Ramtech	0.3125	48	Min. No. 20 gauge X 3.625 in. X 1.375 in metal stud	16	4	8	ET&F 0.100 in. knurled shank x 1.5 in. long x 0.25 in. HD pin fastener	-170	-56.7
11149-98/1554d	Ramtech	0.3125	48	Min. No. 20 gauge X 3.625 in. X 1.375 in metal stud	24	4	8	ET&F 0.100 in. knurled shank x 1.5 in. long x 0.25 in. HD pin fastener	-101	-33.7
3148104COQ-002	Intertek	0.3125	48	7/16" OSB over 2X4 wood frame	16	6	12	No. 8, 1-5/8 in. long x 0.375" HD ribbed wafer head screw directly to OSB	-161.3	-53.8

Table 1A Footnotes:

- Allowable Load is the Ultimate Load divided by a Factor of safety of 3.
- The siding product complies with ASTM C1186, *Standard Specification for Grade II, Type A Non-asbestos Fiber-Cement Flat Sheets*.

The fastener load as tested based on the allowable design loads in Table 1A above are verified to not exceed the NDS-2018 calculated allowable fastener withdrawal load as summarized in Table 1B below:

Fastener Type and Spacing / Stud Spacing	Shank Dia., D (in.)	Fastener Penetration into Framing, P (in.)	Load Duration Factor C_d	Wood Framing Specific Gravity, G^1	NDS Adjusted Withdrawal Capacity W^1 (lb.)	Tested Design Pressure (from Table 1A above) (psf)	Fastener Tributary Area (ft ²)	Single Fastener Load, as tested ² (lb.)	Fastener Load @ Design Pressure Exceeds W^1 (Yes/No)	Adjusted Design Pressure ³ (psf)
6d common at 6" perimeter, 6" vertically along studs / 16" oc	0.120	1.688	1.6	0.43	54.2	49.7	0.667	33.1	No	No Adjustment
6d common at 4" perimeter, 4" vertically along studs / 16" oc	0.120	1.688	1.6	0.43	54.2	78.7	0.444	35.0	No	No Adjustment
6d common at 6" perimeter, 6" vertically along studs / 24" oc	0.120	1.688	1.6	0.43	54.2	31.3	1.000	31.3	No	No Adjustment
6d common at 4" perimeter, 4" vertically along studs / 24" oc	0.120	1.688	1.6	0.43	54.2	47.7	0.667	31.8	No	No Adjustment
4d ring shank nails at 4" perimeter, 8" vertical along studs / 16" oc	0.091	1.188	1.6	0.36	40.3	30.0	0.889	26.7	No	No Adjustment
No. 8, 1-5/8 in. long x 0.375" HD ribbed wafer head screw	0.164	0.438	1.6	0.50	81.8	56.6	0.667	37.8	No	No Adjustment

Table 1B Footnotes:

- The adjusted fastener load (W^1) is calculated using the following equations in NDS-2018:
Equ. 12.2-5 (deformed shank nails): $W^1 = 1800 \times G^2 \times D \times P \times C_d$
Equ. 12.2-3 (smooth shank nails): $W^1 = 1380 \times G^{2.5} \times D \times P \times C_d$
Equ. 12.2-2 (wood screws): $W^1 = 2850 \times G^2 \times D \times P \times C_d$
where $C_d = 1.6$ for wind and earthquake
- Fastener load as tested is determined by multiplying the design pressure by the fastener tributary area.
- If fastener load as tested exceeds W^1 , the allowable design load is adjusted as follows: Adjusted Design Load = W^1 /Fastener Tributary Area

Report Number	Test Agency	Thickness (in.)	Width (in.)	Frame Type ⁴	Frame Spacing (in.)	Fastener Spacing (in.)		Fastener Type	Ultimate Load ⁵ (plf)	Allowable Load ⁶ (plf)
						Perimeter Supports	Field Supports			
IC-1273-94	Ramtech	0.3125	48	2X4 wood Hem-Fir	16	6	6	6d common	603.8	201.3
IC-1273-94	Ramtech	0.3125	48	2X4 wood Hem-Fir	16	4	4	6d common	698.8	232.9
IC-1274-94	Ramtech	0.3125	48	2X4 wood Hem-Fir	24	6	6	6d common	460.0	153.3
IC-1274-94	Ramtech	0.3125	48	2X4 wood Hem-Fir	24	4	4	6d common	637.5	212.5
10868-97/1475	Ramtech	0.3125	48	2X4 wood, SG $\geq$ 0.36	16	4	8	4d, 0.091 in. shank X 0.225 in. HD X 1.5 in. long ring shank nail	595.4	198.5
IC-1057-89	Ramtech	0.25	48	Min. No. 20 gauge X 3.625 in. X 1.375 in metal stud	16 & 24	6	6	Min. No 8 X 1 in. long X 0.323 in head diameter ribbed bugle head screw	123.8	123.8
11284-99/1580	Ramtech	0.3125	48	Min. No. 20 gauge X 3.625 in. X 1.375 in metal stud	16	4	8	ET&F 0.100 in. knurled shank X 1.5 in. long X 0.25 in. head diameter pin fastener	153.4	153.4
11284-99/1580	Ramtech	0.3125	48	Min. No. 20 gauge X 3.625 in. X 1.375 in metal stud	24	4	8	ET&F 0.100 in. knurled shank X 1.5 in. long X 0.25 in. head diameter pin fastener	132.5	132.5

Table 1C Footnotes:

- Table 1C applies only to the Hardie® Architectural Panel – Fine Sand and Hardie® Architectural Panel – Mounded Sand
- All board edges shall be supported by framing. Panels shall be applied with the long dimension either parallel or perpendicular to studs.
- The maximum height-to-length ratio for construction in this Table is 2:1.
- In the steel framed assemblies, the ultimate load values as noted are based on the average load at 1/8 inch net deflection limitation.

Referenced Test Report	Siding Dimensions(in.)	Frame Type	Frame Spacing (in.)	Fastening Method	Fastener Type and Dimensions	Avg. Ultimate Load (psf)	Allowable Design Load ¹ (psf)
QAI Report RJ7504P-1	96" x 48", 5/16" thick	2x4 SPF (min. SG = 0.42) framing	16	4" along studs	16-Ga., 1-1/2" Stainless Finish Nails	-111.1	-37.0
QAI Report RJ7839P-1	96" x 48", 5/16" thick	2x4 SPF framing with 7/16" Wood Structural Panel Sheathing attached per code	16	4" along studs and 4" along panel edges where panel edges may be attached to sheathing only with minimum 3/8" edge distance of the siding	16-Ga., 1-1/2" Stainless Finish Nails	-128.0	-42.7
QAI Report RJ7839P-1	96" x 48", 5/16" thick	2x4 SPF framing with 7/16" Wood Structural Panel Sheathing attached per code	16	4" along studs and 4" along panel edges where panel edges may be attached to sheathing only with minimum 3/8" edge distance of the siding	16-Ga., 1-1/2" Stainless Finish Nails	-128.0	-42.7
QAI RJ8073P-1	120" x 48", 5/16" thick	2X4 wood Douglas-Fir	24	4" along studs	16-ga. x 1.5" stainless steel finish nails	-87.1	-29.0
QAI RJ8073P-1	120" x 48", 5/16" thick	2X4 wood Douglas-Fir	24	4" along studs	4d ring shank nail, 0.091 in. shank x 0.225 in. HD x 1.5 in. long	-88.1	-29.4
QAI RJ8259P-1	120" x 48", 5/16" thick	7/16-inch WSP over 2x4 wood Douglas-Fir Framing	24	4" along studs	16-ga. x 1.5" stainless steel finish nails	-93.6	-31.2
CAE 2101-6	120" x 48", 5/16" thick	7/16-inch WSP over 2x4 wood SPF Framing	24	4" along studs, 4" along panel edges	16-ga. x 1.5" stainless steel finish nails	per analysis in CAE Report 2101-6	-28.0

Table 2A Footnotes:

- Allowable load is the Ultimate load divided by a SF of 3.
- The fastener analysis for the 16-ga. stainless finish nails and 4d ring shank nails for the last four assemblies in Table 2A above are provided in the CAE Report Nos. 2101-5-R1 and 2101-6.

Table 2B - Stainless Steel Nail Fastener Capacity													
Referenced Test Report	Fastener Type & Dimensions (length x shank dia. x head dia.)	Shank Dia., D (in.)	Fastener Penetration into Wood Framing, P (in.)	Load Duration Factor C _d	Wood Framing SG ⁴	Allowable Withdrawal Capacity ¹ W' (lb.)	Allowable Design Pressure ² (psf)	Wind Pressure Area (ft ²)	Number of Fasteners	Single Fastener Tributary Area (ft ²)	Single Fastener Load @ Design Pressure ³ (lb.)	Fastener Load @ Design Pressure Exceeds W' (Y/N)	Adjusted Allowable Design Pressure ⁵ (psf)
QAI Report RJ7504P-1	16-Ga., 1-1/2" Stainless Finish Nails	0.063	1.188	1.6	0.42	15.0	-37.0	10.67	24	0.444	16.5	Y	33.8
QAI Report RJ7504P-1		0.063	1.188	1.6	0.46	17.2	-37.0	10.67	24	0.444	16.5	N	No Adjustment

Table 2B Footnotes:

¹Nail Allowable Withdrawal Capacity (W') is calculated per the following NDS-2018 equations:

Eq. 12.2-3: $W' = C_d \times 1380 \times G^{1.5} \times D \times P$ (for smooth shank nails)

Eq. 12.2-5: $W' = C_d \times 1800 \times G^2 \times D \times P$ (for deformed shank nails)

Eq. 12.2-4: $W' = C_d \times 465 \times G^{1.5} \times D \times P$ (for smooth shank stainless nails)

²Allowable design load from Table 1 of CAE Engineering Report No. 2001-3 (i.e., test values)

³Single fastener load = design pressure x effective fastener tributary area. Example, Single Fastener Load = 37.0 x 0.444 = 16.5 lb for smooth shank nail.

⁴SG values are the NDS published values for wood species: SPF = 0.42 and DFL (South) = 0.46

⁵The allowable design pressure was adjusted for SPF since the calculated single fastener load from the testing exceeds the NDS allowable withdrawal capacity of the nail.

TABLE 2C - Stainless Steel Nail Withdrawal Capacity into Various SPF and WSP (QAI RJ7839P-1)						
Fastener Penetration into Wood	Fastener Type & Dimensions (length x shank dia. x head dia.)	Shank Dia., D (in.)	Fastener Penetration into Wood Framing, P (in.)	Load Duration Factor C _d	Wood Specific Gravity, SG ³	Allowable Design Pressure from Testing ² (psf)
Stud only	16-Ga., 1-1/2" Stainless Finish Nails	0.063	0.750	1.6	0.42	9.5
OSB Sheathing only		0.063	0.438	1.6	0.50	7.2
Through the OSB Sheathing and into Stud						16.7

Table 2C Footnotes:

¹Nail Allowable Withdrawal Capacity (W') is calculated per the following NDS-2018 equations:

Eq. 12.2-3: $W' = C_d \times 1380 \times G^{1.5} \times D \times P$ (for smooth shank nails)

Eq. 12.2-5: $W' = C_d \times 1800 \times G^2 \times D \times P$ (for deformed shank nails)

Eq. 12.2-4: $W' = C_d \times 465 \times G^{1.5} \times D \times P$ (for smooth shank stainless nails)

²Allowable design load from Table 1 (i.e., test values from QAI Report RJ7839P-1)

³SG is the published value from NDS for SPF species and OSB used in the testing

Calculate the allowable design pressure using the NDS allowable withdrawal capacity of the stainless finish nails from the drawing in Figure 1 of QAI Report RJ7839P-1, summarized in the table below:

Table 2D: Allowable Design Pressure Based on NDS Withdrawal Capacity of 16-Ga. Stainless Steel Nails						
Siding Section (See Figure 1 below)	Number of fasteners into sheathing only	Number of fasteners thru sheathing into stud	Total Load (lbf)	Total Area of Panel Assembly (ft ²)	Allowable Design Pressure (for 4- x 8-ft panel) (psf)	Allowable Design Pressure from the testing exceeds that from nail NDS capacity? (Yes/No)
A-1	26	26	433.8	32	49.4	No, therefore no adjustment to allowable design load from the testing
			187.0			
A-2		26	433.8			
A-3	13	26	433.8			
			93.5			

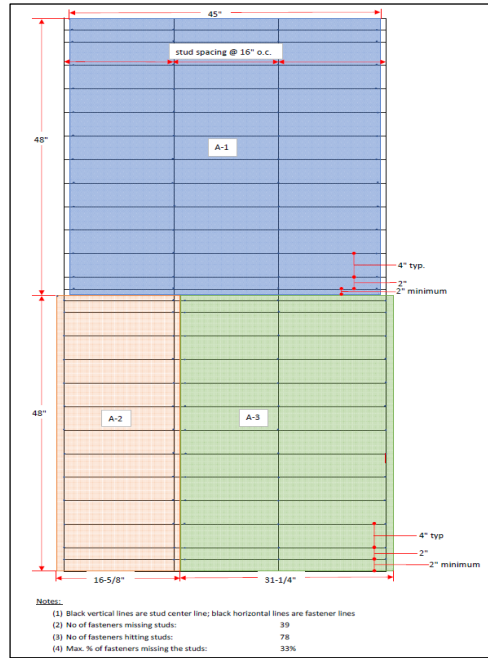


Figure 1 - Fastener Analysis

Table 3A - Results of Transverse Load Testing on Hardie® Architectural Panel-Fine Sand-Grooved							
Referenced Test Report	Siding Dimensions(in.)	Frame Type	Frame Spacing (in.)	Fastening Method	Fastener Type and Dimensions	Avg. Ultimate Load	Allowable Design Load ¹
QAI Report RJ8259P-1	48" widths, 5/16" thick	2x4 DF (SG = 0.50) framing	16	6" along studs	6d common nails (0.113" SD)	-149.0	-49.7
QAI Report RJ8259P-1	48" widths, 5/16" thick	2x4 DF (SG = 0.50) framing	24	6" along studs	6d common nails (0.113" SD)	-94.0	-31.3
QAI Report RJ7876P-2	48" widths, 5/16" thick	2x4 DF (SG = 0.50) framing	16	6" along studs	6d siding nails (0.092" x 0.222" HD x 2")	-158.2	-52.7
QAI Report RJ8073P-2-R1	48" widths, 5/16" thick	2x4 DF (SG = 0.50) framing	24	4" along studs	16-Ga., 1-1/2" Stainless Finish Nails	-56.9	-19.0
QAI Report RJ8073P-2-R1	48" widths, 5/16" thick	7/16" thick OSB over 2x4 DF (SG = 0.50) framing	24	6" vertically and 16" horizontally into OSB sheathing (no penetration into studs)	4d stainless steel ring shanked nails (0.90" x 0.215" HD x 1.5")	-100.9	-33.6
CAE Report 2101-3	48" widths, 5/16" thick	Min. 20-ga. steel studs or 2x4 SPF (SG = 0.42) wood	16	8" along studs	No. 8 x 0.323" HD x 1.25" buglehead screw	per CAE 2101-3 analysis	-43.8
CAE Report 2101-3	48" widths, 5/16" thick		16	10" along studs			-38.8
CAE Report 2101-3	48" widths, 5/16" thick		16	12" along studs			-35.4
CAE Report 2101-3	48" widths, 5/16" thick	Min. 20-ga. steel studs or 2x4 with 3/4" thick SPF (SG = 0.42) wood or min. 20-ga. furring strips attach to framing per code	16	8" along studs	No. 8 x 0.323" HD x 1.25" buglehead screw	per CAE 2101-3 analysis	-43.8
CAE Report 2101-3	48" widths, 5/16" thick		16	10" along studs			-38.8
CAE Report 2101-3	48" widths, 5/16" thick		16	12" along studs			-35.4

Table 3A Footnotes:

- Allowable load is the Ultimate load divided by a SF of 3.
- The fastener analysis for assemblies using the No.8 bugle head screw is provided in the CAE Report Nos. 2101-3.
- The fastener analysis for the 16-ga. finish and 4d stainless ring shanked nails are provided in the CAE Report No. 2101-4-R1.
- The ultimate load values for the two assemblies with 6d common nails are limited to those in Ramtech IC-1273-94 and IC-1274-94.

Table 3B - Fastener Capacity Analysis											
Referenced Test Report	Fastener Type & Dimensions (length x shank dia. x head dia.)	Shank Dia., D (in.)	Fastener Penetration into Wood Framing, P (in.)	Load Duration Factor C _d	Wood Framing SG ⁴	Allowable Withdrawal Capacity ¹ W' (lb.)	Allowable Design Pressure ² (psf)	Single Fastener Tributary Area (ft ²)	Single Fastener Load @ Design Pressure ³ (lb.)	Fastener Load @ Design Pressure Exceeds W' (Y/N)	Adjusted Allowable Design Pressure ⁵ (psf)
QAI Report RJ8259P-1	6d common	0.113	1.688	1.6	0.50	74.4	49.7	0.67	33	N	no adjustment
QAI Report RJ8259P-1	6d common	0.113	1.688	1.6	0.50	74.4	31.3	1.00	31	N	no adjustment
QAI Report RJ7876P-2	6d siding nails (0.092" x 0.222" HD x 2")	0.092	1.688	1.6	0.42	39.2	52.7	0.67	35	N	no adjustment

Table 3B Footnotes:

¹Nail Allowable Withdrawal Capacity (W') is calculated per the following NDS-2018 equations:

Eq. 12.2-3: $W' = C_d \times 1380 \times G^{1.5} \times D \times P$ (for smooth shank nails)

Eq. 12.2-5: $W' = C_d \times 1800 \times G^2 \times D \times P$ (for deformed shank nails)

Eq. 12.2-4: $W' = C_d \times 465 \times G^{1.5} \times D \times P$ (for smooth shank stainless nails)

²Allowable design pressures from Table 3A.

³Single fastener load = design pressure x effective fastener tributary area. Example, Single Fastener Load = 66.6 x 0.67 = 44 lb for smooth shank nail.

⁴SG values are the NDS published values for wood species: SPF = 0.42 and DFL = 0.50

⁵The allowable design pressure is adjusted if the calculated single fastener load from the testing exceeds the NDS allowable withdrawal capacity of the nail.

DESIGN WIND LOAD DETERMINATION AND ANALYSIS:

Fiber-cement siding transverse load capacity (wind load capacity) is determined from transverse load testing in accordance with ASTM E330 or E72 as noted in Section 4.0 of the ICC ES AC90, *Acceptance Criteria for Fiber Cement Siding Used as Exterior Wall Siding* (approved October 2018). The allowable/design capacity from the testing is based on a factor of safety of 3 applied to the ultimate test load per AC90. The wind load values are determined from the ASCE 7 equations.

Since the allowable design load is based on factor of safety of 3, allowable design loads on fiber-cement siding correlate directly to required design pressures for Allowable Stress Design, and therefore should be used with combination loading equations for Allowable Stress Design (ASD).

By using the combination loading equations for Allowable Stress Design (ASD), the tested allowable design loads for fiber-cement siding are aligned with the wind speed requirements in ASCE 7-22 (Figures 26.5-1A to -1D), or the figures in the 2023 FBC as applicable.

Equation 1, $q_z = 0.00256 \cdot K_z \cdot K_{zt} \cdot K_e \cdot V^2$ {ref. ASCE 7-22, Eq. 26.10-1}

q_z , velocity pressure at height z
 K_z , velocity pressure exposure coefficient evaluated at height z
 K_{zt} , topographic factor
 K_e , ground elevation factor. It's permitted to take $K_e = 1$
 V , basic wind speed (3-second gust MPH) as determined from:
ASCE 7-22 Figures 26.5-1A, B, C, or D
2023 FBC Figures 1609.3(1) -1609.3(4)

Equation 2, $V = V_{ult}$

V_{ult} , ultimate design wind speeds (3-second gust MPH) determined from 2023 FBC Figures 1690.3(1) - 1609.3(4)

Equation 3, $p = q_h \cdot K_d \cdot (GC_p - GC_{pi})$ $h \leq 60$ ft {ref. ASCE 7-22 Eq. 30.3-1}

q_h , velocity pressure evaluated at mean roof height h {ref. ASCE 7-22 Section 26.10}

GC_p , product of external pressure coefficient and gust-effect factor {ref. ASCE 7-22 Figure 30.3-1 for walls}

GC_{pi} , product of internal pressure coefficient and gust-effect factor {ref. ASCE 7-22 Table 26.13-1}

K_d , wind directionality factor {ref. ASCE 7-22 Section 26.6}

p , design pressure (PSF) for siding (allowable design load for siding)

To determine design pressure, substitute q_h into Equation 3.

Equation 4, $p = 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V_{ult}^2 \cdot (GC_p - GC_{pi})$

Allowable Stress Design, ASCE 7-22 Section 2.4.1, load combination 7,

Equation 5, $0.6D + 0.6W$ {ref. ASCE 7-22 section 2.4.1, load combination 7}

D , dead load
 W , wind load (load due to wind pressure)

To determine the Allowable Stress Design Pressure, apply the load factor for W (wind) from Equation 5 to p (design pressure) determined from equation 4

Equation 6, $p_{asd} = 0.6 \cdot [p]$

Equation 7, $p_{asd} = 0.6 \cdot [0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V_{ult}^2 \cdot (GC_p - GC_{pi})]$

Equation 7 is used to populate Table 5, 6 and 7.

To determine the allowable ultimate basic wind speed in Table 8, solve Equation 7 for V_{ult} .

Equation 8, $V_{ult} = (p_{asd} / 0.6 \cdot 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot (GC_p - GC_{pi}))^{0.5}$

Applicable to methods specified in Exceptions 1 through 3 of [2023 FBC] Section 1609.1.1., to determine the allowable nominal design wind speed (V_{asd}) in Table 8, apply the conversion formula below,

Equation 9, $V_{asd} = V_{ult} \cdot (0.6)^{0.5}$ {ref. 2023 FBC Eq. 16-17}

V_{asd} , Nominal design wind speed (3-second gust, mph)
 V_{ult} , Ultimate design wind speed (3-second gust, mph) determined from 2023 FBC Figure 1609.3(1), 1609.3(2), 1609.3(3) or 1609.3(4)

Table 4: Coefficients and Constants used in Determining V and p,

Height (ft)	K_e					Wall Zone 5				
	Exp B (ASCE 7-22)	Exp B	Exp C	Exp D		K_{zt}	K_d	K_e	GC_p	GC_{pi}
0-15	0.57	0.70	0.85	1.03	h≤60	1	0.85	1	-1.4	0.18
20	0.62	0.70	0.90	1.08		1	0.85	1	-1.4	0.18
25	0.66	0.70	0.94	1.12		1	0.85	1	-1.4	0.18
30	0.70	0.70	0.98	1.16		1	0.85	1	-1.4	0.18
35	0.72	0.72	1.01	1.19		1	0.85	1	-1.4	0.18
40	0.74	0.74	1.04	1.22		1	0.85	1	-1.4	0.18
45	0.765	0.765	1.065	1.245		1	0.85	1	-1.4	0.18
50	0.79	0.79	1.09	1.27		1	0.85	1	-1.4	0.18
55	0.81	0.81	1.11	1.29		1	0.85	1	-1.4	0.18
60	0.83	0.83	1.13	1.31		1	0.85	1	-1.4	0.18
100	0.95	0.95	1.26	1.43	h>60	1	0.85	1	-1.8	0.18

The coefficients and constants listed in Table 2 above were consistent for ASCE 7-22 except for K_z at Exposure B under 30 ft, where ASCE 7-22 allows to use lower exposure coefficient that previous codes used a more conservative values (resulted in higher design pressure). For the simplicity of the tables, the tables in the following sheet was populated using the more conservative ASCE 7-10 coefficients.

Table 5: Allowable Stress Design Pressure Psd for Component and Cladding (C&C) to be Resisted at Various Wind Speeds for 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)	Exposure 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	-14.9	-16.4	-18.0	-19.6	-21.4	-25.1	-29.1	-33.4	-38.0	-42.9	-48.1	-53.6	-59.4	-65.5
40	-15.3	-16.8	-18.5	-20.2	-22.0	-25.8	-29.9	-34.3	-39.1	-44.1	-49.5	-55.1	-61.1	-67.3
45	-15.8	-17.4	-19.1	-20.9	-22.7	-26.7	-30.9	-35.5	-40.4	-45.6	-51.1	-57.0	-63.1	-69.6
50	-16.3	-18.0	-19.7	-21.6	-23.5	-27.5	-31.9	-36.7	-41.7	-47.1	-52.8	-58.8	-65.2	-71.9
55	-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
60	-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
100	-24.6	-27.1	-29.7	-32.5	-35.4	-41.5	-48.1	-55.3	-62.9	-71.0	-79.6	-88.7	-98.2	-108.3

Table 6: Allowable Stress Design Pressure Psd for Component and Cladding (C&C) to be Resisted at Various Wind Speeds for 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)	Exposure 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 7: Allowable Stress Design Pressure Psd for Component and Cladding (C&C) to be Resisted at Various Wind Speeds for 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)	Exposure 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 5, 6, and 7 are based off of ASCE 7-22, and consistent with the 2023 FBC

Wind Speed Example Calculations:

The following is an example of the wind speed calculation for Table 8:

$$P_{asd} = -49.7 \text{ psf}; K_z = 0.7 \text{ (Exp B)}; K_{dt} = 1; K_g = 0.85; GC_p = -1.4; GC_{pi} = 0.18$$

Use Equation 8:

$$V = V_{ult} = \sqrt{\frac{P_{asd}}{0.6 \times 0.00256 \times K_z \times K_{dt} \times K_g \times (GC_p - GC_{pi})}} = \sqrt{\frac{-49.7}{0.6 \times 0.00256 \times 0.7 \times 1 \times 0.85 \times (-1.4 - 0.18)}} = 185 \text{ mph}$$

Use Equation 9:

$$V_{asd} = V \times \sqrt{0.6} = 185 \times \sqrt{0.6} = 144 \text{ mph}$$



								2023 FBC (Ultimate Design Wind Speed, V _{ult} ⁵)			2023 FBC (Nominal Design Wind Speed, V _{asd} ^{4,7})													
								Applicable to methods specified in Section 1609.1.1. of 2023 FBC			Applicable to methods specified in Exceptions 1 through 3 of Section 1609.1.1 of 2023 FBC			Test Values	Coefficients used for calculations ⁶									
Product	Product Thickness (inches)	Width (inches)	Fastener Type	Fastener Spacing	Frame Type	Stud Spacing (inches)	Building Height ³ (feet)	B	C	D	B	C	D	Design Load (PSF)	Exp B	Exp C	Exp D	K _{zt}	K _d	K _e	GC _p	GC _{pi}		
Hardie® Architectural Panel ¹¹	5/16	48	6d common	6	2X4 wood Hem-Fir	16	0-15	185	168	153	144	130	118	-49.7	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2	
							20	185	164	149	144	127	116	-49.7	0.70	0.9	1.08							
							25	185	160	147	144	124	114	-49.7	0.70	0.94	1.12							
							30	185	157	144	144	121	112	-49.7	0.70	0.98	1.16							
							35	183	154	142	142	120	110	-49.7	0.72	1.01	1.19							
							40	180	152	140	140	118	109	-49.7	0.74	1.04	1.22							
							45	177	150	139	137	116	108	-49.7	0.77	1.07	1.25							
							50	175	149	138	135	115	107	-49.7	0.79	1.09	1.27							
							55	172	147	137	134	114	106	-49.7	0.81	1.11	1.29							
							60	170	146	136	132	113	105	-49.7	0.83	1.13	1.31							
							100	142	123	116	110	96	90	-49.7	0.95	1.26	1.43							
							Hardie® Architectural Panel ¹¹	5/16	48	6d common	4	2X4 wood Hem-Fir	16	0-15	233	212	192							181
20	233	206	188	181	159	146								-78.7	0.70	0.9	1.08							
25	233	201	185	181	156	143								-78.7	0.70	0.94	1.12							
30	233	197	181	181	153	140								-78.7	0.70	0.98	1.16							
35	230	194	179	178	151	139								-78.7	0.72	1.01	1.19							
40	227	191	177	176	148	137								-78.7	0.74	1.04	1.22							
45	223	189	175	173	147	136								-78.7	0.77	1.07	1.25							
50	220	187	173	170	145	134								-78.7	0.79	1.09	1.27							
55	217	185	172	168	144	133								-78.7	0.81	1.11	1.29							
60	214	184	171	166	142	132								-78.7	0.83	1.13	1.31							
100	179	155	146	139	120	113								-78.7	0.95	1.26	1.43							
Hardie® Architectural Panel ¹¹	5/16	48	6d common	6	2X4 wood Hem-Fir	24								0-15	147	134	121	114	104	94	-31.3	0.70	0.85	1.03
							20	147	130	119	114	101	92	-31.3	0.70	0.9	1.08							
							25	147	127	116	114	98	90	-31.3	0.70	0.94	1.12							
							30	147	124	114	114	96	89	-31.3	0.70	0.98	1.16							
							35	145	123	113	113	95	88	-31.3	0.72	1.01	1.19							
							40	143	121	112	111	94	86	-31.3	0.74	1.04	1.22							
							45	141	119	110	109	93	86	-31.3	0.77	1.07	1.25							
							50	139	118	-	107	91	-	-31.3	0.79	1.09	1.27							
							55	137	117	-	106	91	-	-31.3	0.81	1.11	1.29							
							60	135	116	-	105	90	-	-31.3	0.83	1.13	1.31							
							100	113	-	-	87	-	-	-31.3	0.95	1.26	1.43							
							Hardie® Architectural Panel ¹¹	5/16	48	6d common	4	2X4 wood Hem-Fir												



TABLE 8 - MAXIMUM WIND SPEEDS (MPH) FOR HARDIE® ARCHITECTURAL PANEL¹

								2023 FBC (Ultimate Design Wind Speed, V_{ult}^5)			2023 FBC (Nominal Design Wind, Speed, $V_{asd}^{4,7}$)														
								Applicable to methods specified in Section 1609.1.1. of 2023 FBC			Applicable to methods specified in Exceptions 1 through 3 of Section 1609.1.1 of 2023 FBC						Coefficients used for calculations ⁶								
Product	Product Thickness (inches)	Width (inches)	Fastener Type	Fastener Spacing	Frame Type	Stud Spacing (inches)	Building Height ³ (feet)	B	C	D	B	C	D	Design Load (PSF)	Exp B	Exp C	Exp D	K _z			K _{st}	K _d	K _e	GC _p	GC _{pi}
Hardie® Architectural Panel ¹¹	1/4	48	Min. No 8 X 1 in. long X 0.323 in head diameter ribbed bugle head screw ²	6	Min. No. 20 ga. (33 mil, fy = 33 ksi) steel stud	16	0-15	198	180	163	153	139	126	-56.6	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2		
							20	198	175	159	153	135	123	-56.6	0.70	0.9	1.08								
							25	198	171	157	153	132	121	-56.6	0.70	0.94	1.12								
							30	198	167	154	153	130	119	-56.6	0.70	0.98	1.16								
							35	195	165	152	151	128	118	-56.6	0.72	1.01	1.19								
							40	193	162	150	149	126	116	-56.6	0.74	1.04	1.22								
							45	189	161	148	147	124	115	-56.6	0.77	1.07	1.25								
							50	186	159	147	144	123	114	-56.6	0.79	1.09	1.27								
							55	184	157	146	143	122	113	-56.6	0.81	1.11	1.29								
							60	182	156	145	141	121	112	-56.6	0.83	1.13	1.31								
							100	152	132	124	118	102	96	-56.6	0.95	1.26	1.43								
							h>60	146	132	120	113	102	93	-30.6	0.70	0.85	1.03								
Hardie® Architectural Panel ¹¹	1/4	48	Min. No 8 X 1 in. long X 0.323 in head diameter ribbed bugle head screw ²	6	Min. No. 20 ga. (33 mil, fy = 33 ksi) steel stud	24	20	146	128	117	113	99	91	-30.6	0.70	0.9	1.08	hs60	1	0.9	1	-1	0.2		
							25	146	126	115	113	97	89	-30.6	0.70	0.94	1.12								
							30	146	123	113	113	95	88	-30.6	0.70	0.98	1.16								
							35	144	121	112	111	94	87	-30.6	0.72	1.01	1.19								
							40	142	119	110	110	93	85	-30.6	0.74	1.04	1.22								
							45	139	118	-	108	91	-	-30.6	0.77	1.07	1.25								
							50	137	117	-	106	90	-	-30.6	0.79	1.09	1.27								
							55	135	116	-	105	90	-	-30.6	0.81	1.11	1.29								
							60	134	115	-	104	89	-	-30.6	0.83	1.13	1.31								
							100	112	-	-	87	-	-	-30.6	0.95	1.26	1.43								
							h>60	112	-	-	87	-	-	-30.6	0.95	1.26	1.43								
							Hardie® Architectural Panel ¹¹	5/16	48	ET&F 0.100 in. knurled shank X 1.5 in. long X 0.25 in. head diameter pin fastener ²	4 edge 8 field	Min. No. 20 ga. (33 mil, fy = 33 ksi) steel stud	16	0-15	198	180	163							153	139
20	198	175	159	153	135	124								-56.7	0.70	0.9	1.08								
25	198	171	157	153	132	121								-56.7	0.70	0.94	1.12								
30	198	167	154	153	130	119								-56.7	0.70	0.98	1.16								
35	195	165	152	151	128	118								-56.7	0.72	1.01	1.19								
40	193	163	150	149	126	116								-56.7	0.74	1.04	1.22								
45	189	161	149	147	124	115								-56.7	0.77	1.07	1.25								
50	186	159	147	144	123	114								-56.7	0.79	1.09	1.27								
55	184	157	146	143	122	113								-56.7	0.81	1.11	1.29								
60	182	156	145	141	121	112								-56.7	0.83	1.13	1.31								
100	152	132	124	118	102	96								-56.7	0.95	1.26	1.43								
h>60	152	132	124	118	102	96								-56.7	0.95	1.26	1.43								
Hardie® Architectural Panel ¹¹	5/16	48	ET&F 0.100 in. knurled shank X 1.5 in. long X 0.25 in. head diameter pin fastener ²	4 edge 8 field	Min. No. 20 ga. (33 mil, fy = 33 ksi) steel stud	24	0-15	153	139	126	118	107	98	-33.7	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2		
							20	153	135	123	118	104	95	-33.7	0.70	0.9	1.08								
							25	153	132	121	118	102	94	-33.7	0.70	0.94	1.12								
							30	153	129	119	118	100	92	-33.7	0.70	0.98	1.16								
							35	151	127	117	117	98	91	-33.7	0.72	1.01	1.19								
							40	149	125	116	115	97	90	-33.7	0.74	1.04	1.22								
							45	146	124	114	113	96	89	-33.7	0.77	1.07	1.25								
							50	144	122	113	111	95	88	-33.7	0.79	1.09	1.27								
							55	142	121	112	110	94	87	-33.7	0.81	1.11	1.29								
							60	140	120	112	109	93	86	-33.7	0.83	1.13	1.31								
							100	117	-	-	91	-	-	-33.7	0.95	1.26	1.43								
							h>60	117	-	-	91	-	-	-33.7	0.95	1.26	1.43								
Hardie® Architectural Panel ¹¹	5/16	48	No. 8, 1-5/8 in. long x 0.375" HD ribbed wafer head screw	6" vert. 12" horiz.	7/16" WSP sheathing over 2x4 wood framing ^{10,12}	16	0-15	193	175	159	149	136	123	-53.8	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2		
							20	193	170	155	149	132	120	-53.8	0.70	0.9	1.08								
							25	193	167	153	149	129	118	-53.8	0.70	0.94	1.12								
							30	193	163	150	149	126	116	-53.8	0.70	0.98	1.16								
							35	190	161	148	147	124	115	-53.8	0.72	1.01	1.19								
							40	188	158	146	145	123	113	-53.8	0.74	1.04	1.22								
							45	185	156	145	143	121	112	-53.8	0.77	1.07	1.25								
							50	182	155	143	141	120	111	-53.8	0.79	1.09	1.27								
							55	179	153	142	139	119	110	-53.8	0.81	1.11	1.29								
							60	177	152	141	137	118	109	-53.8	0.83	1.13	1.31								
							100	148	128	121	115	100	93	-53.8	0.95	1.26	1.43								
							h>60	148	128	121	115	100	93	-53.8	0.95	1.26	1.43								



TABLE 8 - MAXIMUM WIND SPEEDS (MPH) FOR HARDIE® ARCHITECTURAL PANEL¹

								2023 FBC (Ultimate Design Wind Speed, V_{ult}^5)			2023 FBC (Nominal Design Wind, Speed, $V_{nsd}^{4,7}$)												
								Applicable to methods specified in Section 1609.1.1. of 2023 FBC			Applicable to methods specified in Exceptions 1 through 3 of Section 1609.1.1 of 2023 FBC												
								Wind Exposure Category			Wind Exposure Category			Test Values			Coefficients used for calculations ⁶						
								Product	Product Thickness (inches)	Width (inches)	Fastener Type	Fastener Spacing	Frame Type	Stud Spacing (inches)	Building Height ³ (feet)	B	C	D	B	C	D	Design Load (PSF)	Exp B
																		K _z					
Hardie® Architectural Panel ¹¹	5/16	48	16-Ga., 1-1/2" Stainless Finish Nails	4" along studs	2x4 SPF (min. SG = 0.42) framing	16	0-15	153	139	126	119	108	98	-33.8	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2
							20	153	135	123	119	105	95	-33.8	0.70	0.9	1.08						
							25	153	132	121	119	102	94	-33.8	0.70	0.94	1.12						
							30	153	129	119	119	100	92	-33.8	0.70	0.98	1.16						
							35	151	127	117	117	99	91	-33.8	0.72	1.01	1.19						
							40	149	126	116	115	97	90	-33.8	0.74	1.04	1.22						
							45	146	124	115	113	96	89	-33.8	0.77	1.07	1.25						
							50	144	123	114	112	95	88	-33.8	0.79	1.09	1.27						
							55	142	122	113	110	94	87	-33.8	0.81	1.11	1.29						
							60	141	120	112	109	93	87	-33.8	0.83	1.13	1.31						
							100	117	-	-	91	-	-	-33.8	0.95	1.26	1.43						
Hardie® Architectural Panel ¹¹	5/16	48	16-Ga., 1-1/2" Stainless Finish Nails	4" along studs	2x4 DFL framing (min. SG=0.46)	16	0-15	160	145	132	124	113	102	-37.0	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2
							20	160	141	129	124	109	100	-37.0	0.70	0.9	1.08						
							25	160	138	127	124	107	98	-37.0	0.70	0.94	1.12						
							30	160	135	124	124	105	96	-37.0	0.70	0.98	1.16						
							35	158	133	123	122	103	95	-37.0	0.72	1.01	1.19						
							40	156	131	121	121	102	94	-37.0	0.74	1.04	1.22						
							45	153	130	120	119	101	93	-37.0	0.77	1.07	1.25						
							50	151	128	119	117	99	92	-37.0	0.79	1.09	1.27						
							55	149	127	118	115	99	91	-37.0	0.81	1.11	1.29						
							60	147	126	117	114	98	91	-37.0	0.83	1.13	1.31						
							100	123	-	-	95	-	-	-37.0	0.95	1.26	1.43						
Hardie® Architectural Panel ¹¹	5/16	48	16-Ga., 1-1/2" Stainless Finish Nails	4" along studs, 4" along panel edges ⁹	7/16" WSP Sheathing over 2x4 SPF Framing ^{8,10}	16	0-15	172	156	142	133	121	110	-42.7	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2
							20	172	152	138	133	117	107	-42.7	0.70	0.9	1.08						
							25	172	148	136	133	115	105	-42.7	0.70	0.94	1.12						
							30	172	145	134	133	113	103	-42.7	0.70	0.98	1.16						
							35	169	143	132	131	111	102	-42.7	0.72	1.01	1.19						
							40	167	141	130	130	109	101	-42.7	0.74	1.04	1.22						
							45	164	139	129	127	108	100	-42.7	0.77	1.07	1.25						
							50	162	138	128	125	107	99	-42.7	0.79	1.09	1.27						
							55	160	137	127	124	106	98	-42.7	0.81	1.11	1.29						
							60	158	135	126	122	105	97	-42.7	0.83	1.13	1.31						
							100	132	114	-	102	89	-	-42.7	0.95	1.26	1.43						
Hardie® Architectural Panel ¹¹	5/16	48	16-ga. x 1.5" stainless steel finish nails	4" along studs	2X4 wood Douglas-Fir	24	0-15	142	129	117	110	100	91	-29.0	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2
							20	142	125	114	110	97	88	-29.0	0.70	0.9	1.08						
							25	142	122	112	110	95	87	-29.0	0.70	0.94	1.12						
							30	142	120	110	110	93	85	-29.0	0.70	0.98	1.16						
							35	140	118	-	108	91	-	-29.0	0.72	1.01	1.19						
							40	138	116	-	107	90	-	-29.0	0.74	1.04	1.22						
							45	136	115	-	105	89	-	-29.0	0.77	1.07	1.25						
							50	133	114	-	103	88	-	-29.0	0.79	1.09	1.27						
							55	132	113	-	102	87	-	-29.0	0.81	1.11	1.29						
							60	130	112	-	101	86	-	-29.0	0.83	1.13	1.31						
							100	-	-	-	-	-	-	-29.0	0.95	1.26	1.43						
Hardie® Architectural Panel ¹¹	5/16	48	4d ring shank nail, 0.091 in. shank x 0.225 in. HD x 1.5 in. long	4" along studs	2X4 wood Douglas-Fir	24	0-15	143	129	118	110	100	91	-29.4	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2
							20	143	126	115	110	97	89	-29.4	0.70	0.9	1.08						
							25	143	123	113	110	95	87	-29.4	0.70	0.94	1.12						
							30	143	121	111	110	93	86	-29.4	0.70	0.98	1.16						
							35	141	119	-	109	92	-	-29.4	0.72	1.01	1.19						
							40	139	117	-	107	91	-	-29.4	0.74	1.04	1.22						
							45	136	116	-	106	90	-	-29.4	0.77	1.07	1.25						
							50	134	114	-	104	89	-	-29.4	0.79	1.09	1.27						
55	133	113	-	103	88	-	-29.4	0.81	1.11	1.29													
60	131	112	-	101	87	-	-29.4	0.83	1.13	1.31													
100	-	-	-	-	-	-	-29.4	0.95	1.26	1.43													
Hardie® Architectural Panel ¹¹	5/16	48	16-ga. x 1.5" stainless steel finish nails	4" along studs	7/16-inch WSP over 2x4 wood Douglas-Fir Framing	24	0-15	147	133	121	114	103	94	-31.2	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2
							20	147	130	118	114	100	92	-31.2	0.70	0.9	1.08						
							25	147	127	116	114	98	90	-31.2	0.70	0.94	1.12						
							30	147	124	114	114	96	88	-31.2	0.70	0.98	1.16						
							35	145	122	113	112	95	87	-31.2	0.72	1.01	1.19						
							40	143	121	111	111	93	86	-31.2	0.74	1.04	1.22						
							45	141	119	110	109	92	85	-31.2	0.77	1.07	1.25						
							50	138	118	-	107	91	-	-31.2	0.79	1.09	1.27						
							55	137	117	-	106	90	-	-31.2	0.81	1.11	1.29						
							60	135	116	-	105	90	-	-31.2	0.83	1.13	1.31						
							100	113	-	-	87	-	-	-31.2	0.95	1.26	1.43						

								2023 FBC (Ultimate Design Wind Speed, V_{ult}^5)			2023 FBC (Nominal Design Wind, Speed, $V_{asd}^{4,7}$)																	
								Applicable to methods specified in Section 1609.1.1. of 2023 FBC			Applicable to methods specified in Exceptions 1 through 3 of Section 1609.1.1 of 2023 FBC												Test Values					
								Wind Exposure Category			Wind Exposure Category			Coefficients used for calculations ⁶														
								Product			Product Thickness (inches)	Width (inches)	Fastener Type	Fastener Spacing	Frame Type	Stud Spacing (inches)	Building Height ³ (feet)	B	C	D	B	C	D	Design Load (PSF)	Exp B	Exp C	Exp D	K _{zt}
Hardie® Architectural Panel ¹¹	5/16	48	16-ga. x 1.5" stainless steel finish nails	4" along studs, 4" along panel edges	7/16-inch WSP over 2x4 wood SPF Framing	24	0-15	139	126	115	108	98	89	-28.0	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2					
							20	139	123	112	108	95	87	-28.0	0.70	0.9	1.08							1	0.9	1	-1	0.2
							25	139	120	110	108	93	85	-28.0	0.70	0.94	1.12							1	0.9	1	-1	0.2
							30	139	118	-	108	91	-	-28.0	0.70	0.98	1.16							1	0.9	1	-1	0.2
							35	137	116	-	106	90	-	-28.0	0.72	1.01	1.19							1	0.9	1	-1	0.2
							40	135	114	-	105	88	-	-28.0	0.74	1.04	1.22							1	0.9	1	-1	0.2
							45	133	113	-	103	87	-	-28.0	0.77	1.07	1.25							1	0.9	1	-1	0.2
							50	131	112	-	102	86	-	-28.0	0.79	1.09	1.27							1	0.9	1	-1	0.2
							55	129	111	-	100	86	-	-28.0	0.81	1.11	1.29							1	0.9	1	-1	0.2
							60	128	-	-	99	-	-	-28.0	0.83	1.13	1.31							1	0.9	1	-1	0.2
100	-	-	-	-	-	-	-28.0	0.95	1.26	1.43	h>60	1	0.9	1	-2	0.2												
Hardie® Architectural Panel-Fine Sand-Grooved	5/16	48	6d common nails (0.113" SD)	6" along studs	2x4 DF (SG = 0.50) framing	16	0-15	185	168	153	144	130	118	-49.7	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2					
							20	185	164	149	144	127	116	-49.7	0.70	0.9	1.08							1	0.9	1	-1	0.2
							25	185	160	147	144	124	114	-49.7	0.70	0.94	1.12							1	0.9	1	-1	0.2
							30	185	157	144	144	121	112	-49.7	0.70	0.98	1.16							1	0.9	1	-1	0.2
							35	183	154	142	142	120	110	-49.7	0.72	1.01	1.19							1	0.9	1	-1	0.2
							40	180	152	140	140	118	109	-49.7	0.74	1.04	1.22							1	0.9	1	-1	0.2
							45	177	150	139	137	116	108	-49.7	0.77	1.07	1.25							1	0.9	1	-1	0.2
							50	175	149	138	135	115	107	-49.7	0.79	1.09	1.27							1	0.9	1	-1	0.2
							55	172	147	137	134	114	106	-49.7	0.81	1.11	1.29							1	0.9	1	-1	0.2
							60	170	146	136	132	113	105	-49.7	0.83	1.13	1.31							1	0.9	1	-1	0.2
100	142	123	116	110	96	90	-49.7	0.95	1.26	1.43	h>60	1	0.9	1	-2	0.2												
Hardie® Architectural Panel-Fine Sand-Grooved	5/16	48	6d common nails (0.113" SD)	6" along studs	2x4 DF (SG = 0.50) framing	24	0-15	147	134	121	114	104	94	-31.3	0.70	0.85	1.03	hs60	1	0.9	1	-1	0.2					
							20	147	130	119	114	101	92	-31.3	0.70	0.9	1.08							1	0.9	1	-1	0.2
							25	147	127	116	114	98	90	-31.3	0.70	0.94	1.12											



TABLE 8 - MAXIMUM WIND SPEEDS (MPH) FOR HARDIE® ARCHITECTURAL PANEL¹

								2023 FBC (Ultimate Design Wind Speed, V_{ult}^5)			2023 FBC (Nominal Design Wind, Speed, $V_{asd}^{4,7}$)																																																				
								Applicable to methods specified in Section 1609.1.1. of 2023 FBC			Applicable to methods specified in Exceptions 1 through 3 of Section 1609.1.1 of 2023 FBC			Test Values			Coefficients used for calculations ⁶																																														
Product	Product Thickness (inches)	Width (inches)	Fastener Type	Fastener Spacing	Frame Type	Stud Spacing (inches)	Building Height ³ (feet)	B	C	D	B	C	D	Design Load (PSF)	Exp B	Exp C	Exp D	K _z	K _{st}	K _d	K _e	GC _p	GC _{pi}																																								
Hardie® Architectural Panel-Fine Sand-Grooved	5/16	48	No. 8 x 0.323" HD x 1.25" buglehead screw	8" along studs	Min. 20-ga. steel studs or 2x4 SPF (SG = 0.42) wood	16	0-15	174	158	144	135	122	111	-43.8	0.70	0.85	1.03	h≤60						1	0.9	1	-1	0.2																																			
							20	174	154	140	135	119	109	-43.8	0.70	0.9	1.08		1	0.9	1	-1	0.2																																								
							25	174	150	138	135	116	107	-43.8	0.70	0.94	1.12												1	0.9	1	-1	0.2																														
							30	174	147	135	135	114	105	-43.8	0.70	0.98	1.16																	1	0.9	1	-1	0.2																									
							35	172	145	134	133	112	103	-43.8	0.72	1.01	1.19																						1	0.9	1	-1	0.2																				
							40	169	143	132	131	111	102	-43.8	0.74	1.04	1.22																											1	0.9	1	-1	0.2															
							45	167	141	131	129	109	101	-43.8	0.77	1.07	1.25																																1	0.9	1	-1	0.2										
							50	164	140	129	127	108	100	-43.8	0.79	1.09	1.27																																					1	0.9	1	-1	0.2					
							55	162	138	128	125	107	99	-43.8	0.81	1.11	1.29																																										1	0.9	1	-1	0.2
							60	160	137	127	124	106	99	-43.8	0.83	1.13	1.31																																														
100	134	116	-	103	90	-	-43.8	0.95	1.26	1.43	h>60	1	0.9	1	-2	0.2																																															
0-15	164	149	135	127	115	105	-38.8	0.70	0.85	1.03							h≤60	1	0.9	1	-1	0.2																																									
20	164	145	132	127	112	102	-38.8	0.70	0.9	1.08													1	0.9	1	-1	0.2																																				
25	164	141	130	127	110	100	-38.8	0.70	0.94	1.12																		1	0.9	1	-1	0.2																															
30	164	139	127	127	107	99	-38.8	0.70	0.98	1.16																							1	0.9	1	-1	0.2																										
35	162	136	126	125	106	97	-38.8	0.72	1.01	1.19																												1	0.9	1	-1	0.2																					
40	159	134	124	123	104	96	-38.8	0.74	1.04	1.22																																	1	0.9	1	-1	0.2																
45	157	133	123	121	103	95	-38.8	0.77	1.07	1.25																																						1	0.9	1	-1	0.2											
50	154	131	122	120	102	94	-38.8	0.79	1.09	1.27																																											1	0.9	1	-1	0.2						
55	152	130	121	118	101	94	-38.8	0.81	1.11	1.29																																																1	0.9	1	-1	0.2	
60	151	129	120	117	100	93	-38.8	0.83	1.13	1.31	1	0.9	1	-1	0.2																																																
100	126	-	-	97	-	-	-38.8	0.95	1.26	1.43						h>60	1	0.9	1	-2	0.2																																										
0-15	157	142	129	121	110	100	-35.4	0.70	0.85	1.03												h≤60	1	0.9	1	-1	0.2																																				
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45	150	127	117	116	98	91	-35.4	0.77	1.07	1.25																																											1	0.9	1	-1	0.2						
50	147	125	116	114	97	90	-35.4	0.79	1.09	1.27																																																1	0.9	1	-1	0.2	
55	146	124	115	113	96	89	-35.4	0.81	1.11	1.29	1	0.9	1	-1	0.2																																																
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100	120	-	-	93	-	-	-35.4	0.95	1.26	1.43											h>60	1	0.9	1	-2	0.2																																					
0-15	174	158	144	135	122	111	-43.8	0.70	0.85	1.03																	h≤60	1	0.9	1	-1	0.2																															
20	174	154	140	135	119	109	-43.8	0.70	0.9	1.08																							1	0.9	1	-1	0.2																										
25	174	150	138	135	116	107	-43.8	0.70	0.94	1.12																												1	0.9	1	-1	0.2																					
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50	164	140	129	127	108	100	-43.8	0.79	1.09	1.27	1	0.9	1	-1	0.2																																																
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20	164	145	132	127	112	102	-38.8	0.70	0.9	1.08																												1	0.9	1	-1	0.2																					
25	164	141	130	127	110	100	-38.8	0.70	0.94	1.12																																	1	0.9	1	-1	0.2																
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45	157	133	123	121	103	95	-38.8	0.77	1.07	1.25	1	0.9	1	-1	0.2																																																
50	154	131	122	120	102	94	-38.8	0.79	1.09	1.27						1	0.9	1	-1	0.2																																											
55	152	130	121	118	101	94	-38.8	0.81	1.11	1.29											1	0.9	1	-1	0.2																																						
60	151	129	120	117	100	93	-38.8	0.83	1.13	1.31																1	0.9	1	-1	0.2																																	
100	126	-	-	97	-	-	-38.8	0.95	1.26	1.43																					h>60	1	0.9	1	-2	0.2																											



TABLE 8 - MAXIMUM WIND SPEEDS (MPH) FOR HARDIE® ARCHITECTURAL PANEL¹

								2023 FBC (Ultimate Design Wind Speed, $V_{ult}^{5,6}$)			2023 FBC (Nominal Design Wind, Speed, $V_{asd}^{4,7}$)												
								Applicable to methods specified in Section 1609.1.1. of 2023 FBC			Applicable to methods specified in Exceptions 1 through 3 of Section 1609.1.1 of 2023 FBC			Test Values	K_z			Coefficients used for calculations ⁶					
								Wind Exposure Category			Wind Exposure Category												
Product	Product Thickness (inches)	Width (inches)	Fastener Type	Fastener Spacing	Frame Type	Stud Spacing (inches)	Building Height ³ (feet)	B	C	D	B	C	D	Design Load (PSF)	Exp B	Exp C	Exp D	K_{zt}	K_d	K_e	GC_p	GC_{pi}	
Hardie® Architectural Panel-Fine Sand-Grooved	5/16	48	No. 8 x 0.323" HD x 1.25" buglehead screw	12" along studs	Min. 20-ga. steel studs or 2x4 with 3/4" thick SPF (SG = 0.42) wood or min. 20-ga. furring strips attach to framing per code	16	0-15	157	142	129	121	110	100	-35.4	0.70	0.85	1.03						hs60
							20	157	138	126	121	107	98	-35.4	0.70	0.9	1.08	1	0.9	1	-1	0.2	
							25	157	135	124	121	105	96	-35.4	0.70	0.94	1.12	1	0.9	1	-1	0.2	
							30	157	132	122	121	103	94	-35.4	0.70	0.98	1.16	1	0.9	1	-1	0.2	
							35	154	130	120	120	101	93	-35.4	0.72	1.01	1.19	1	0.9	1	-1	0.2	
							40	152	128	119	118	100	92	-35.4	0.74	1.04	1.22	1	0.9	1	-1	0.2	
							45	150	127	117	116	98	91	-35.4	0.77	1.07	1.25	1	0.9	1	-1	0.2	
							50	147	125	116	114	97	90	-35.4	0.79	1.09	1.27	1	0.9	1	-1	0.2	
							55	146	124	115	113	96	89	-35.4	0.81	1.11	1.29	1	0.9	1	-1	0.2	
							60	144	123	114	111	95	89	-35.4	0.83	1.13	1.31	1	0.9	1	-1	0.2	
							100	120	-	-	93	-	-	-35.4	0.95	1.26	1.43	h>60	1	0.9	1	-2	0.2

Table 8 Footnotes:

1. Installation must be in accordance with siding manufacturer's instructions. The wind speeds apply to only non-grooved Hardie® Architectural Panels.
2. Screws must penetrate steel framing at minimum 3 full threads. Knurled shank pins shall penetrate the metal framing at least 1/4 inch.
3. 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). Linear interpolation of building height (≤ 60 ft) and wind speed is permitted.
4. V_{asd} = nominal design wind speed
5. V_{ult} = ultimate design wind speed
6. Wind speed design coefficient assumptions per Section 30.4 of ASCE 7-22: $K_{zt}=1$, $K_d=0.85$, $K_e = 1$; $GC_p=-1.4$ (hs60), $GC_p=-1.8$ (h>60), $GC_{pi}=0.18$.
7. 2023 FBC Section 1609.3.1 Eq. 16-17, $V_{asd} = V_{ult}(0.6)^{0.5}$
8. Attachment of wood structural panel (WSP) sheathing to framing is the responsibility of an engineer and must be designed to resist the required wind loads noted in this table.
9. Panel edges may be attached to WSP only
10. Unless otherwise noted in the table, wood framing species must have specific gravity of 0.42 or higher. WSP sheathing must have specific gravity of 0.50 or higher
11. The wind speeds apply to only non-grooved Hardie® Architectural Panels.

LIMITATIONS OF USE:

- 1) Fastener pullout must be evaluated when installed a species of wood studs other than that which was tested.

