

TEST REPORT

Intertek

REPORT NUMBER: 101113787COQ-005
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EVALUATION CENTER

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

RENDERED TO

CEMENT BOARD FABRICATORS, INC.
2148 S. 41ST STREET
LOUISVILLE, KY 40211

PRODUCT EVALUATED: Silbonit™ Fiber-Cement Flat Sheets
EVALUATION PROPERTY: Physical Testing

**Report of Silbonit™ Fiber-Cement Flat Sheets for the selected requirements of
ASTM C1186-08 (Reapproved 2012), Standard Specification for Flat Fiber-
Cement Sheets**

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2 Introduction

Intertek Testing Services NA Ltd. (Intertek) has conducted physical testing on a fiber-cement panel product for Cement Board Fabricators, Inc. The testing was carried out in accordance with ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*. This evaluation was completed during the months of April to June 2013.

3 Test Samples

3.1. SAMPLE SELECTION

The client submitted the fiber-cement panels to the Evaluation Center on April 8, 2013 (Coquitlam ID# VAN1304081354-001). Samples were not independently selected for testing.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The product was identified as the Silbonit™ Fiber-Cement Flat Sheets, a fiber-reinforced panel product measuring 4 ft. x 8 ft. x 5/16 in. thick and weighing 3 lbs/ft².

4 Testing and Evaluation Methods

4.1. CONDITIONING

Unless otherwise stated, the sample materials were maintained in standard laboratory conditions for a minimum of 7 days at a temperature of 73 ± 4°F (23 ± 2°C) and relative humidity of 50 ± 5%.

Samples tested in the wet condition were immersed in water at 73 ± 7°F (23 ± 4°C) for a period of 48 hours minimum and tested immediately upon removal from the water as per ASTM C1185-08 (2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*.

4.2. DIMENSIONAL TOLERANCE

The dimensional tolerance was evaluated in accordance with ASTM C1186-08 (2012) with reference to ASTM C1185-08 (2012). Five (5) panels were measured for length, width, thickness, squareness, and edge straightness.

4.3. DENSITY

Density was determined in accordance with ASTM C1186-08 (2012) with reference to ASTM C1185-08 (2012) using the water displacement method. Each specimen was weighed under water after being immersed for 48 hours. The saturated weight in air was then measured and the dry mass was obtained by drying each specimen to constant weight in an oven at 194 ± 4°F (90 ± 2°C). The density was calculated as follows:

$$D = [W / (B-S)] \times \rho_w$$

Where: D = Density, lb/ft³ (kg/m³)
W = Dry weight of specimen, lb (kg)
B = Saturated weight, lb (kg)
S = Suspended weight, lb (kg)
 ρ_w = Density of water lb/ft³ (kg/m³)

4.4. FLEXURAL STRENGTH

Flexural strength was evaluated in accordance with ASTM C1186-08 (2012) with reference to ASTM C1185-08 (2012). Five (5) specimens in both the machine and cross direction were prepared for testing. Sample dimensions measured 12 in. (305 mm) in length and 5 in. (127 mm) in width. The specimens were simply supported over a span of 10 in. (254 mm) and loaded at a rate to achieve failure within 5 and 30 seconds. Specimens were tested both in the dry and wet condition. The flexural strength was calculated as follows:

$$S = 3PL / 2bd^2$$

Where: S = Flexural strength, psi (MPa)
P = Maximum load, lbf (N)
L = Length of span, in. (mm)
b = Width of specimen, in. (mm)
d = Thickness of specimen, in. (mm)

4.5. MOISTURE MOVEMENT

Moisture movement was conducted in accordance with ASTM C1186-08 (2012) with reference to ASTM C1185-08 (2012). Five (5) specimens in both the machine and cross direction were prepared for testing. Sample dimensions measured 3 in. (76 mm) wide x 12 in. (305 mm) long. The specimens were conditioned to practical equilibrium at a temperature of 73 ± 4°F (23 ± 2°C) and relative humidity of 30 ± 2%. After conditioning, each specimen was measured for length to the nearest 0.001 in. (0.02 mm). The specimens were further conditioned to practical equilibrium at a temperature of 73 ± 6°F (23 ± 3°C) and relative humidity of 90 ± 5%. Each specimen was once again measured and recorded. These values were used to calculate the moisture movement as follows:

$$L = [(l_{90} - l_{30}) / l_{30}] \times 100$$

Where: L = linear change, %
l₉₀ = length of specimen at RH of 90%, in. (mm)
l₃₀ = length of specimen at RH of 30%, in. (mm)

4.6. WATER ABSORPTION

Water absorption was conducted in accordance with ASTM C1186-08 (2012) with reference to ASTM C1185-08 (2012). Five (5) specimens, measuring 4 in. (102 mm) x 4 in. (102 mm), were dried to constant weight in an oven at 194 ± 4°F (90 ± 2°C). After drying, the specimens were cooled in a desiccator and weighed to the nearest 0.001 g. The specimens were then immersed in distilled water at 73 ± 4°F (23 ± 2°C) for 48 ± 8 hours. At the end of this period, each specimen was carefully blotted dry, and then weighed again. The water absorption was calculated as follows:

$$A = (W_S - W_D) / W_D \times 100$$

Where: W_D = dry weight of specimen, lb (g)
W_S = saturated weight of specimen, lb (g)
A = water absorption, %

4.7. MOISTURE CONTENT

Moisture content was determined in accordance with ASTM C1186-08 (2012) with reference to ASTM C1185-08 (2012), on material conditioned at 73 ± 4°F (23 ± 2°C) and relative humidity of 50 ± 5%. After equilibrium conditioning, the specimens were weighed to an accuracy of 0.5%. They were then dried to constant weight in an oven operating at 194 ± 4°F (90 ± 2°C). After drying, the specimens were cooled in a desiccator and weighed to the nearest 0.5% of the total weight. The moisture content was calculated as follows:

$$M = 100 \times [(W - F) / F]$$

Where M = Moisture content, %
W = Initial weight of specimen, lb (kg)
F = Final weight of specimen, lb (kg)

4.8. WATER TIGHTNESS

Water tightness was tested in accordance with ASTM C1186-08 (2012) with reference to ASTM C1185-08 (2012). Three (3) specimens, measuring 20 in. (508 mm) x 24 in. (610 mm), were prepared for testing. The samples were sealed around the perimeter with a waterproof frame and then filled with water to a height of 2 in. (50 mm) above the strip. The prepared specimens were maintained at a temperature of 73 ± 4°F (23 ± 2°C) and relative humidity of 50 ± 5%. After 24 hours of exposure, the specimens were visually examined for any formation of liquid water on the underside of the sheet.

4.9. SURFACE BURNING CHARACTERISTICS

Surface burning characteristics was conducted in accordance with ASTM C1186-08 (2012) with reference to ASTM E84-12c, *Standard Test Method for Surface Burning Characteristics of Materials*. Testing was conducted in Intertek Report 101113787COQ-002, dated April 23, 2013.

4.10. FREEZE/THAW RESISTANCE

Freeze/thaw resistance was conducted in accordance with ASTM C1186-08 (2012) with reference to ASTM C1185-08 (2012). A minimum of five (5) specimens in both the machine and cross direction, each measuring 12 in. (305 mm) in length and 5 in. (127 mm) in width, were prepared for testing. The material was initially immersed in water at a temperature of 41°F (5°C) for a minimum of 48 hours. The specimens were then packaged individually into 8 mils (0.2 mm) plastic bags and subjected to 50 cycles of the following:

- Cooling to -4 ± 4°F (-20 ± 2°C) during a time of between 1 and 2 hours, then holding at this temperature for 1 hour.
- Thawing to 68 ± 4°F (20 ± 2°C) during a time of between 1 and 2 hours, then holding at this temperature for 1 hour.

During weekends and holidays, the freeze/thaw process was suspended by holding the specimens in standard laboratory conditions. At the completion of 50 cycles, a visual examination was performed to check for signs of cracking, delamination, or other physical changes. Prepared specimens of the examined material were later subjected to flexural testing.

4.11. WARM WATER RESISTANCE

Warm water resistance was tested in accordance with ASTM C1186-08 (2012) with reference to ASTM C1185-08 (2012). Five (5) specimens in both the machine and cross direction, each measuring 12 in. (305 mm) in length and 5 in. (127 mm) in width, were prepared for testing. The material was immersed in water with an excess of lime at a temperature of 140 ± 4°F (60 ± 2°C) for duration of 56 ± 2 days. After conditioning, a visual examination was performed to check for signs of cracking, delamination, or other physical changes. Prepared specimens of the examined material were later subjected to flexural testing.

4.12. HEAT/RAIN RESISTANCE

Heat/rain resistance was tested in accordance with ASTM C1186-08 (2012) with reference to

ASTM C1185-08 (2012). One test deck, measuring 8 ft. x 8 ft., was constructed using SPF grade 2, nominal 2 in. x 6 in. studs spaced at 16 in. on center. 1/2 in. plywood sheathing was applied to the test panel with fasteners spaced 6 in. on the perimeter and 12 in. in-field. Both framing members and sheathing were fastened using 2-1/2 in. coil nails. A layer of breathable waterproof membrane (supplied by the client) was fastened to the sheathing using staples spaced 12 in. on center. Plywood furring strips, measuring 1-1/2 in. x 3/4 in., were installed to the test deck at the vertical stud locations. The supplied EPDM rubber strips were then fastened to the furring strips. The Silbonit™ panels were installed vertically over the EPDM rubber strips using the supplied stainless steel 1-1/2 in. long screws spaced every 24 in. o/c along the studs. A 5/16 in. gap was left between sheets. Refer to Appendix B for installation details. The test specimen was vertically erected in an environmental test chamber and subjected to 25 cycles consisting of the following:

- Water spray at a rate of 1 gal/min for a duration of 2 h 55 min; water temperature not to exceed 86°F (30°C);
- Pause for a duration of 5 minute;
- Heat to give a measurement plate temperature of 140 ± 9°F (60 ± 5°C) for a duration of 2 h 55 minutes;
- Pause for a duration of 5 minute;

On completion, the material was examined for any evidence of physical or structural alterations.

5 Testing and Evaluation Results

The test results for Cement Board Fabricators, Inc. fiber-cement panels together with the applicable requirements of ASTM C1186-08 (2012) are shown in Table 1 below. A copy of the data sheets can be found in the Appendices.


Table 1. Test Results			
Property	Test Result	Requirement	Pass/Fail
Dimensional Tolerances			
▪ Length, in.	0.10	± 0.25	Pass
▪ Width, in.	0.05	± 0.25	Pass
▪ Thickness Variation			
▪ Between Sheets, in.	0.01	± 0.04	Pass
▪ Within Sheet, %	1.2	≤ 15	Pass
▪ Squareness, in.	0	± 0.125	Pass
▪ Edge straightness, in.	0	± 0.125	Pass
Density, lb/ft ³	99.2	As Reported	As Reported
Flexural Strength, psi			
▪ Dry	4773	≥ 3190 ¹	Pass
▪ Wet	3437	≥ 2610 ¹	Pass
Moisture Movement, %			
▪ Machine direction	0.02	As Reported	As Reported
▪ Cross Direction	0.02	As Reported	As Reported
Water Absorption, %	22.3	As Reported	As Reported
Moisture Content, %	9.2	As Reported	As Reported
Water Tightness	No formation of water drops	No formation of water drops	Pass
Surface Burning Characteristics			
▪ Flame Spread Index	0	0	Pass
▪ Smoke Developed Index	0	≤ 5	Pass
Freeze/Thaw Resistance			
▪ Strength Retention, %	103	≥ 80	Pass
▪ Observation	No deleterious effects	No deleterious effects	Pass
Warm Water Resistance			
▪ Strength Retention, %	107	As Reported	As Reported
▪ Observation	No deleterious effects	No deleterious effects	Pass
Heat Rain Resistance	No cracks or structural alteration	No cracks or structural alteration	Pass

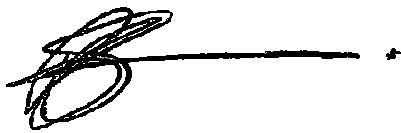
Note ¹ – Grade IV requirements taken from Table 1 – “Flexural Strength Requirements” of ASTM C1186-08(2012)

6 Conclusion

The Cement Board Fabricators, Inc. Silbonit™ Fiber-Cement Flat Sheets product identified and evaluated in this report has met the requirements of ASTM C1186-08 (2012), *Standard Specification for Flat Fiber-Cement Sheets*. The product test results are presented in Section 5 of this report.

INTERTEK TESTING SERVICES NA LTD.

Reported by: 
Chris Chang, EIT
Engineer, Building Products

Reviewed by: 
Baldeep Sandhu
Technologist, Building Products

APPENDIX A: Test Data (13 pages)



Company	Cement Board Fabricators, Inc.	Technician(s)	Chris Chang <i>CC</i>
Project No.	G101113787	Reviewer	Baldeep Sandhu <i>BS</i>
Models	Silbonit™ Fiber-Cement Flat Sheets	Start/End Date	April 18 - June 18, 2013
Product Name	Same as above	Sample ID	VAN1304081354-001
Standard	ASTM C1186-08 (Reapproved 2012), Standard Specification for Flat Fiber-Cement Sheets		
	ASTM C1185-08 (Reapproved 2012), Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards		

Test Data Package

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Test: **Density** Project No: G101113787
 Date: 3-May-13 Eng/Tech: Chris Chang
 Client: Cement Board Fabricators, Inc. Reviewer: Baldeep Sandhu
 Product: **Silbonit Fiber-Cement Flat Sheets**
 Test Method: ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*
 ASTM C1185-08 (Reapproved 2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*
 Conditioning: Saturation - Immersed in water at 68 ± 2°F (20 ± 1°C) for 48 h minimum
 Drying - Dried in ventilated oven at 194 ± 4°F (90 ± 2°C) until equilibrium
 Equipment: Setra Scale 2000g (Intertek ID# P52606, cal due February 2014)
 Temperature controlled oven (Intertek ID# 9-0477)
 Graphtec MIDI Logger (Intertek ID# P60555, cal due August 2013)
 Time/Temp/RH: 1:20PM / 23.0°C / 51.0%

Sample	Oven-dry weight after 24 hours (g)	Oven-dry weight after 26 hours (g)	Increment of Loss ¹ (% by mass)	Suspended weight (g)	Saturated weight in air (g)	Calculated Volume (cm ³)	Density	
							(kg/m ³)	(lb/ft ³)
1	489.03	488.85	0.0	292.20	598.89	306.69	1594	99.51
2	493.99	493.70	0.1	281.40	593.63	312.23	1581	98.71
3	490.81	490.66	0.0	285.86	593.75	307.90	1594	99.48
4	491.62	491.34	0.1	277.81	588.07	310.27	1584	98.86
5	490.31	490.06	0.1	292.15	599.41	307.26	1595	99.57
Mean:							1589	99.2
StdDev:							6.50	0.41
COV:							0.4%	0.4%

¹ Not to exceed 0.1 %



Test: **Flexural Strength - Dry**

Date: 24-Apr-13

Client: Cement Board Fabricators, Inc.

Product: **Silbonit Fiber-Cement Flat Sheets**

Test Methods: ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*
 ASTM C1185-08 (Reapproved 2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*

Conditioning: Minimum 7 days at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%

Load Rate: 0.5 in./min

Support Span: 10 in. 254 mm

Specimen: 5 in. x 12 in.

Equipment: T&D Thermorecorder Temperature and Humidity Indicator (Intertek ID# P60554, cal due August 2013)

Mitutoyo Digital 8 in. Calipers (Intertek ID# 52650, cal due May 2013)

Instron 3382 (Intertek ID# P60553, cal due July 2013)

Time/Temp/RH: 12:40PM / 23.8°C / 51.0%

Project No: G101113787

Eng/Tech: Chris Chang

Reviewer: Baldeep Sandhu 

Machine Direction

Specimen	Width (mm)			Depth (mm)			Max Load (N)	Flexural Strength	
	W1	W2	W3	D1	D2	D3		(MPa)	(psi)
1	127.14	126.94	126.96	8.08	8.13	8.12	836.2	38.14	5531
2	126.93	126.76	126.87	8.21	8.20	8.17	829.7	37.12	5384
3	126.98	126.85	126.84	8.10	8.09	8.06	807.2	37.09	5380
4	127.03	126.95	126.82	8.09	8.12	8.13	807.7	36.83	5342
5	126.90	126.97	127.24	8.18	8.20	8.20	876.5	39.16	5679
							Mean	37.67	5463
							StdDev:	0.97	141
							COV:	2.6%	2.6%

Cross Direction

Specimen	Width (mm)			Depth (mm)			Max Load (N)	Flexural Strength	
	W1	W2	W3	D1	D2	D3		(MPa)	(psi)
6	128.31	128.18	128.10	8.02	7.92	7.95	547.0	25.63	3718
7	128.07	128.28	128.13	8.00	7.92	7.97	633.3	29.69	4306
8	127.52	128.17	128.04	7.99	7.93	7.97	610.9	28.70	4162
9	127.61	127.44	127.31	8.02	8.06	8.13	637.6	29.27	4245
10	128.22	128.29	128.32	7.97	7.90	8.02	586.7	27.48	3986
							Mean	28.15	4083
							StdDev:	1.63	237
							COV:	5.8%	5.8%

Average

Flexural Strength	
(Mpa)	(psi)
32.91	4773



Test: **Flexural Strength - Wet**

Date: 3-May-13

Client: Cement Board Fabricators, Inc.

Product: **Silbonit Fiber-Cement Flat Sheets**

Test Methods: ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*
 ASTM C1185-08 (Reapproved 2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*

Conditioning: Minimum 7 days at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%
 48 hour minimum saturation

Load Rate: 0.5 in./min

Support Span: 10 in. 254 mm

Specimen: 5 in. x 12 in.

Equipment: T&D Thermorecorder Temperature and Humidity Indicator (Intertek ID# P60554, cal due August 2013)
 Mitutoyo Digital 8 in. Calipers (Intertek ID# 52650, cal due May 2013)
 Instron 3382 (Intertek ID# P60553, cal due July 2013)

Time/Temp/RH: 12:40PM / 23.8°C / 51.0%

Project No: G101113787

Eng/Tech: Chris Chang

Reviewer: Baldeep Sandhu 

Machine Direction

Specimen	Width (mm)			Depth (mm)			Max Load (N)	Flexural Strength	
	W1	W2	W3	D1	D2	D3		(MPa)	(psi)
1	126.76	126.86	127.03	8.08	8.08	8.09	595.0	27.34	3966
2	126.78	126.59	126.74	8.06	8.05	8.06	593.3	27.49	3987
3	126.81	126.82	126.83	8.06	7.99	7.99	591.3	27.66	4012
4	126.67	126.70	127.08	7.87	7.90	7.93	617.3	29.71	4310
5	126.88	126.74	126.69	7.91	7.91	7.90	553.2	26.60	3857
							Mean:	27.76	4026
							StdDev:	1.17	169
							COV:	4.2%	4.2%

Cross Direction

Specimen	Width (mm)			Depth (mm)			Max Load (N)	Flexural Strength	
	W1	W2	W3	D1	D2	D3		(MPa)	(psi)
6	127.46	127.20	127.55	7.99	7.99	8.07	441.9	20.56	2983
7	128.31	128.32	128.45	8.03	7.95	8.03	370.9	17.19	2493
8	127.59	127.49	127.40	8.02	8.06	8.14	409.5	18.78	2723
9	128.31	128.20	128.32	8.02	7.94	7.98	428.5	19.98	2898
10	127.52	127.60	127.71	8.02	7.99	7.99	464.4	21.66	3142
							Mean:	19.63	2848
							StdDev:	1.72	249
							COV:	8.8%	8.8%

Average

Flexural Strength	
(Mpa)	(psi)
23.70	3437



Test: **Moisture Movement - Machine Direction**
 Date: 15-May-13
 Client: Cement Board Fabricators, Inc.
 Product: **Silbonit Fiber-Cement Flat Sheets**
 Test Method: ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*
 ASTM C1185-08 (Reapproved 2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*
 Conditioning: Temperature of 23 ± 2°C and relative humidity of 30 ± 2% until equilibrium
 Temperature of 23 ± 2°C and relative humidity of 90 ± 5% until equilibrium
 Equipment: Mitutoyo Digital 18 in. Calipers (Intertek ID# P52639, cal due May 2014)
 Graphtec MIDI Logger (Intertek ID# P60555, cal due August 2013)
 Lunaire Environmental Chamber (Intertek ID# 22079)
 Time/Temp/RH: 3:00PM / 22.5°C / 48.0%

Project No: G101113787
 Eng/Tech: Chris Chang
 Reviewer: Baldeep Sandhu *BS*

Measurement at 23°C and 30 % RH after equilibrium			
Specimen	Length (mm)		
1	304.91	304.99	305.13
2	304.40	304.40	304.31
3	304.58	304.59	304.32
4	304.37	304.21	304.30
5	304.62	304.46	304.58

Measurement at 23°C and 90 % RH after equilibrium			
Specimen	Length (mm)		
1	305.04	305.20	305.15
2	304.64	304.49	304.35
3	304.61	304.65	304.33
4	304.38	304.21	304.27
5	304.74	304.49	304.64

Linear Change				
Specimen	Length (%)			Mean (%)
1	0.04	0.07	0.01	0.04
2	0.08	0.03	0.01	0.04
3	0.01	0.02	0.00	0.01
4	0.00	0.00	-0.01	0.00
5	0.04	0.01	0.02	0.02
Mean:				0.02
StdDev:				0.02
COV:				82%



Test: **Moisture Movement - Cross Direction**
 Date: 15-May-13
 Client: Cement Board Fabricators, Inc.
 Product: **Silbonit Fiber-Cement Flat Sheets**
 Test Method: ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*
 ASTM C1185-08 (Reapproved 2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*
 Conditioning: Temperature of 23 ± 2°C and relative humidity of 30 ± 2% until equilibrium
 Temperature of 23 ± 2°C and relative humidity of 90 ± 5% until equilibrium
 Equipment: Mitutoyo Digital 18 in. Calipers (Intertek ID# P52639, cal due May 2014)
 Graphtec MIDI Logger (Intertek ID# P60555, cal due August 2013)
 Lunaire Environmental Chamber (Intertek ID# 22079)
 Time/Temp/RH: 3:00PM / 22.5°C / 48.0%

Project No: G101113787
 Eng/Tech: Chris Chang
 Reviewer: Baldeep Sandhu *BS*

Measurement at 23°C and 30 % RH after equilibrium			
Specimen	Length (mm)		
1	304.00	303.97	303.79
2	304.21	304.09	303.99
3	303.92	303.91	304.12
4	304.01	304.00	303.94
5	304.15	304.17	304.21

Measurement at 23°C and 90 % RH after equilibrium			
Specimen	Length (mm)		
1	304.07	304.02	303.84
2	304.29	304.18	304.05
3	303.95	304.08	304.18
4	304.03	304.05	303.98
5	304.24	304.30	304.27

Linear Change				
Specimen	Length (%)			Mean (%)
1	0.02	0.02	0.02	0.02
2	0.03	0.03	0.02	0.03
3	0.01	0.06	0.02	0.03
4	0.01	0.02	0.01	0.01
5	0.03	0.04	0.02	0.03
			Mean:	0.02
			StdDev:	0.01
			COV:	33%



Test: **Water Absorption**
 Date: 26-Apr-13
 Client: Cement Board Fabricators, Inc.
 Product: **Silbonit Fiber-Cement Flat Sheets**

Project No: G101113787
 Eng/Tech: Chris Chang
 Reviewer: Baldeep Sandhu *BSS*

Test Method: ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*
 ASTM C1185-08 (Reapproved 2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*

Conditioning: Minimum 7 days at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%
 Drying - Dried in ventilated oven at 194 ± 4°F(90 ± 2°C) until equilibrium
 48 hour water immersion at 73 ± 7°F(23 ± 4°C)

Equipment: Setra Scale 2000g (Intertek ID# P52606, cal due February 2014)
 Temperature controlled oven (Intertek ID# 9-0477)
 Graphtec MIDI Logger (Intertek ID# P60555, cal due August 2013)

Time/Temp/RH: 7:45AM / 23.4°C / 50.0%

Sample	Oven-dry weight after 24 hours (g)	Oven-dry weight after 48 hours (g)	Increment of Loss ¹ (% by mass)	Wet Weight (g)	Water Absorption %
1	132.70	132.70	0.0	161.07	21.4
2	130.81	130.81	0.0	160.81	22.9
3	131.61	131.53	-0.1	160.40	22.0
4	130.36	130.36	0.0	159.54	22.4
5	131.97	131.94	0.0	161.79	22.6
Mean:					22.3
StdDev:					0.61
COV:					2.7%

¹ Not to exceed 0.1 %



Test: **Moisture Content**
 Date: 22-Apr-13
 Client: Cement Board Fabricators, Inc.
 Product: **Silbonit Fiber-Cement Flat Sheets**

Project No: G101113787
 Eng/Tech: Chris Chang
 Reviewer: Baldeep Sandhu *BSS*

Test Method: ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*
 ASTM C1185-08 (Reapproved 2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*

Conditioning: Minimum 7 days at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%
 Drying - Dried in ventilated oven at 194 ± 4°F(90 ± 2°C) until equilibrium

Equipment: Setra Scale 2000g (Intertek ID# P52606, cal due February 2014)
 Temperature controlled oven (Intertek ID# 9-0477)
 Graphtec MIDI Logger (Intertek ID# P60555, cal due August 2013)

Time/Temp/RH: 12:PM / 24.1°C / 49.0%

Sample	Initial Mass (g)	Oven-dry weight after 24 hours (g)	Oven-dry weight after 48 hours (g)	Increment of Loss ¹ (% by mass)	Moisture Content %
1	533.97	489.03	488.85	0.0	9.2
2	539.31	493.99	493.70	0.1	9.2
3	535.05	490.81	490.66	0.0	9.0
4	536.68	491.62	491.34	0.1	9.2
5	536.05	490.31	490.06	0.1	9.4
Mean:					9.2
StdDev:					0.12
COV:					1.3%

¹ Not to exceed 0.1 %



Test: **Water Tightness**
Date: 17-Apr-13
Client: Cement Board Fabricators, Inc.
Product: **Silbonit Fiber-Cement Flat Sheets**
Test Method: ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*
ASTM C1185-08 (Reapproved 2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*
Conditioning: Minimum 7 days at a temperature of $23 \pm 2^\circ\text{C}$ and relative humidity of $50 \pm 5\%$
Equipment: T&D Thermorecorder Temperature and Humidity Indicator (Intertek ID# P60554, cal due August 2013)
Time/Temp/RH: 9:00AM / 22.9°C / 51.0%

Project No: G101113787
Eng/Tech: Chris Chang
Reviewer: Baldeep Sandhu 

Sample	Observation
1	No moisture or formation of water drops on underside of specimen
2	No moisture or formation of water drops on underside of specimen
3	No moisture or formation of water drops on underside of specimen



Test: **Freeze Thaw Resistance**

Date: 7-Jun-13

Client: Cement Board Fabricators, Inc.

Product: **Silbonit Fiber-Cement Flat Sheets**

Test Methods: ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*

ASTM C1185-08 (Reapproved 2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*

Conditioning: Minimum 7 days at a temperature of $23 \pm 2^\circ\text{C}$ and relative humidity of $50 \pm 5\%$

48 hour minimum saturation at temperature greater than 5°C

50 freeze/thaw cycles, each consisting of:

a) Freeze to $-20 \pm 2^\circ\text{C}$ in approximately 1-2 hours and held for 1 hour

b) Thaw to $+20 \pm 2^\circ\text{C}$ in approximately 1-2 hours and held for 1 hour

48 hour minimum saturation

Load Rate: 0.5 in./min

Support Span: 10 in. 254 mm

Specimen: 5 in. x 12 in.

Equipment: Mitutoyo Digital 8 in. Calipers (Intertek ID# P60005, cal due May 2014)

Instron 3382 (Intertek ID# P60553, cal due July 2013)

Graphtec MIDI Logger (Intertek ID# P60555, cal due August 2013)

Time/Temp/RH: 8:00AM / 22.5°C / 50.0%

Project No: G101113787

Eng/Tech: Chris Chang

Reviewer: Baldeep Sandhu *BSS*

Machine Direction

Specimen	Width (mm)			Depth (mm)			Max Load (N)	Flexural Strength	
	W1	W2	W3	D1	D2	D3		(MPa)	(psi)
1	127.21	126.98	126.93	8.19	8.24	8.21	611.1	27.17	3941
2	126.96	126.98	127.29	8.19	8.22	8.26	614.7	27.25	3953
3	126.72	126.91	127.27	8.05	8.07	8.10	598.4	27.55	3996
4	127.03	127.05	127.07	8.02	8.08	8.06	594.9	27.51	3990
5	127.02	127.01	127.37	8.21	8.24	8.26	638.5	28.21	4091
							Mean:	27.54	3994
							StdDev:	0.41	59
							COV:	1.5%	1.5%

% Retention of Wet Flexural Strength
99%

Cross Direction

Specimen	Width (mm)			Depth (mm)			Max Load (N)	Flexural Strength	
	W1	W2	W3	D1	D2	D3		(MPa)	(psi)
6	127.68	127.39	127.40	8.05	8.04	8.13	440.3	20.19	2928
7	128.10	127.93	128.18	8.10	8.20	8.19	471.0	21.03	3050
8	127.77	127.57	128.27	8.10	8.22	8.22	486.1	21.64	3139
9	128.29	127.82	127.64	8.24	8.14	8.08	477.0	21.37	3100
10	128.23	128.19	128.08	8.17	8.29	8.30	476.3	20.78	3014
							Mean:	21.00	3046
							StdDev:	0.56	81
							COV:	2.7%	2.7%

% Retention of Wet Flexural Strength
107%

Average

% Retention of Wet Flexural Strength
103%



Test: **Warm Water Flexural Strength**

Date: 18-Jun-13

Client: Cement Board Fabricators, Inc.

Product: **Silbonit Fiber-Cement Flat Sheets**

Test Methods: ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*

ASTM C1185-08 (Reapproved 2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*

Conditioning: Minimum 7 days at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%
 56 days in lime solution at a temperature of 60 ± 2°C
 48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%
 48 hour minimum saturation

Load Rate: 0.5 in./min

Support Span: 10 in. 254 mm

Specimen: 5 in. x 12 in.

Equipment: Mitutoyo Digital 8 in. Calipers (Intertek ID# P60005, cal due May 2014)

Instron 3382 (Intertek ID# P60553, cal due July 2013)

Graphtec MIDI Logger (Intertek ID# P60555, cal due August 2013)

Time/Temp/RH: 8:50AM / 23.3°C / 49.0%

Project No: G101113787

Eng/Tech: Chris Chang

Reviewer: Baldeep Sandhu *BSS*

Machine Direction

Specimen	Width (mm)			Depth (mm)			Max Load (N)	Flexural Strength	
	W1	W2	W3	D1	D2	D3		(MPa)	(psi)
1	127.27	127.16	127.04	8.34	8.37	8.32	657.1	28.29	4102
2	127.14	126.88	126.99	8.26	8.26	8.23	643.2	28.35	4112
3	127.23	127.03	126.91	8.21	8.20	8.16	659.9	29.50	4279
4	127.34	126.97	126.94	7.89	7.99	8.01	603.7	28.54	4140
5	127.33	126.97	127.19	8.29	8.29	8.31	678.1	29.52	4281
Mean:								28.84	4183
StdDev:								0.62	90
COV:								2.1%	2.1%

% Retention of Wet Flexural Strength
104%

Cross Direction


Specimen	Width (mm)			Depth (mm)			Max Load (N)	Flexural Strength	
	W1	W2	W3	D1	D2	D3		(MPa)	(psi)
6	128.36	128.31	127.73	8.25	8.15	8.12	510.1	22.71	3293
7	128.37	128.40	128.23	8.01	8.00	8.07	460.4	21.21	3077
8	128.44	127.41	128.29	7.99	7.99	8.02	448.8	20.86	3026
9	128.33	128.10	128.28	8.32	8.26	8.27	500.7	21.68	3144
10	127.75	127.51	127.27	8.08	8.02	8.10	478.9	21.99	3189
Mean:								21.69	3146
StdDev:								0.71	103
COV:								3.3%	3.3%

% Retention of Wet Flexural Strength
110%

Average

% Retention of Wet Flexural Strength
107%



Test: **Heat-Rain Resistance** Project No: G101113787
Date: 28-May-13 Eng/Tech: Chris Chang
Client: Cement Board Fabricators, Inc. Reviewer: Baldeep Sandhu 
Product: **Silbonit Fiber-Cement Flat Sheets**
Test Method: ASTM C1186-08 (Reapproved 2012), *Standard Specification for Flat Fiber-Cement Sheets*
ASTM C1185-08 (Reapproved 2012), *Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards*
Conditioning: Minimum 7 days at a temperature of 23 ± 2° C and relative humidity of 50 ± 5%
Exposure: 25 cycles consisting of:
5 minute pause, 2 hrs, 55 minutes of water spray at a rate of 1 gal/min
5 minute pause, 2 hrs, 55 minutes of 60°C (140°F) heat
Equipment: Universal Heat Rain Chamber
Vaisala Temperature and Humidity Indicator (Intertek ID# 9-0176, cal due June 2013)
Time/Temp/RH: 1:15PM / 22.0° / 48.0%

Specimen ID	Observation
Silbonit Fiber-Cement Flat Sheets	No visible cracks or structural alteration of the sheet and frame assembly

APPENDIX B: Installation Instructions (24 pages)

Cement Board Fabricators

2013 Product Guide



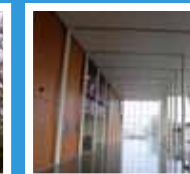
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Jim Burton Architects
[www.blipdesign.com]
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Cement Board Fabricators

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Lead Times

Our products are imported from Europe, which can result in an 8-12 week lead time. We can only estimate the delivery date that the material will be available. We hold no responsibility for importing delays. If you would like to reserve material a 50% deposit is required. A 25% restocking fee is issued for all canceled orders.

Quotations

CBF will gladly assist in budgeting by providing a formal quote for your project. We can produce a quote from an estimated square foot surface coverage, or from the detailed needs of the specific project (including fabrication if needed). CBF does not do take offs or shop drawings; this is the responsibility of the client.

Placing the Order

When placing an order please specify quantity, color, steel or wood furring, & what color screw head. The rubber EPDM gasket strips are required in all exterior applications. CBF will calculate the amount of EPDM & screws needed for your project.

Fabrication

We will gladly fabricate the panels per your cut list. Dimensions & quantities will be needed to calculate the linear foot cutting charge that will be applied (please call for pricing). CBF reserves a cutting tolerance +/-1/8" cutting +/-3/16" of material squared tolerance. We require payment in full before any fabrication of any order. CBF does not accept shop drawings or do the take offs for your projects. A formal cut list will need to be provided for fabrication.

Payment

We accept Visa, MasterCard, or a company check may be mailed. If the material is not in stock, the customer may put 50% down to reserve material from our next incoming shipment. The other 50% will be due before the material can ship. If the material is in stock, & can be shipped immediately, we require payment in full before the material is shipped.

Delivery

We are located in Louisville, KY & all orders will ship from this location. The material is shipped by semi truck. It is the responsibility of the customer to secure a method of unloading the material upon receipt. Please have this information available when setting up shipment. The panels must be stored indoors & CANNOT be allowed to get wet/damp in any way while stacked. This will damage the panels & void any warranty claim.

Release Form

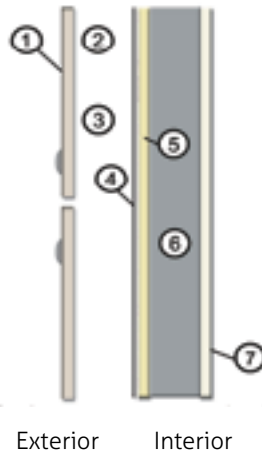
All customers must complete and return the release form found on page 23. This form states that the customer is aware that the material must be installed per the installation instructions in order to validate the warranty. This form must be notarized & returned to CBF before the order will be released.



Introduction • Benefits of a Ventilated Wall System*

Legend

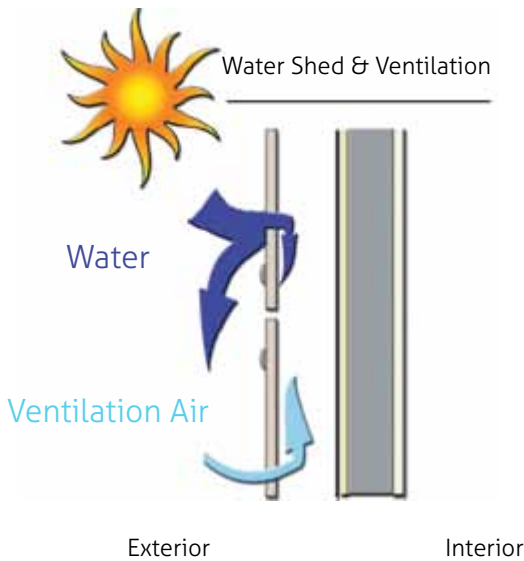
- ① Cement Board
- ② Air Gap
- ③ Vertical Furring
- ④ Membrane
- ⑤ Sheathing
- ⑥ Interior Stud
- ⑦ Drywall



Climate Considerations*

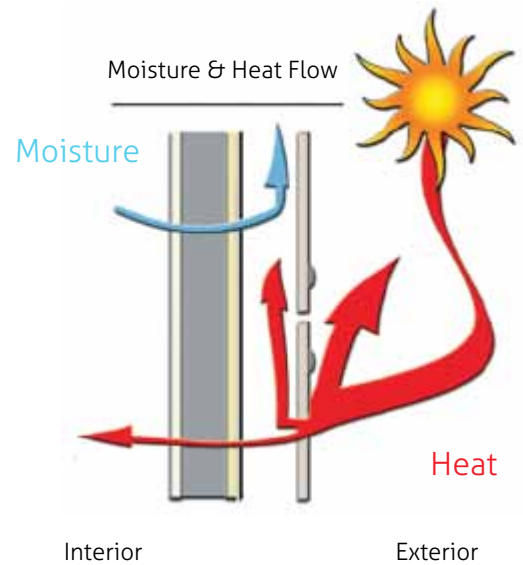
Proper functioning of the ventilated wall must be studied in relation to the building's design & the climatic conditions in which the building is located. Some materials will work better than others in certain regions, & it is the responsibility of the architect/engineer to establish the proper materials for their specific project.

Summer



In the summer the ventilated wall is an exceptional reflector of solar radiation. The heat is accumulated on the surface layer & is not passed onto the underlying layers. The heat then escapes the wall thanks to the free-flowing air (The Fireplace Effect).

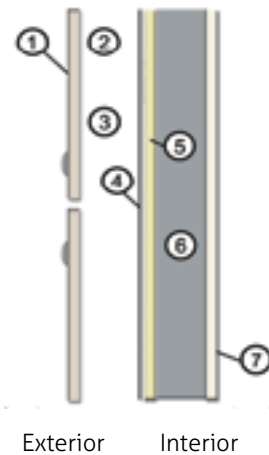
The air gap also helps to prevent the water from spreading inward to the underlying layers. Most of the water will run down the face of the material & most of what does get into the air gap will run down the back of the panel. The water will then evaporate & will be able to escape the wall thanks to the free-flowing air (The Fireplace Effect).



Introduction • Benefits of a Ventilated Wall System*

Legend

- ① Cement Board
- ② Air Gap
- ③ Vertical Furring
- ④ Membrane
- ⑤ Sheathing
- ⑥ Interior Stud
- ⑦ Drywall



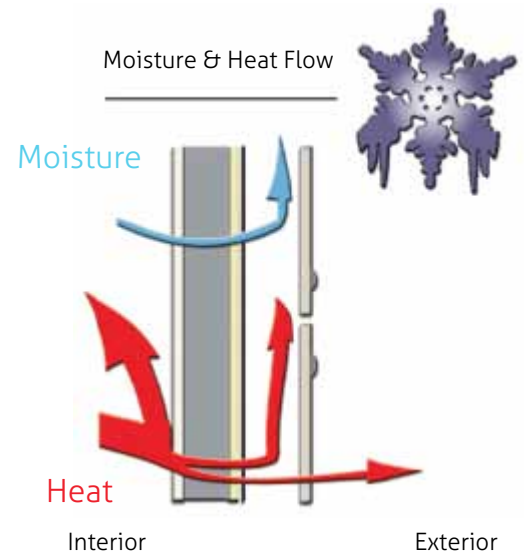
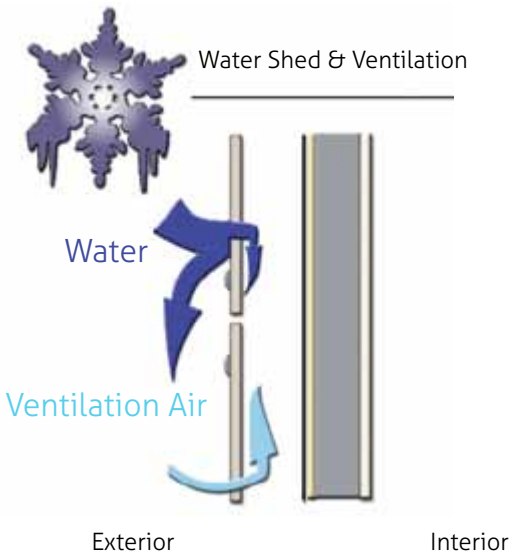
Climate Considerations*

Proper functioning of the ventilated wall must be studied in relation to the building's design & the climatic conditions in which the building is located. Some materials will work better than others in certain regions, & it is the responsibility of the architect/engineer to establish the proper materials for their specific project.

Winter

In the winter the vapor pressure inside heated structures are usually higher than outside, this could lead to the transportation of partial vapor pressure through the outside wall. The moisture is then eliminated by the free flowing air through the cavity.

The air gap also helps to prevent the water from spreading inward to the underlying layers. Most of the water will run down the face of the material & most of what does get into the air gap will run down the back of the panel. The water will then evaporate & will be able to escape the wall thanks to the free-flowing air.



Applications

SILBONIT™ cladding sheets are specially designed for external cladding, semi-exposed & external lining applications. Applied on a ventilated fascade our fiber cement products are a strong, durable & lightweight material, which provides an attractive cost-effective solution for a wide variety of projects.

Composition

SILBONIT™ cladding sheets belong to the new generation of asbestos free compressed & stabilized flat sheeting reinforced with mineralized cellulose fibers. The sheets are non-combustible & resistant to rot, fungus & vermin attack.

Color / Finish

SILBONIT™ cladding sheets are available in many beautiful colors ranging from our "Natural" earth-tone to our "Treated" colors that resemble eggshell paint sheen. It is important to note that the non-uniformity of the color & the presence of little imperfections are considered a common characteristic of the product & is not a defect as the panels are like a natural stone & does not look like an artificial product with an unnatural surface. These characteristics do not constitute a warranty claim & will not be entertained as such. The sheet is through colored & has impermeability.

The general resistance of the sheet to airborne pollutants can be enhanced by using the "Treated" material. The treatment allows for an easily cleaned surface, & will help the sheets maintain their beauty for many years. The "Treated" sheets are coated with a UV polymerizing system, which also makes the sheet resistant to graffiti. The treatment greatly reduces the absorption & allows for an easily cleaned surface.

The ventilation equalizes the changes in pressures, which can be caused by gusts of wind, climate change, or drying of the panels, as well as ensuring humidity & condensation from both inside & outside the structure is able to escape.

Material Characteristics

Due to the nature of fiber cement products there will be variations in color as well as small imperfections ranging in size from a pin point to a dime. The color variations may be apparent within each board & from board to board. These characteristics mentioned above do not constitute a warranty claim & will not be entertained as such.

Sheet Sizes

The sheets are manufactured sizes of 4ft x 8ft & 4ft x 10ft. Our cutting service can fabricate the material to meet your project's specific needs. CBF reserves a tolerance +/- 1/8" cutting & +/- 3/16" of material squared tolerance.

Thicknesses

The panels weigh 3lbs per square foot for the 5/16" thickness.

Maintenance

SILBONIT™ cladding sheets require no regular maintenance to uphold their strengths, qualities & functions. When using our materials, please remove any dirt, dust, fingerprints, etc. from face of the material, & before it's installed. Over time if the panels do happen to get dirty, a simple washdown with water & a mild detergent (Dawn dish soap) is usually sufficient.

SILBONIT™

The Colors of Nature

Stone Desert Almond Coral Ash Gold Olive



Stone Desert Almond Coral Iceberg Gold Olive



The top row are the "Natural" colors & the bottom row are the "Treated" colors. The sheets are sanded so there is a slight grain that runs the length of the panels.



Receipt of Material

Any damages or deviations must be immediately specified IN WRITING on the bill of lading when the delivery driver is still present. A copy of the bill of lading, with any remarks, must be submitted to the driver at the time of delivery.

Access to the job site must be such that deliveries can be made by a full 18 wheel flat-bed, or an enclosed tractor trailer. When placing the order please specify if you are able to unload an enclosed trailer, or if you will require a flat-bed delivery.

The job site must have access to accommodate an 18 wheel flat bed or enclosed tractor trailer. When placing an order please specify if you are able to unload an enclosed trailer or flat bed delivery. Smaller trucks can be arranged if needed.



It is the recipient's responsibility for unloading the material, & provisions must be arranged prior to the delivery. The delivery driver is not allowed to assist in unloading the material. The delivery driver will call 24 hours before making the drop to schedule the delivery.

Inspection of Material

It is the recipient's responsibility that all the materials are not damaged & in accordance with the order submitted. Any damages must be immediately documented in writing on the bill of lading while the delivery company employee is still present. Photos are required at that time for further documentation of damage.

CBF must be notified & provided with a copy of the bill of lading the same day as the delivery. Materials may only be returned after the freight claim is submitted.

Storing the Material

The material must be kept in a dry, well ventilated area, raised off the ground, & on a dry level surface at all times. Extended storage (more than two weeks) must take place in a dry ventilated building, & the plastic wrap should be removed. The panels must always be stored raised off the ground with supports at a maximum of 19", & always stacked with the edges directly over each other. The accessories should also be protected against dirt & precipitation. Flat panels that get wet due to precipitation or condensation will precipitate calcium/efflorescence, & will result in permanent damage that would not occur when properly stored or in proper use. If the boards do get damp when stacked, individually place the panels on their edge to ensure rapid drying & good ventilation. NEVER cut, drill, or install when the material is damp or in damp conditions.

Handling the Material

The material must be handled with care as to not damage the face, the corners or the edges. While handling the material you must also take care as to protect the panels against dirt & moisture as this will damage the material. Do not stack wet or dirty boards, as this will result in permanent damage that would not occur if properly handled.

The sheets must be lifted & not dragged off the stack, as this can result in damage to the material.

The sheets must also be carried by two people, & by the edge to reduce the strain on the material & the workers.



CORRECT



INCORRECT



CORRECT



INCORRECT



Wind & Water Barrier*

There must be a wind & water barrier behind the facade cladding that is designed to make the structure impervious to the weather & the wind. Water will penetrate our facade cladding so it is extremely important to ensure that your wall is 100% waterproofed by the membrane. This product should be a breathable waterproof membrane to protect the substrate from damaging moisture from the weather, as well as allowing the building to breathe and the condensation within the structure to escape. *This item is not supplied by CBF.

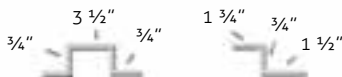
Supports / Furring Strips*

Regardless of the construction, our cladding sheets must be fastened to supports of sectional wood or steel. The depth of the strips must create a minimum 3/4" hollow air grip from back of our panels to the substrate.



STEEL

Minimum Dimensions

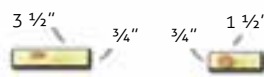


When using steel furring you may use hat channels, z-furring, or a combination of the two. The steel must be 16 or 18 gauge.



WOOD

Minimum Dimensions



When using wood we recommend painting the lumber black with an exterior grade paint or wrapping it with the weather barrier. This will not only help to preserve the wood, it will also hide the wood in the horizontal gaps.

- * The maximum length of any furring strip is 10ft.
- * NEVER use a combination of wood & steel furring.
- * It is the client's responsibility to choose the correct wood product.
- * The use of treated lumber is not recommended.
- * Specific static calculations must comply with local regulations.
- * This Item is not supplied by CBF.

EPDM Rubber Strips**



DIMENSIONS

3 1/2" x 1/8"

1 1/4" x 1/8"

The EPDM rubber strips must always be used on the supporting structure of wood or steel furring strips, & are applied as a direct base for our material. You may staple or use a spray adhesive to attach the EPDM rubber strips to the furring strips. These strips not only help to protect the furring, but also aid in the movement of our material. The wider strips are applied on the furring at the vertical joints & the narrower strips are applied on the furring in the field of the material. ** This item is supplied by CBF.

Stainless Steel Screws**

The panels are secured to the supporting structure using exposed stainless steel pan head screws. The screw spacing will be determined by the furring style used. Please refer to the installation instructions on page 13 & 14. The screws cannot be countersunk because the panels need movement to succeed.



WOOD

STEEL

You will be supplied with one driver per every 250 screws. All our screws for steel are self drilling.

DO NOT OVERTIGHTEN THE SCREWS



Over tightening screws will restrict the movement of the panels, which will crack the panels. Screws need to be set with 3lbs of torque per foot. A measurement tool is needed to ensure the correct torque is applied. This item is not supplied by CBF.



Cutting the Material*

We can supply you with the correct saw blades



CBF will fabricate the order per your cut list. Our facilities are equipped with two industrial stone saws. Our fabrication is done with a 20" segmented diamond blade to ensure accurate lines and measurements. This blade leaves a sharp edge with minimal chipping. The correct diamond blades and drill bits are available for purchase from our facility. The fabrication must be done with the finished side facing up. If larger holes are needed use a diamond tipped hole saw. For cuts that don't require a sharp edge, jigsaws with a carbide tip are required. It is imperative to only work with dry material and in dry conditions. Working with damp panels or in damp conditions will cause the panel to "burn" into the material and leave permanent stains. This will void any warranty claims.

Drilling the Material

The holes must be pre-drilled from the finished side of the material facing up using carbide tipped drill bits. (CBF can supply this item.) The holes must be drilled larger than the shaft of the screw to allow for movement of the panel.



Only work with dry material & in dry conditions. Working with damp material or in damp conditions will cause the dust to permanent "burn" into the material & leave permanent stains.

Steel Furring

When using steel furring strips there must be one fixed point near the center of the board with a 7/32" drill bit. The other dilation points will be oversized using a 9/32" drill bit.

Wood Furring

When using wood furring strips you will only have dilation points using a 9/32" drill bit, which are all oversized.

Completion of Work

When the installation is complete check to ensure the cladding is clean and without damage, defects, or omissions. It is important that you remove any dust from the face of the panels before installing to avoid the dust from permanently burning into the material.



(Dust from cutting the edge)

The dust can be easily removed with a clean and damp towel & should be removed before the panel is installed.

In order to achieve the best results dirt, markings & other stains you may use a pressure washer with a mild detergent (dish soap). Be sure to thoroughly rinse.



FABRICATION & CLEANING CHECKLIST

• Exterior Field Application

- Place the panel finished side facing up at the desired fabrication space.
- Mark the appropriate cut & drill areas.
- Cut & Drill the material finish side facing up (using a vacuum device to collect dust)
- Vacuum all remaining dust & reminisce off the panel. Be sure not to scratch the panel face, a soft bristle attachment works well
- Use a bucket of soap (dish soap) and water and soft sponge to clean each panel after fabrication. Make sure drill holes and markings are cleaned thoroughly along with the rest of the panel. Clean so there is no soap residue left on the panel.
- Go back over the panel with a clean dry sponge to aid in drying.
- Seal the fabricated edges of the panel with two coats. (Sealer & Applicator; Supplied by CBF)
- Once the panel is fabricated & thoroughly cleaned, make sure it is dry before stacking.

Repeat steps 5 & 6 after installation to clean any remaining dirt, dust & fingerprints.

▶ For interior applications skip Step #7 & follow all other steps.

FAILURE TO FOLLOW THESE INSTRUCTIONS WILL CAUSE DAMAGE TO PANEL CALLED
A" BURN" & WILL RUIN APPEARANCE & CANNOT BE REPAIRED.



Attention to Details



In order to achieve a good result the panels must be installed on a stiff, strong, flat & level construction. The wall's stability must be ensured without help from our products. Attention to detail is of MAJOR importance, so it is therefore important that the joints & connections of the cladding are solved and completed with precision & care.

Since our products will move when the climate changes, they may bend +/- 1/4".



Ventilated Construction

Our facade cladding must always be installed as a ventilated construction with the outermost cladding open in order to allow ventilation of an underlying cavity. There must be a minimum 3/4" hollow air gap between the substrate & the back of our panels. You must also allow for a 5/16" gap between sheets in both the vertical & horizontal joints, as well as a 3/4" gap at the very bottom of the wall & at the soffit/cap.



This ventilation is an upgoing air flow from the bottom of the wall to the soffit/cap & this air gap is not to be blocked at any point. There must also be a minimum 1/2" through going air gap on each height between floors (a 1/2" gap between the furring strips).

The ventilation equalizes the changes in pressures, which can be caused by gusts of wind, climate change, or drying of the panels, as well as ensuring humidity & condensation from both inside and outside the structure is able to escape.

Safety



Inhalation: Acute over-exposure to dust may cause mild irritation & inflammation of the respiratory tract & organs. Use approved respiratory equipment when airborne dust is present. We advise the use of a dust extractor & a mask when cutting with power tools. If irritation occurs, get into fresh air. If condition persists, seek medical advise.



Eye Contact: You may experience a mild discomfort of the eyes caused by the dust. Always wear safety goggles when cutting or drilling the material. If an irritation occurs, flush with plenty of fresh water, & seek medical attention if condition persists.



Skin Contact: Prolonged contact may cause a mild irritation. You should always wear gloves when handling the material. If an irritation occurs, wash hands thoroughly with water.

Although our products contain no asbestos, you should choose a working method which minimizes dust during installation.



Installation at a Glance

1. Apply the Breathable Waterproof Membrane.



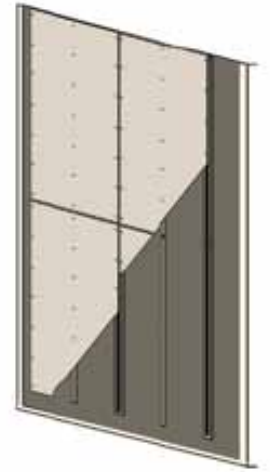
2. Apply the Vertical Furring Strips of Wood or Steel.



3. Apply the EPDM Rubber Strips.

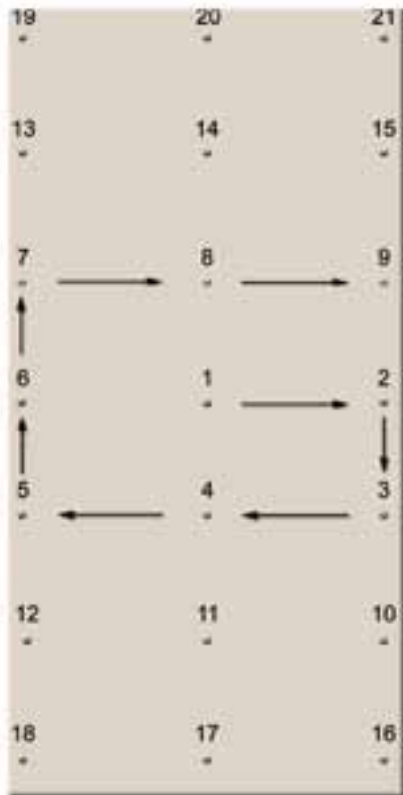


4. Apply the Fiber Cement Panels.



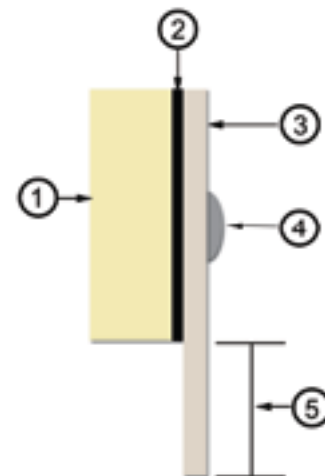
Installation of Screws

The screws are installed in a spiral manner. You apply the center screw first, then continue in a spiral manner.



Unsupported Panel

- ① 3 3/4" Spacer
- ② EPDM Rubber Strip
- ③ Fiber Cement Board
- ④ Stainless Steel; Pan Screw Head
- ⑤ 2" max. Unsupported Board



This image is for demonstration purposes only.

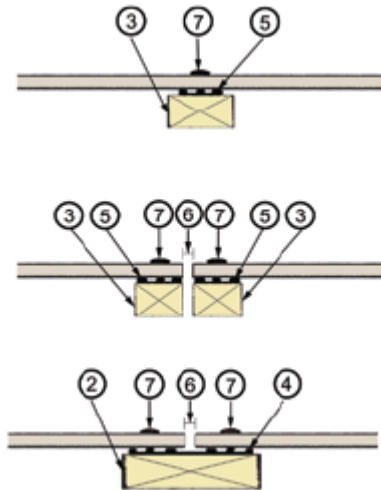
Installation Instructions • Installation on Wood Furring

Legend

- | | |
|-----------------------------------|--|
| ① Breathable Waterproof Membrane | ⑧ 1 ½" Screw Distance from Verticle Edge* |
| ② ¾" x 3 ½" Minimum Spacer | ⑨ 2 ¾" Screw Distance from Horizontal Edge* |
| ③ ¾" x 1 ½" Minimum Spacer | ⑩ 24" Maximum Spacer Distance in Vertical Plane (facade)
16" Maximum Spacer Distance in Horizontal Plane (soffit) |
| ④ 3 ½" EPDM Rubber Strip | ⑪ 16 ⅛" Maximum Screw Distance in Vertical Plane ≤ 8 Floors
12" Maximum Screw Distance in Vertical Plane ≥ 8 Floors |
| ⑤ 1 ¼" EPDM Rubber Strip | * 4" Maximum distance from the verticle & horizontal edges. |
| ⑥ ⅝" Gap Between Sheets | |
| ⑦ Stainless Steel; Pan Head Screw | |

Horizontal Elevations

(All Drawings are not to Scale)



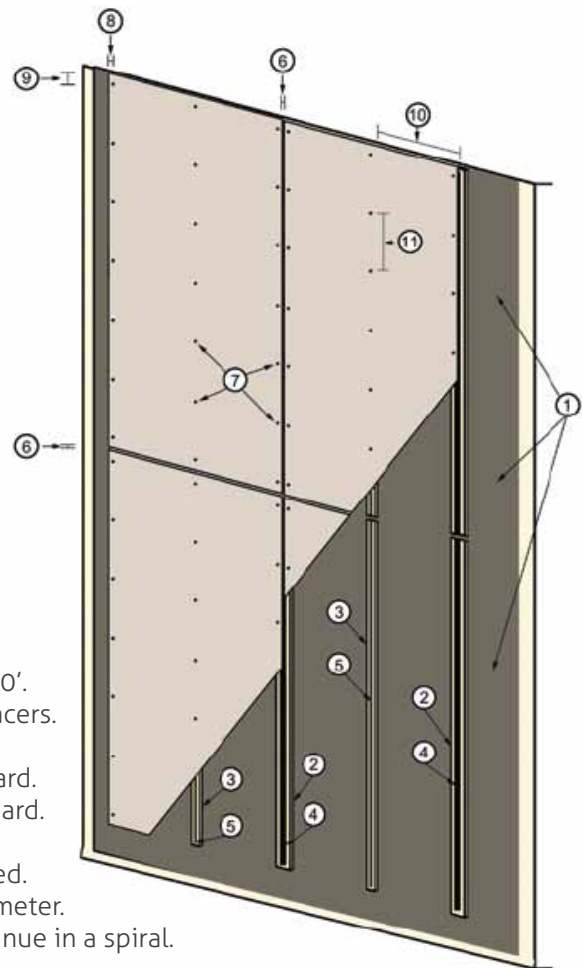
- The spacers may never be longer than 10'.
- There must be a 1/2" gap between the spacers.

- There should be 21 screws in a 4'x 8' board.
- There should be 24 screws in a 4'x 10' board.

- All the holes must be predrilled oversized.
- Contact CBF for the correct pre-drilling diameter.
- Remember to install the center screw first then continue in a spiral.

- Only install the screws with 3 ft lbs of torque.

- The screws should only be snug against the panel & not screwed in as tight as possible.
- Overtightening the screws will restrict movement & destroy the board.



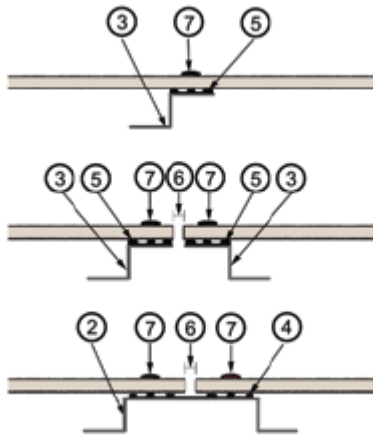
Installation Instructions • Installation on Steel Furring

Legend

- | | |
|-----------------------------------|--|
| ① Breathable Waterproof Membrane | ⑧ 1 ½" Screw Distance from Verticle Edge* |
| ② Steel Hat Channel** | ⑨ 2 ¾" Screw Distance from Horizontal Edge* |
| ③ Steel Z-Furring Channel** | ⑩ 24" Maximum Spacer Distance in Vertical Plane (facade)
16" Maximum Spacer Distance in Horizontal Plane (soffit) |
| ④ 3 ½" EPDM Rubber Strip | ⑪ 16 ⅛" Maximum Screw Distance in Vertical Plane ≤ 8 Floors
12" Maximum Screw Distance in Vertical Plane ≥ 8 Floors |
| ⑤ 1 ¼" EPDM Rubber Strip | * 4" Maximum distance from the verticle & horizontal edges. |
| ⑥ 5/16" Gap Between Sheets | |
| ⑦ Stainless Steel; Pan Head Screw | |

Horizontal Elevations

(All drawings are NOT to scale)

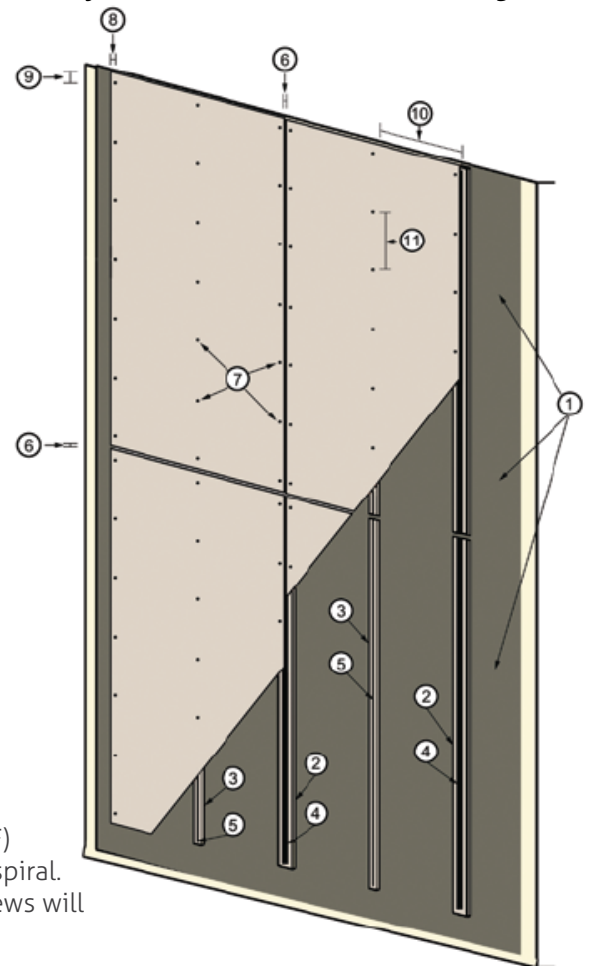


- The steel must be 16 or 18 gauge.
- The dilation points must be pre-drilled oversized using a 9/32" carbide tip drill bit with the center screw being the fixed point using a 7/32" carbide tip drill bit.

Only install screw with 3 ft lbs of torque. A torque measurement tool is recommended. (Not supplied by CBF)
Remember to install the center screw first then continue in a spiral. The screws must not be over tightened. Over tightening the screws will restrict the panel's movement & will cause cracking.

- The spacers may never be longer than 10'.
- There must be a 1/2" gap between the spacers.

- There should be 21 screws in a 4'x 8' board.
- There should be 24 screws in a 4'x 10' board.



**See Pages 15-17



STEEL FURRING ONLY

When using steel furring strips, please remember that it is not allowed to attach one panel onto furring strips running vertically

(See pages 16-17)



ALLOWED



NOT ALLOWED



III AD Architects & Design, [www.3-ad.com] Spitzack / Vice photo by Jayme Halbritter Photography

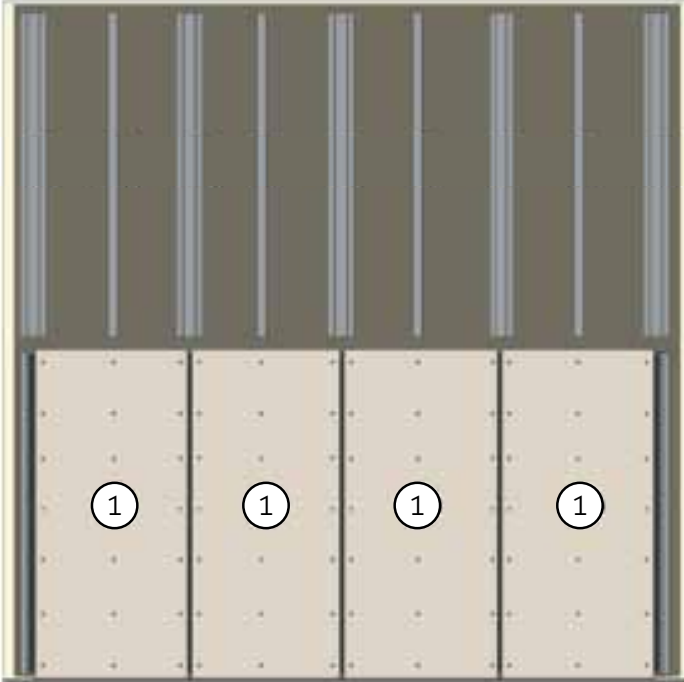
Installation Instructions

- Attaching Large Panels for Steel Furring

Vertical Panels on Steel

(4' x 8' panels shown here)

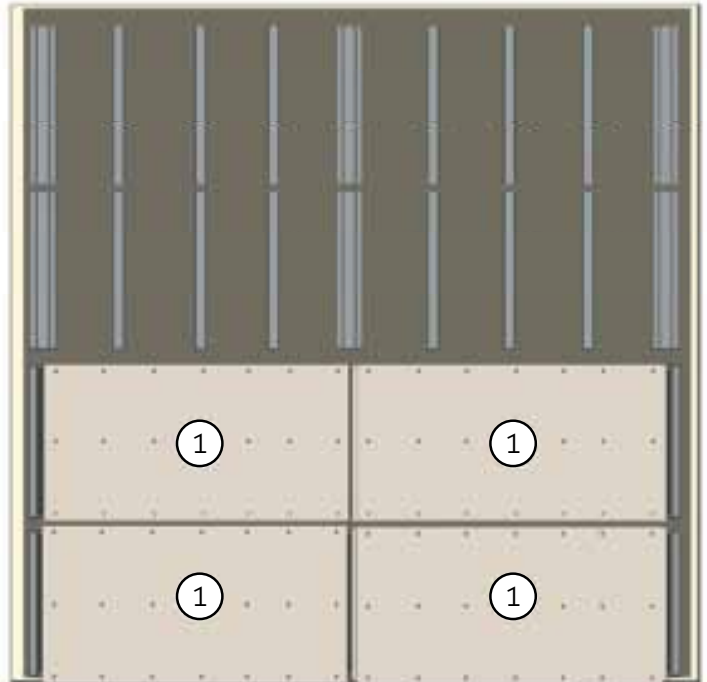
Drawings NOT to scale



Horizontal Panels on Steel

(4' x 8' panels shown here)

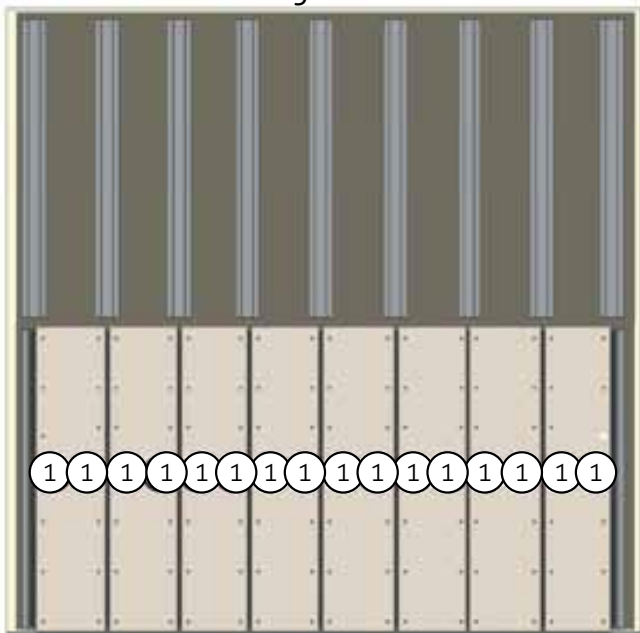
Drawings NOT to scale



Vertical Panels on Steel

(2' x 8' panels shown here)

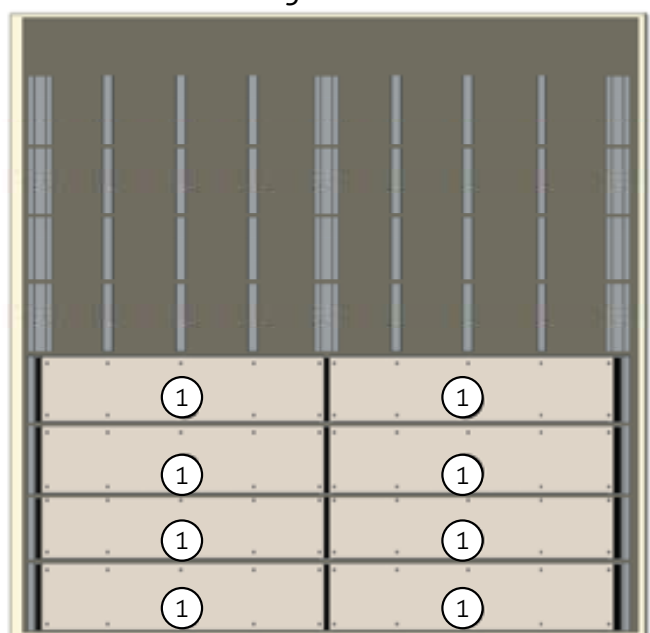
Drawings NOT to scale



Horizontal Panels on Steel

(2' x 8' panels shown here)

Drawings NOT to scale



Legend

① Fixed Point of Panel on Steel Furring**

** All other attachments of panel are oversized.

- Call your local steel furring supplier for the correct securing applications.



2148 S. 41st Street • Louisville, KY 40211 • 1-800-366-5378 • info@cbf11.com

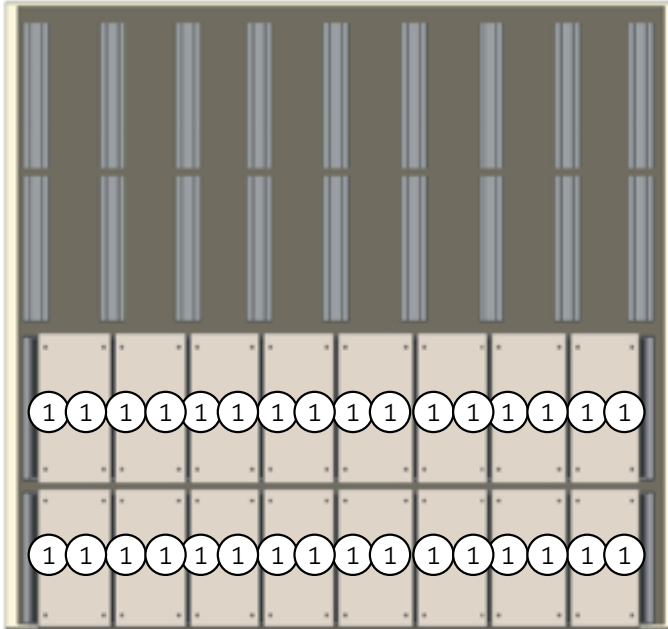
Installation Instructions

- Attaching Small Panels for Steel Furring

Vertical Panels on Steel

(2' x 4' panels shown here)

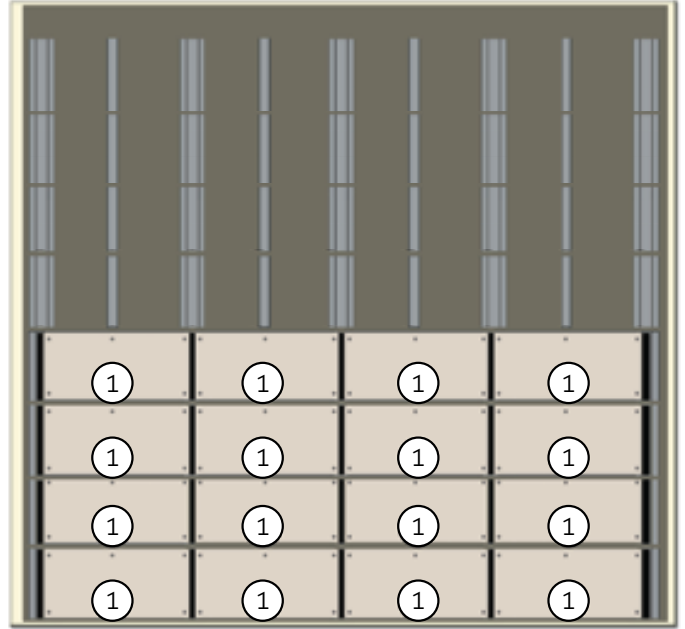
Drawings NOT to scale



Horizontal Panels on Steel

(2' x 4' panels shown here)

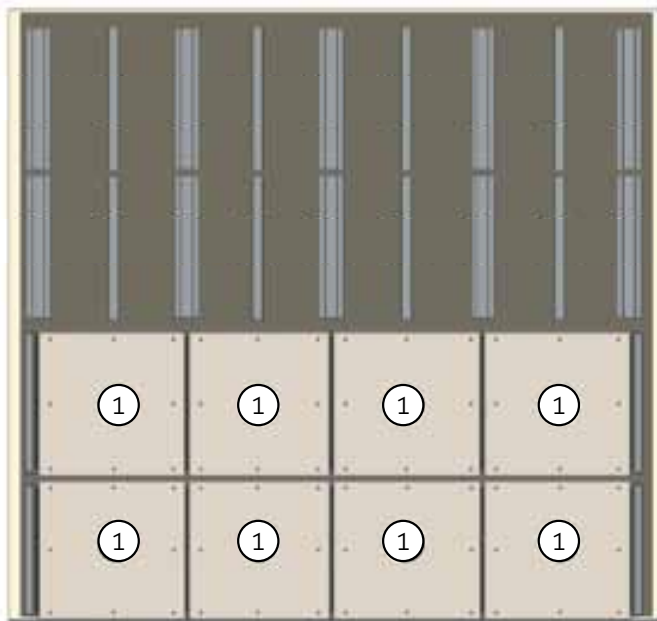
Drawings NOT to scale



Vertical Panels on Steel

(4' x 4' panels shown here)

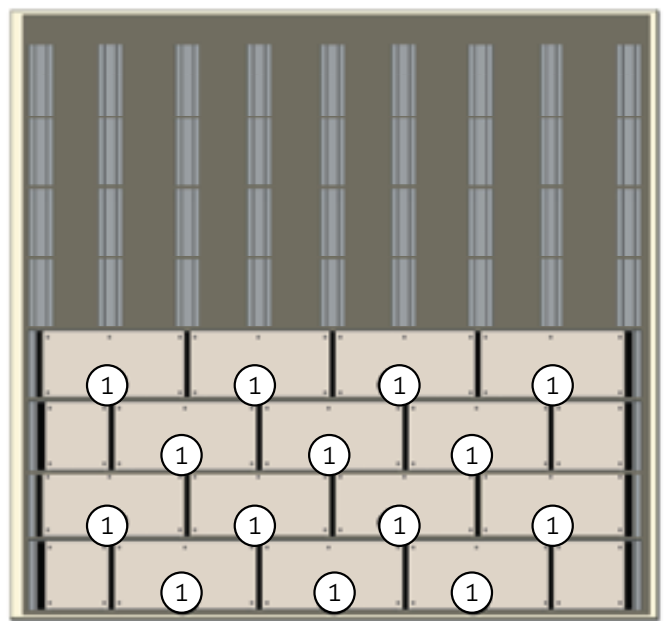
Drawings NOT to scale



Horizontal Panels on Steel

(2' x 4' panels shown here)

Drawings NOT to scale



Legend

① Fixed Point of Panel on Steel Furring**

** All other attachments of panel are oversized.

- Call your local steel furring supplier for the correct securing applications.



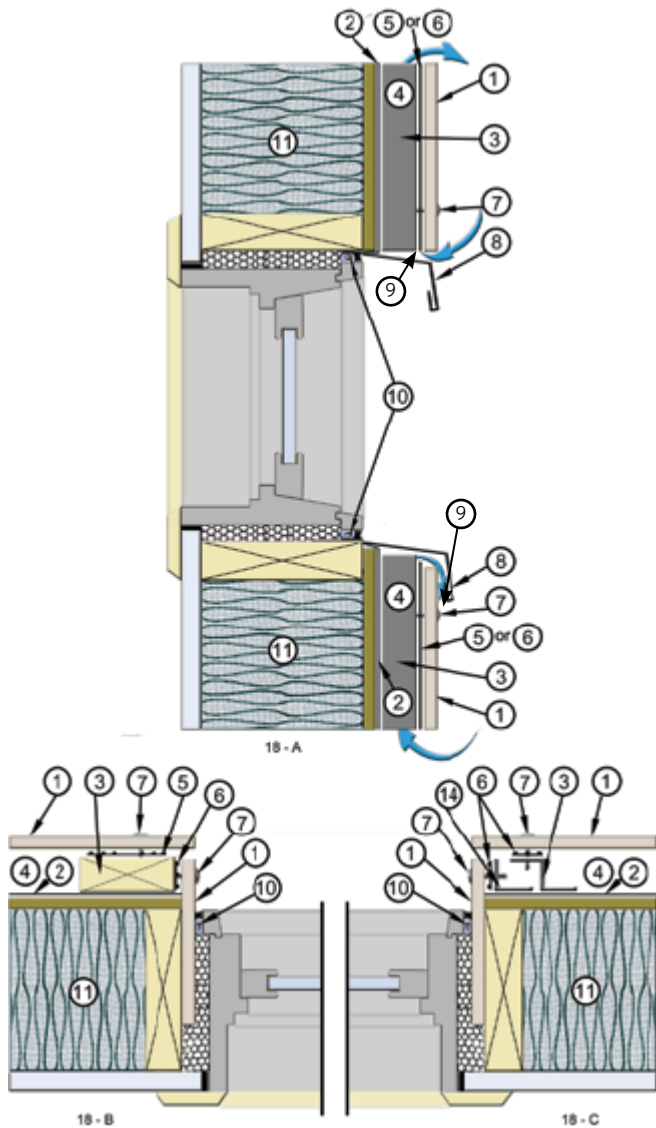
2148 S. 41st Street • Louisville, KY 40211 • 1-800-366-5378 • info@cbf11.com

Installation Details • Door & Window Solutions

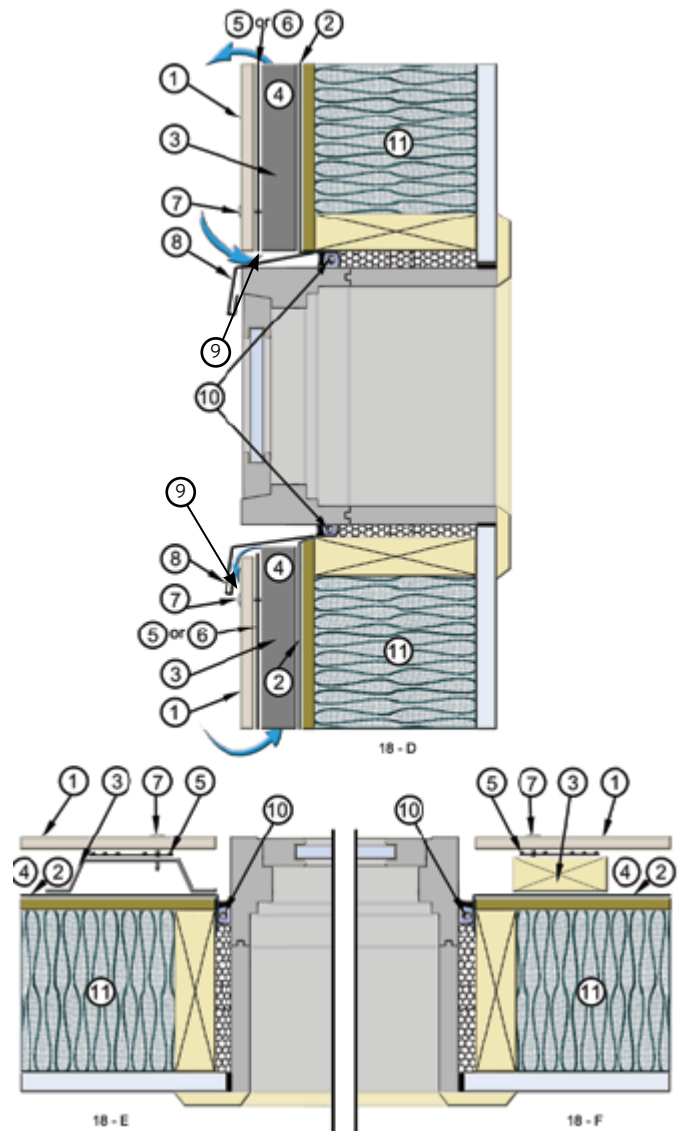
Legend

- | | | |
|-------------------------------------|----------------------------------|--|
| ① Fiber Cement Cladding Sheets | ⑥ 1 ¼" EPDM Rubber Strip | ⑪ Insulation |
| ② Breathable Waterproof Membrane | ⑦ Stainless Steel Screw | ⑫ Vertical Batten |
| ③ ¾" Minimum Spacer for Ventilation | ⑧ Flashing | ⑬ Horizontal Batten |
| ④ Air Space | ⑨ ¾" Min. Distance from flashing | <i>*In window application
a minimum of 6" in L"
shaped cuts.</i> |
| ⑤ 3 ½" EPDM Rubber Strip | ⑩ Backer Rod & Sealant | |

Recessed Window Solutions



Flush Window Solutions

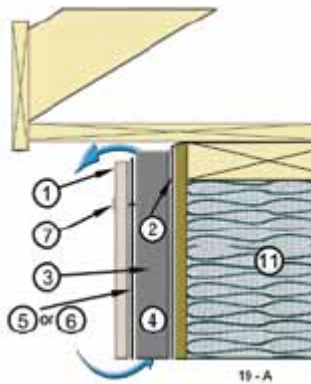


Installation Details • Top, Bottom & Exterior Wall Solutions

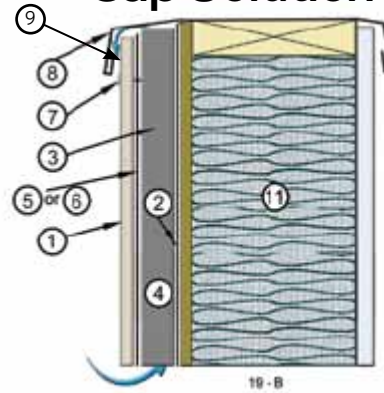
Legend

- ① Fiber Cement Cladding Sheets
- ② Breathable Waterproof Membrane
- ③ ¾" Minimum Spacer for Ventilation
- ④ Air Space
- ⑤ 3 ½" EPDM Rubber Strip
- ⑥ 1 ¼" EPDM Rubber Strip
- ⑦ Stainless Steel Screw
- ⑧ Flashing
- ⑨ ¾" Min. Distance from flashing
- ⑩ Backer Rod & Sealant
- ⑪ Insulation

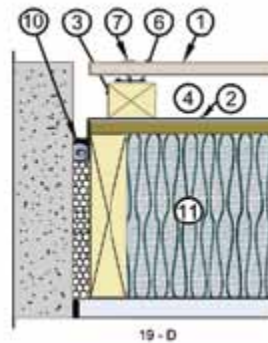
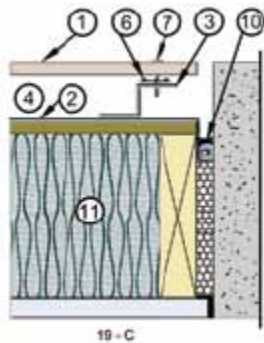
Soffit Solution



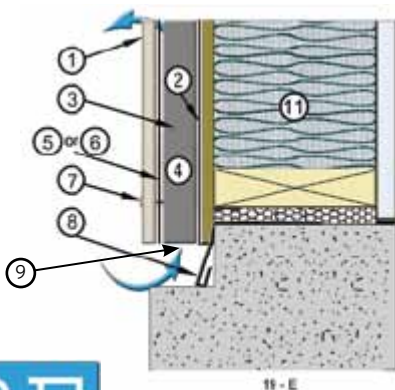
Cap Solution



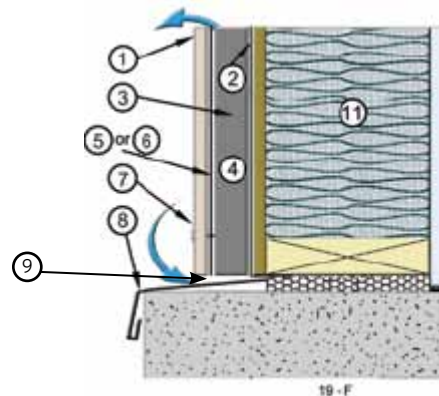
Exterior Wall Connection



Socle Solution



Socle Solution

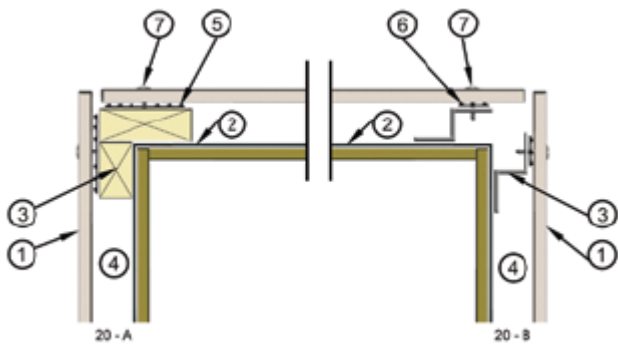


Legend

- | | | |
|-------------------------------------|--------------------------|---------------------|
| ① Fiber Cement Cladding Sheets | ⑥ 1 ¼" EPDM Rubber Strip | ⑪ Insulation |
| ② Breathable Waterproof Membrane | ⑦ Stainless Steel Screw | ⑫ Vertical Batten |
| ③ ¾" Minimum Spacer for Ventilation | ⑧ Flashing | ⑬ Horizontal Batten |
| ④ Air Space | ⑨ N/A | |
| ⑤ 3 ½" EPDM Rubber Strip | ⑩ Backer Rod & Sealant | |

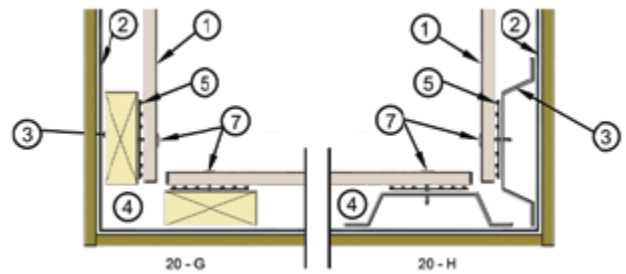
Open Joints

Outside Corner

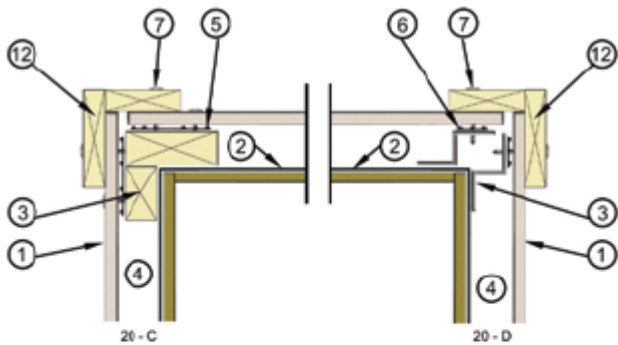


Open Joints

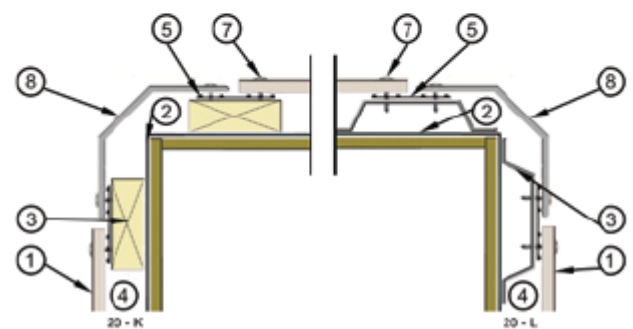
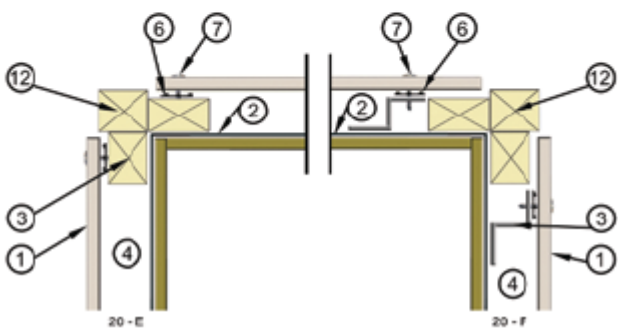
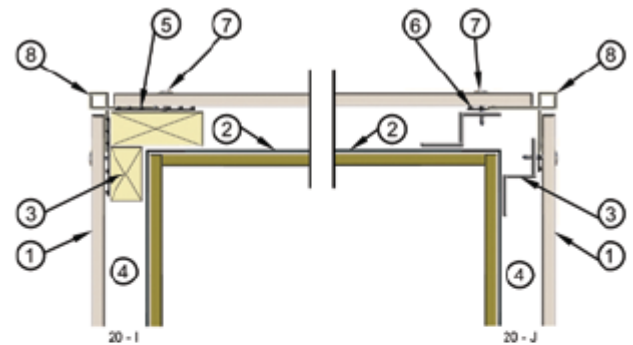
Outside Corner



Wood Battens



Metal/Plastic Flashing

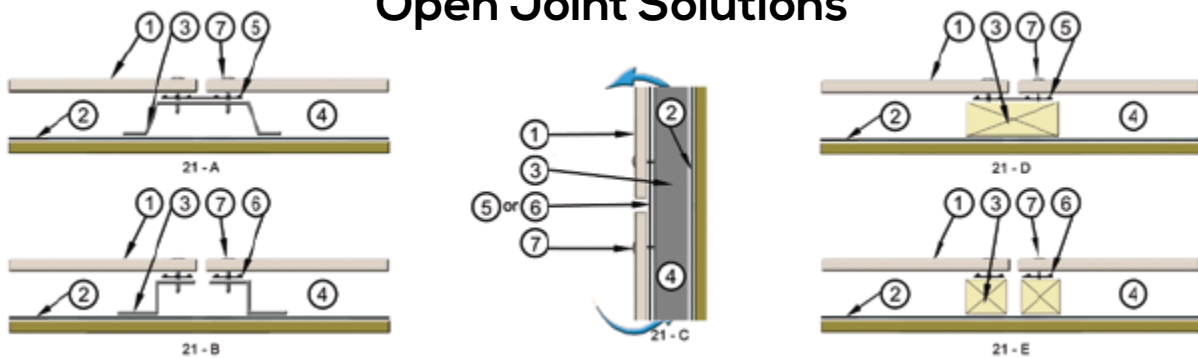


Installation Details • Joint Solutions

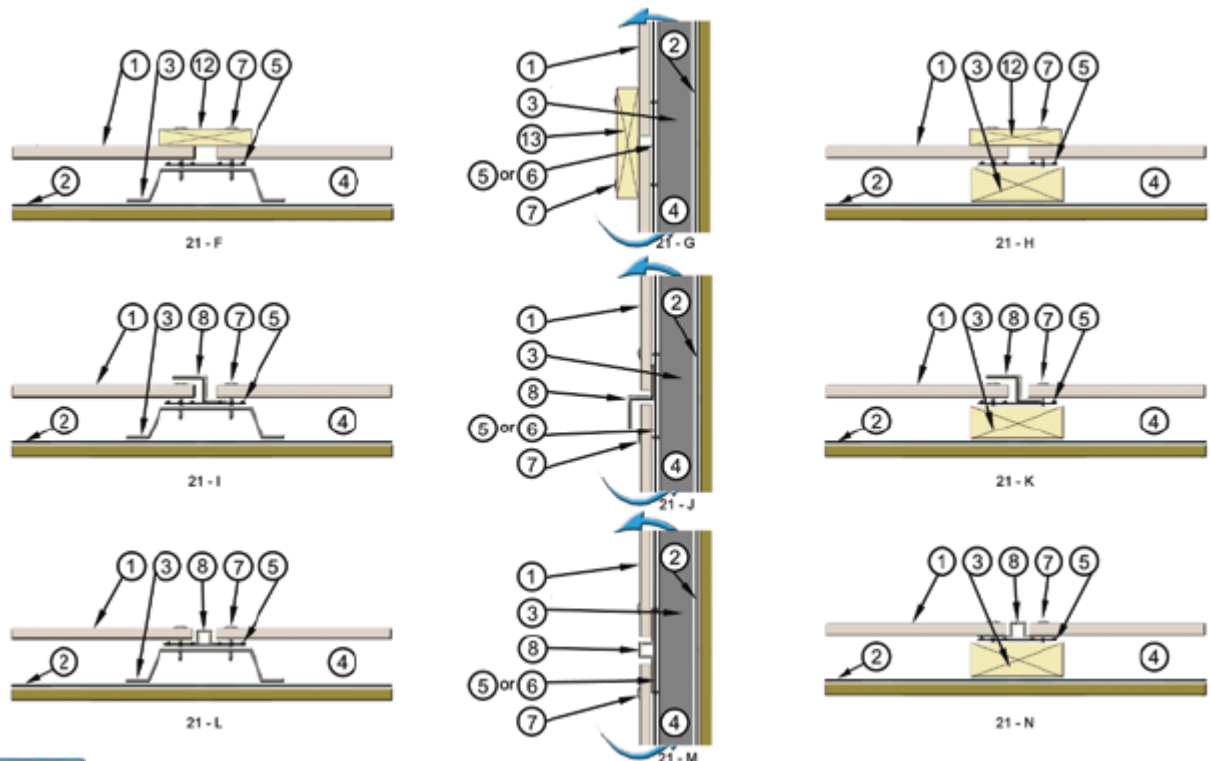
Legend

- | | | |
|-------------------------------------|--------------------------|---------------------|
| ① Fiber Cement Cladding Sheets | ⑥ 1 ¼" EPDM Rubber Strip | ⑪ Insulation |
| ② Breathable Waterproof Membrane | ⑦ Stainless Steel Screw | ⑫ Vertical Batten |
| ③ ¾" Minimum Spacer for Ventilation | ⑧ Flashing | ⑬ Horizontal Batten |
| ④ Air Space | ⑨ N/A | |
| ⑤ 3 ½" EPDM Rubber Strip | ⑩ Backer Rod & Sealant | |

Open Joint Solutions



Covered Joint Solutions



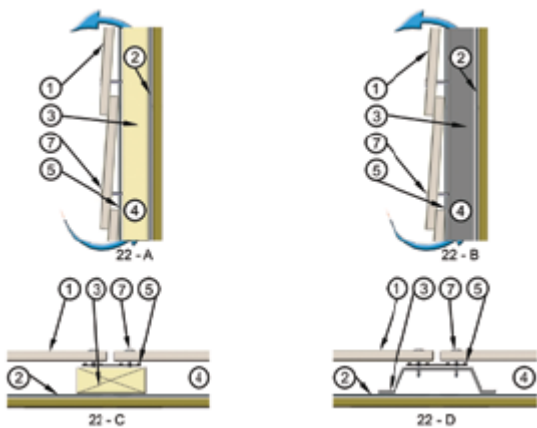
Installation Details • Weather Boarding*

Legend

- | | | |
|-------------------------------------|--------------------------|-------------------------------------|
| ① Fiber Cement Cladding Sheets | ⑥ 1 ¼" EPDM Rubber Strip | ⑪ Insulation |
| ② Breathable Waterproof Membrane | ⑦ Stainless Steel Screw | ⑫ Vertical Batten |
| ③ ¾" Minimum Spacer for Ventilation | ⑧ Flashing | ⑬ Horizontal Batten |
| ④ Air Space | ⑨ N/A | *6 Minimum & 16" Maximum Board Size |
| ⑤ 3 ½" EPDM Rubber Strip | ⑩ Backer Rod & Sealant | |

Vertical Spacers

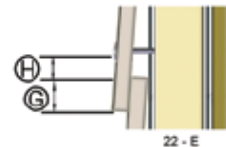
(Boards from 6" - 16")



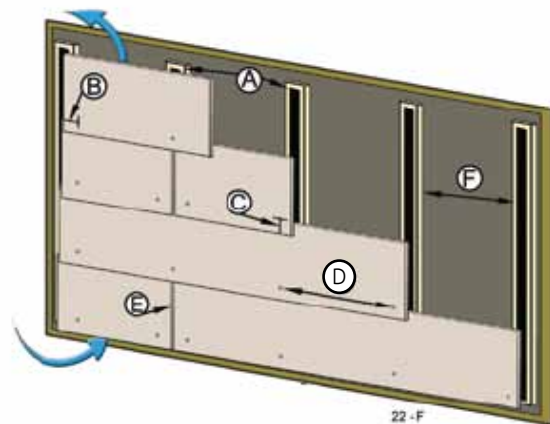
Vertical Spacers

(Boards from 6" - 16")

- ① ¾" x 3 ½" Minimum Spacer
- ② 1 ½" Minimum Distance (4" Maximum)
- ③ 2 ¾" Maximum Distance
- ④ 24" Max Distance
- ⑤ 5/16" Gap
- ⑥ See Chart Below
- ⑦ 1" Minimum Overlap (2" Maximum)
- ⑧ ¼" Minimum Distance of Screw from the Bottom Board



Building Height	< 66'	16"
Building Height	66' -125'	12"



Miscellaneous Information • Release Form

I, We _____ acknowledge receipt of Cement Board Fabricators, Inc.'s Product Guide provided by Cement Board Fabricators Inc. to be used in the installation of the fiber cement panels, which shall be purchased from Cement Board Fabricators, Inc.

I, We also acknowledge that all of the specified accessories are to be utilized during the installation of the fiber cement panels.

I, We acknowledge & understand that any failure to follow each of the instructions contained in the Product Guide and any failure to utilize each specific accessory may result in the partial or total invalidation of the warranty.

Company

Project Name

Printed Name & Title

Project Address

Signature

Project City, State & Zip

Date

NOTARY

On this day of ____ / ____ / ____ before me, _____
personally appeared _____, to me known to be the person named in & who
executed the foregoing instrument & acknowledged that he executed the same as his free & voluntary act.

Notary Public

My commission expires _____



LIMITED WARRANTY

Cement Board Fabricators (CBF) warrants that all products distributed by CBF are free from defects in material and workmanship using manufacturers' specifications as a standard. Only products that are installed & used in accordance with applicable CBF instructions or specifications are warranted by CBF. All warranty claims must be made, in writing, within 30 days of discovery of the defect, or within five years after the date of shipment of the product by CBF, whichever is later. Any claims made outside of this period are waived. If a claim is made under this warranty, you must allow for a reasonable inspection of the product you claim is defective & must provide samples that adequately demonstrate the problem which resulted in your claim for testing by CBF. CBF disclaims all implied warranties including the warranty of merchantability & fitness for a particular purpose or use. This warranty shall serve as the exclusive remedy for all claims arising from your status as a buyer of CBF products. This limited warranty may not be modified or amended except by a written agreement authorized & signed by an authorized representative of CBF. Without an express, written authorization from CBF, no retailer or distributor of CBF products has the ability to modify or amend this warranty.

LIMITATION OF LIABILITY

This limited warranty is your sole & exclusive warranty for all claims arising from your status as a buyer of CBF products, including defects in material & workman ship. It is expressly understood & agreed that the limit of liability will be, at CBF's option, repair, resupply of a like quantity of non-defective product, or refund of the purchase price of the material. All labor and service charges which may be incurred with respect to either the original or replacement product are excluded. CBF shall have no liability except where the claim results solely from breach of CBF's limited warranty. CBF shall not be liable for any incidental or consequential damages result ing from the purchase or use of CBF products. Furthermore, CBF shall not be liable for damage to the property to which any CBF product is applied or its contents, loss of time, profits, or any inconveniences arising out of any breach of this limited warranty or obligations under this limited warranty. CBF shall not be liable for damages which are based on negligence, breach of warranty, strict liability, or any other theory except as provided for in the Limited Warranty above. Incidental & consequential damages shall not be recovered even if the replacement remedy fails of its own purpose or for any other reason.

