ICC EVALUATION SERVICE

ICC-ES Evaluation Report

ESR-2273

Reissued June 2019
Revised March 2020
This report is subject to renewal June 2021.

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 12 13—Cementitious Reinforced Panels

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 45 00—Fiber-Reinforced Cementitious Panels

REPORT HOLDER:

JAMES HARDIE BUILDING PRODUCTS, INC.

EVALUATION SUBJECT:

HARDIESOFFIT® AND CEMSOFFIT® EXTERIOR SOFFIT PANEL

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015, 2012 and 2009 *International Building Code®* (IBC)
- 2018, 2015, 2012 and 2009 *International Residential Code®* (IRC)

Properties evaluated:

- Physical Properties
- Structural
- Noncombustible Construction
- Surface-burning characteristics
- Thermal Resistance
- Weather Protection

2.0 USES

Hardiesoffit® and Cemsoffit® panels are used as exterior soffit covering of buildings of non-fire-resistance-rated construction.

3.0 DESCRIPTION

Hardiesoffit® and Cemsoffit® panels are single-faced, cellulose fiber-reinforced cement (fiber-cement) sheets manufactured by the Hatschek process and cured by high-pressure steam autoclaving. The exterior soffit panels are identified as Hardiesoffit® (Cemsoffit®) panels and may be vented or unvented.

The fiber-cement sheets comply with ASTM C1186 as Type A, Grade II, and have a flame-spread index of 0 and a smoke developed index of 5 when tested in accordance with ASTM E84. The sheets are classified as noncombustible when tested in accordance with ASTM E136.

Thermal conductivity (K) and thermal resistance (R) values for the unvented products are shown in Table 2 based on ASTM C177 tests. When tested in accordance with ASTM E96, unvented products with a thickness of ¼ inch (6.4 mm) have demonstrated the permeance value given in Table 3 of this report.

Soffit panels are available with either a woodgrain texture or a smooth unsanded surface. The exterior soffit products may be supplied unprimed or primed for subsequent application of a compatible primer and/or exterior-grade topcoat(s). Nominal soffit dimensions are noted in Table 1.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The maximum wind speeds, building heights and exposure categories applicable for Hardiesoffit® and Cemsoffit® panels are noted in Table 5. Vented and VentedPlus™ soffit panels provide net free ventilation area as presented in Table 4 of this report.

4.2 Installation:

Installation shall comply with this report and the manufacturer's published installation instructions. A copy of the manufacturer's published installation instructions this report must be available at the job site during installation.

All panel edges must be supported be framing members. Panels must be attached with corrosion-resistant fasteners installed with a minimum 3/8 inch (9.5 mm) edge distance and minimum 2-inch (51 mm) clearance from corners. The panels must be installed with the long edge of the panel perpendicular to the joist framing and must be attached with fastener types, lengths, and spacings described in Table 5. Framing must include a subfascia, blocking, and/or ledger board to provide a nailing base along the dimension of the soffit.

5.0 CONDITIONS OF USE

The Hardiesoffit® and Cemsoffit® exterior soffit panels described in this report comply with, or are suitable alternatives to what is specified in those codes listed in Section 1.0 of his report, subject to the following conditions:

5.1 The Hardiesoffit® and Cemsoffit® panels must be installed in accordance with this report and the

manufacturer's published installation instructions. In the event of a conflict between this report and the manufacturer's published installation instructions, this report governs.

5.2 The Hardiesoffit® and Cemsoffit® soffit panels are manufactured under a quality control program with inspections by ICC-ES at the following locations:

5.2.1 Pulaski, Virginia

5.2.2 Tacoma, Washington

5.2.3 Waxahachie,Texas

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Fiber Cement Siding Used as Exterior Wall Siding (AC90), dated October 2018.

7.0 IDENTIFICATION

7.1 Hardiesoffit® and Cemsoffit® panels shall be identified by a stamp or label on the board bearing the name and address of the report holder (James Hardie Building Products), the product name (Hardiesoffit® or Cemsoffit®), and the evaluation report number (ESR-2273).

7.2 The report holder's contact information is the following:

JAMES HARDIE BUILDING PRODUCTS, INC.
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TABLE 1—STANDARD NOMINAL SOFFIT DIMENSIONS

PRODUCT TYPE	WIDTH (inches)	LENGTH (feet)	THICKNESS (inches)
Hardiesoffit® Smooth (unvented)	4, 5, 6, 10, 12, 16, 24, 36 & 48	8, 9, 10 & 12	1/4
Hardiesoffit® Woodgrain (unvented)	4, 5 1/4 , 5 3/4, 6, 6 1/4, 7 1/4, 8, 8 1/4, 9 1/2, 10, 11 1/4, 11 1/2, 12, 15 1/4, 16, 24, 36 & 48	8, 9, 10 & 12	1/4
Hardiesoffit® Smooth (vented)	4, 6, 9 1/2, 10, 11 1/2, 12, 16 & 24	8 & 12	1/4
Hardiesoffit® Woodgrain (vented)	4, 5 1/4, 5 3/4, 6, 6 1/4, 7 1/4, 8, 8 1/4, 9 1/2, 11 1/2, 12, 16 & 24	8 & 12	1/4
Hardiesoffit® VentedPlus™ Smooth (Vented)	12, 16 & 24	8 & 12	1/4
Hardiesoffit® VentedPlus™ Woodgrain (Vented)	12, 16 & 24	8 & 12	1/4
Cemsoffit® Woodgrain (unvented)	4, 5, 6, 10, 12, 16, 24, 36 & 48	8, 9, 10 & 12	1/4
Cemsoffit® Woodgrain (vented)	4, 5 1/2, 5 3/4, 6, 6 1/2, 7 1/4, 8, 8 1/4, 9 1/2, 11 1/2, 12, 16 & 24	8 & 12	1/4

For **SI:** 1 inch = 25.4 mm, 1 ft = 304.8 mm

TABLE 2—K AND R VALUES FOR UNVENTED SOFFIT PRODUCTS

PRODUCT THICKNESS (inch)	ACTUAL THERMAL CONDUCTIVITY (K_{eff})	ACTUAL THERMAL RESISTANCE (Btu/h-ft^2-°F)
1/4	7.80	0.13

For **SI:** 1 inch = 25.4 mm, 1 Btu/h-ft2-°F = 5.678 W/m^2-K

TABLE 3—WATER VAPOR PERMEANCE VALUES FOR UNVENTED SOFFIT PRODUCTS

PRODUCT THICKNESS (inch)	PERMEANCE (perms)
1/4	1.75

For **SI:** 1 inch = 25.4 mm, 1 perm = 57 mg/(s•m^2•Pa)

TABLE 4—VENTILATION RATES FOR VENTED SOFFIT PRODUCTS

PRODUCT LINE	PANEL WIDTH (inch)	NET FREE VENTILATION (in^2 / linear ft)
Hardiesoffit® and Cemsoffit®	5 3/4 and over	5.0 (105 cm^2/m)
Hardiesoffit® and Cemsoffit®	5 1/4	4.0 (84 cm^2/m)
Hardiesoffit® and Cemsoffit®	4	3.0 (64 cm^2/m)
Hardiesoffit® VentedPlus™	12, 16 & 24	12.6 (266 cm^2/m)

For **SI:** 1 inch = 25.4 mm

TABLE 5—MAXIMUM WIND SPEEDS FOR EXPOSURE CATEGORY (mph)[2]

Product	Product Dimensions (in.)		Fastener Type [9]	Fastener Spacing (in.)	Frame Type	Stud Spacing (in.)	Building Height[8] (ft.)	2012 IRC, 2009 IBC/IRC, 2006 IBC/IRC (Basic Wind Speed, V_{asd}[1,4,7,12]) EXPOSURE CATEGORY			2018 IRC, 2015 IBC/IRC, 2012 IBC (Ultimate Design Wind Speed, V_{ult}[5,6]), 2018 IBC (Basic Design Wind Speed, V[10,11]) EXPOSURE CATEGORY		
	Thick	Max. Width						B	C	D	B	C	D
Hardiesoffit®	1/4	48	4d common, 1½-in long	8	2 x 4 wood[3]	16	0-15	111	100	91	143	130	118
							20	111	98	89	143	126	115
							40	106	91	-	137	117	-
							60	100	87	-	130	112	-
Hardiesoffit®	1/4	48	4d common, 1½-in long	8	2 x 4 wood[3]	24	0-15	94	86	-	122	110	-
							20	94	-	-	122	-	-
							40	90	-	-	117	-	-
							60	86	-	-	110	-	-
Hardiesoffit®	1/4	48	6d siding nail 0.092-in shank x 2-in long x 0.235-in HD	4	2 x 4 wood[3]	24	0-15	139	126	114	179	162	147
							20	139	122	112	179	158	144
							40	133	114	105	172	147	135
							60	126	109	101	162	141	131
Hardiesoffit®	1/4	16	0.083-in shank x 0.187" HD x 1 1/2-in long ring shank nail	8	2 x 4 wood[3]	16	0-15	185	168	152	239	217	197
							20	185	163	149	239	211	192
							40	177	152	140	229	196	181
							60	168	146	135	217	188	175
Hardiesoffit®	1/4	16	0.083-in shank x 0.187" HD x 1 1/2-in long ring shank nail	8	2 x 4 wood[3]	24	0-15	186	169	153	240	218	198
							20	186	164	150	240	211	193
							40	178	152	141	230	197	182
							60	169	146	136	218	189	175
Hardiesoffit®	1/4	24	0.083 shank x 0.187" HD x 1 1/2-in long ring shank nail	8	2 x 4 wood[3]	22.5 max	0-15	106	96	87	137	124	113
							20	106	93	85	137	121	110
							40	102	87	80	131	112	104
							60	96	83	-	124	108	-
Hardiesoffit®	1/4	24	6d siding nail 0.092-in shank x 2-in long x 0.235-in HD	4	2 x 4 wood[3]	24	0-15	144	131	119	186	169	153
							20	144	127	116	186	164	150
							40	138	118	109	178	152	141
							60	131	113	105	169	146	136
Hardiesoffit®	1/4	24	6d common nail 0.113-in shank x 2-in long x 0.266-in HD	4	2 x 4 wood[3]	24	0-15	150	136	123	193	175	159
							20	150	132	121	193	171	156
							40	144	123	113	186	159	146
							60	136	118	109	175	152	141
Hardiesoffit®	1/4	48	No 8 x 1-in long x 0.323 in HD ribbed bugle head screw	6	20 ga Min 3 5/8 in x 1 3/8 in metal C-stud	16	0-15	116	106	96	150	136	124
							20	116	103	94	150	133	121
							40	112	95	88	144	123	114
							60	106	92	85	136	118	110

TABLE 5—MAXIMUM WIND SPEEDS FOR EXPOSURE CATEGORY (mph)[2] (CONTINUED)

Product	Product Dimensions (in.)		Fastener Type [9]	Fastener Spacing (in.)	Frame Type	Stud Spacing (in.)	Building Height[8] (ft.)	2012 IRC, 2009 IBC/IRC, 2006 IBC/IRC (Basic Wind Speed, V_{asd}[1,4,7, 12]) EXPOSURE CATEGORY			2018 IRC, 2015 IBC/IRC, 2012 IBC (Ultimate Design Wind Speed, V_{ult}[5,6]), 2018 IBC (Basic Design Wind Speed, V[10,11]) EXPOSURE CATEGORY		
	Thick	Max. Width						B	C	D	B	C	D
Hardiesoffit® VentedPlus™	1/4	24	ET&F shot pin .100" shank x 1.5" long x .250" HD	6	20 ga Min $3^5/_8$ in x $1^3/_8$ in metal C-stud	24	0-15	104	95	86	134	122	111
							20	104	92	84	134	119	108
							40	100	85	79	129	110	102
							60	95	82	-	122	106	-
Hardiesoffit® VentedPlus™	1/4	24	6d siding nail .092" shank x 2.0" long x .222" HD	4	2 x 4 wood[3]	24	0-15	148	135	122	192	174	158
							20	148	131	119	192	169	154
							40	142	122	112	184	157	145
							60	135	117	108	174	151	140
Hardiesoffit® VentedPlus™	1/4	24	6d common nail .113" shank x 2.0" long x .266" HD	4	2 x 4 wood[3]	24	0-15	162	147	134	209	190	172
							20	162	143	130	209	185	168
							40	156	133	123	201	172	158
							60	147	128	118	190	165	153
Hardiesoffit® VentedPlus™	1/4	16	4d ring shank siding nail (.090-inch shank x .215 in. HD x 1-1/2 in. long	8	2 x 4 wood[3]	24	0-15	126	114	104	163	148	134
							20	126	111	101	163	143	131
							40	121	103	95	156	133	123
							60	114	99	92	148	128	119
Hardiesoffit® VentedPlus™	1/4	16	4d ring shank siding nail (.090-inch shank x .215 in. HD x 1-1/2 in. long	8	2 x 4 wood[3]	16	0-15	141	128	116	182	165	150
							20	141	124	113	182	160	146
							40	135	116	107	175	149	138
							60	128	111	103	165	143	133
Hardiesoffit® VentedPlus™	1/4	16	4d ring shank siding nail (.090-inch shank x .215 in. HD x 1-1/2 in. long	8" o.c. on perimeter framing member only	2 x 4 wood[3]	16	0-15	108	98	89	140	127	115
							20	108	96	87	140	123	113
							40	104	89	82	134	115	106
							60	98	85	79	127	110	102
Hardiesoffit® VentedPlus™	1/4	24	4d ring shank siding nail (.090-inch shank x .215 in. HD x 1-1/2 in. long	8	2 x 4 wood[3]	24	0-15	110	100	90	142	129	117
							20	110	97	88	142	125	114
							40	105	90	83	136	116	107
							60	100	86	80	129	112	104

For **SI:** 1 ft = 305 mm, 1 inch = 25.4 mm, 1 mph = 0.44 m/s.

[1]Wind speed design assumptions per Section 6.5, Method 2, of ASCE 7-05: I = 1.0, K_{zt} = 1, K_d = 0.85, GC_{pi} = 0.18, GC_p = -1.4.
[2]Installation must be in accordance with Section 4.2 of this report.
[3]Values are for species of wood having a specific gravity of 0.42 or greater.
[4]Vasd = nominal design wind speed.
[5]Vult = ultimate design wind speed
[6]Wind speed design assumptions per Section 30.4, of ASCE 7-10: K_{zt} = 1, K_d = 0.85, GC_{pi} = 0.18, GC_p = -1.4.
[7]2015 and 2012 IBC Section 1609.3.1, Eq. 16-33, $V_{asd} = V_{ult}\sqrt{0.6}$
[8]Building height equals the 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).
[9]Smooth-shank stainless steel nails are outside of the scope of this report.
[10]V= basic design wind speed
[11]Wind speed design assumptions per Section 30.3, of ASCE 7-16: K_{zt} = 1, K_d = 0.85, GC_{pi} = 0.18, GC_p = -1.4.
[12]2018 IBC Section 1609.3.1, Eqn 16-33, $V_{asd} = V\sqrt{0.6}$