**SECTION 07 42 46**

**HIGH DENSITY CEMENTITIOUS WALL PANELS**

**PART 1 – GENERAL**

* 1. **SECTION INCLUDES**
1. Fiber-reinforced cementitious wall panels mounted using the drained and back ventilated (D&BV) rainscreen design principles.
2. Panel fasteners and accessories.
3. Metal Sub-Framing Support System
	1. **RELATED SECTIONS**
4. 05 40 00 Cold-Formed Metal Framing (if applicable)
5. 06 10 00 Rough Carpentry (if applicable)
6. 06 16 00 Sheathing
7. 07 05 43 Cladding Support Systems (if applicable)
8. 07 21 00 Thermal Insulation
9. 07 27 00 Air Barriers
10. 07 62 00 Sheet Metal Flashing and Trim
	1. **REFERENCES**
11. ASTM International
	1. ASTM C120-90: Standard Test Methods of Flexure Testing of Slate (Breaking Load, Modulus of Rupture, Modulus of Elasticity)
	2. ASTM C1185: Standard Test Methods for Sampling and Testing Non Asbestos Fiber Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards
	3. ASTM C1186: Standard Specification for Flat Fiber-Cement Sheets
	4. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials
	5. ASTM E136: Standard Test Method for Behavior or Materials in a Vertical Tub Furnace
	6. ASTM E228: Standard Test Method for Linear Thermal Expansion of Solid Materials with a Push-Rod Dilatometer
	7. ATSM G155: Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
	8. ASTM E330: Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
	9. ASTM E331: Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
12. Additional
	1. ICC AC 90: Acceptance Criteria for Fiber Cement Siding used as Exterior Wall Siding
	2. IBC 1403.2: Reference Standard for Selection of Weather Resistive Barriers
	3. AAMA 509: Test and Classification Method for Drained and Back-Ventilated Rainscreen Wall Cladding Systems
	4. EN12467: European Committee for Standardization: Fiber Cement Flat Sheets. Product Specification and Test Methods
	5. NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Combustible Components.
	6. Florida Building Code: Test Application Standard (TAS) 203: Criteria for testing Products subject to Cyclic Wind Pressure Loading
	7. IAPMO Test
	8. **SUBMITTALS**
13. Refer to Section 01 33 00 – Submittal Procedures
14. Product Data: Manufacturer’s data sheets on each product to be used, including, but not limited to:
	1. Preparation instructions and Recommendations
	2. Storage and Handling Requirement and Recommendations
	3. Installation methods for the supporting framework and the panels
15. Shop Drawings: Submit detailed shop drawings showing:
	1. Integrated engineered system with single source responsibility of shop drawings to incorporate panel manufacturer and sub-framing. Sub-framing must have fixed and sliding points that addresses thermal cycling for both panels and sub-framing. Engineering Calculations: Submit stamped calculations by licensed engineer as required by local building code
16. Samples
17. 1 inch by 3.25 inch minimum fiber cement color samples for selection by architect
18. One 4 inch by 5.8 inch fiber cement panel in selected color and surface finish
19. Provide samples of each type of panel fastener
20. Provide manufacturer’s Design and Installation Manual
21. Provide test reports indication compliance with performance criteria.
22. ICC Evaluation Report for Installation on a Rear Ventilated Open Joint System
23. Provide manufacturer’s sample warranty
24. Design Loads [as required by applicable codes for Project location]
25. System shall be optimized based on design loads
26. Maximum panel deflection: 1/300 [or applicable for product] of span or less of span when tested in accordance with positive and negative pressures and as required to prevent cracking or damage to panel facing
27. Comply with applicable seismic requirements for Project location
28. Adequately resist wind forces and uplift for Project location with minimum of [\_\_\_\_\_\_] [PSF] [kilopascals] [\_\_\_\_\_\_] for wall surface and [\_\_\_\_\_\_] [PSF] [kilopascals] for parapet and corner panels tested in accordance with ASTM E330
29. Accommodate movement of cladding components without undue stress on fasteners or other detrimental effects, when subjected to seasonal temperature range of :
	1. Ambient: [120 degrees F] [67 degrees C]
	2. Cladding surface: [180 degrees F] [100 degrees C]
30. Accommodate tolerances of support structure
31. Provide panels and panel supports capable of the following:
	1. Wind Loads: Panel and sub-framing system design meets wind load requirements as defined by structural design and local building codes.
	2. Deflection Limits: Withstand deflection L/300 maximum
32. Provide thermal U-value analysis on typical wall assembly to incorporate specified insulation and cavity depth(s).
	1. **QUALITY ASSURANCE**
33. Manufacturer Qualifications: Minimum of twenty (20) years’ experience in the production of fiber-reinforced cementitious panels
34. Installer Qualifications: Acceptable to panel manufacturer’s representative, with a minimum of five (5) years of proven experience in the installation of the specified products on projects of a similar size and scope.
35. Mock-up shall incorporate panels and all accessories
	1. **DELIVERY, STORAGE, AND HANDLING**
36. Storage and handling to comply with Design and Installation Manual
	1. **WARRANTY**
37. Manufacturer standard warranty against material failure for a period of twenty (20) years from date of delivery. (Note: Zenor series has a 10 year warranty). Warranty only available when material is installed in accordance with manufacturer’s design and installation manual with shop drawings approved by manufacturer.
38. Failures include:
39. Structural failure: Water Tightness, Frost Resistance, Mechanical and Physical Characteristics per EN standards and manufacturer’s performance values. No visible irregular deviation of color within one panel for 10 years.

**PART 2 – PRODUCTS**

**2.1 MANUFACTURER**

1. Basis of Design: Swisspearl® by Cladding Corp: [www.claddingcorp.com](http://www.claddingcorp.com) or (888)826-8453
	1. Swisspearl Fiber Cement Panel
		1. Panel Thickness: {8mm / 12mm}
		2. Color: {Carat / Reflex / Avera / Vintago / Gravial / Nobilis / Planea / Vintago-Reflex / Terra / Zenor}
		3. Panel size: As shown on architectural drawings [Maximum panels size of 1250mm x 3050mm]
2. Substitution Limitations

Submit written request for approval of substitution to the Architect a minimum of {14} days prior to the date of receipt of bids.

Include the following information:

* + - * 1. Name of the material and description of the proposed substitute.
				2. Drawings, cut sheets, performance and test data
				3. List of projects of similar scope and photographs of exisiting installations.
				4. Test reports indicating compliance with the performance criteria.
				5. Documentation proving manufacturing process is in compliance with performance criteria.
				6. Other information necessary for evaluation.

(OR)

1. Substitutions: Not Permitted

**2.2 PANEL MATERIALS**

1. Panels made with:
	1. Portland cement (greater than 70% of composition)
	2. Polyvinyl alcohol fibers (PVA)
	3. High Performance finish on all six sides (face, rear, and all edges)
	4. ASTM C1186 at Type A Grade IV fiber-cement boards, in accordance with Section 1404.10 and 1405.16 of the IBC.
2. Panels must be air cured for a minimum of 4 weeks
3. The following characteristics are not acceptable:
	1. Autoclaved products
	2. Products reinforced with only wood/cellulose fibers
	3. Efflorescence
	4. Combustible products without ASTM E 136 approval
	5. Color Change greater than E 2.0 per ASTM G155
4. Panel Fastening: Exposed: Fasteners – Rivets Color Match to Panel. Provide panels and panel fasteners from a single source.

{OR} F. Panel Fastening: Concealed: Concealed Fastening System

**2.3 FABRICATION**

1. Fabricate panels by a manufactured approved fabricator
2. Dimensional tolerances
	1. Overall panel dimensions within 1mm of panel width and height
	2. Squareness within 0.5mm per meter
3. Labeling: Apply identification label to back side of each fabricated panel

**2.4 SUB-FRAMING SYSTEM**

1. Basis of Design: (ECO Hci.10 / ECO Vci.40) by ECO Cladding: [www.ecocladding.com](http://www.ecocladding.com) or (855) 237-3370
2. Sub-Framing Requirements:
3. Thermal Modeling: Attachment system must be thermally modeled to demonstrate, at minimum, a compliance with ANSI/ASHRAE 90.1-2010 maximum U-Value for walls.
4. Thermally Broken Sub-Framing: Continuous framing profiles (including C- or Z-shaped sections or furring) penetrating insulation are not permitted.
5. Internal Shimming: Sub-framing will incorporate brackets with internal shimming for out of plumb conditions, with at least 1 1/2” of built in adjustability.
6. Cavity Ventilation: Sub-framing system shall accommodate positive drainage and ventilation for moisture control of the cavity
7. Flatness: Sub-framing System shall be flat with no noticeable warpage, buckling, deflection or other surface irregularities. The back plate shall not bend or deflect when compressed against the air barrier membrane but instead create a compression seal.
8. Fasteners: Minimum 304 series stainless steel fasteners and anchors of type, size and spacing required for type of substrate and project conditions, to meet performance requirements specified and as indicated in design calculations and shop drawings. Grommet fasteners should be used to ensure face seal of the bracket.
9. Not Acceptable: Components made from galvanized steel, galvalume, or other carbon-based metals. Components made from FRP or fiberglass materials.
10. Sub-Framing Manufacturer: 15 years’ experience in rainscreen wall design in the United States.
11. Single Sourced Engineered System: Integrated engineered system with single source responsibility of shop drawings to incorporate panel manufacturer and sub-framing. Sub-framing must have fixed and sliding points that addresses thermal cycling for both panels and sub-framing.
12. Aluminum System: Made from 6000 series architectural grade aluminum to address corrosion.
13. Stainless Steel: Minimum 304 series stainless steel brackets and/or profiles for system attachment.
14. Finishes: Brackets and L shapes in mill finish and panel attachment profiles in black anodized finish.

**2.4 VENTILATION REQUIREMENTS**

1. Panels shall be rear ventilated with a continuous ventilation cavity.
	1. Cladding heights less than 20ft require minimum ¾” continuous vent cavity.
	2. Cladding heights more than 20ft, but less than 100ft, require minimum 1-1/4” continuous vent cavity.
	3. Cladding heights 100ft or great require minimum 1-3/4” continuous vent cavity.
2. All base, top, sill, and head conditions must have minimum ¾” clearance from panel edge and panel face to ensure proper ventilation.
3. Ventilation Cavity with Perforated Horizontal Profiles
	1. Minimum ventilation gap to be 1.5”. Horizontal profiles should allow minimum 75% airflow. Continuous, non-perforated, horizontal profiles at not allowed.

**PART 3 – EXECUTION**

**3.1 EXAMINATION**

1. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of drained and back ventilated rain screen cladding
2. Do not proceed with cladding installation until deficiencies have been addressed

**3.2 PREPARATION**

1. Clean substrates of projections and substances detrimental to application.
2. Field dimension: Field verifies overall dimensions prior to panel fabrication.
3. Coordinate panel installation with rain drainage work, flashing trim, soffit, roofing, parapet, wall, and other adjoining work to provide a leak-proof, secure, and non-corrosive installation.
4. Allow for scaffolding or mobile access to all parts of cladding.

**3.3 INSTALLATION**

1. Install panels in accordance with manufacturer’s Design and Installation Manual and approved shop drawings.
2. Install panels with appropriate joint layout and configuration. Vertical and horizontal joints shall be open. Typical joint spacing to be 5/16” wide. Minimum joint spacing allowed is ¼”.

**3.4 QUALITY CONTROL**

1. The installing contractor shall perform daily inspections of panel installation to maintain and confirm that tolerances are being met and that panel manufacturer’s DIM is complied with.
2. The owner may engage a third party inspection agency to verify that installed panels meet performance requirements and tolerances.

**3.5 CLEANING, HANDLING, STORAGE AND PROTECTION**

1. Panels should be handled and storage at jobsite per the manufacturer’s Design and Installation Manual.
2. Remove and replace broken, chipped, stained, or otherwise damaged panels.
3. Immediately after installing, wipe down panels. Do not use wire brushes, metallic tools, or abrasives for cleaning.
4. Protect cladding from roof run-off, splashed water, mud, sealants, bitumen, and other contaminants from remaining construction activities.
5. Without damaging completed work, provide protective boards at exposed external corners, which may be damaged by construction activities.

**END OF SECTION 07 42 46**