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SECTION 07 05 43.01

CLADDING SUPPORT SYSTEMS

This document is intended to serve as a best practice guide that provides Advanced Architectural Products' recommendation for specification language that applies to their products.

This document does not inherently serve as a pre-written master specification. Review and edit as needed to suit each Project's individual requirements. Text in bold parenthesis indicates choices or options that the specifier preparing the Project specifications must select.

ABOUT US

Advanced Architectural Products, based in Allegan, Michigan, is a leading innovator in high-performance building enclosure and continuous insulation systems. Since our founding in 2012, we have been dedicated to developing cutting-edge solutions that enhance energy efficiency, structural integrity, and sustainability in modern construction.

Our flagship products, **GreenGirt®** CMH and **SMARTci®** systems, utilize advanced composite metal hybrid technology to provide superior thermal performance and moisture control, supporting Architects, Engineers, and builders in creating more efficient and durable structures.

With a state-of-the-art headquarters in Allegan, a 100,000-square-foot manufacturing and research facility in Hamilton, Michigan, and a West Coast distribution center in Washington, we are committed to innovation, quality, and customer success. Recognized as one of Inc.'s Fastest Growing Companies, we continue to push the boundaries of construction technology.

PART 1 - GENERAL

This Section specifies the **SMARTci®** Building Enclosure System, an advanced continuous insulation solution designed to eliminate thermal bridging and enhance building envelope performance. The system is available in two configurations:

SMARTci® on Closed Framing: Installed over traditional closed framing with sheathing and a water-resistive barrier (WRB), providing water tightness up to 1.57 PSF and air tightness up to 6 PSF

SMARTci® on Open Framing: Installed directly over open framing, achieving air and water tightness up to 20 PSF, and offering potential reductions in labor and material costs

1.01 SECTION INCLUDES

- A. Composite metal hybrid (CMH) sub-framing support system for exterior cladding.

1.02 RELATED REQUIREMENTS

Keep the following subparagraph(s) to reference requirements that may typically be expected in this Section but are specified in other Sections.

- A. Section 03 3000 – Cast-in-Place Concrete for concrete wall substrate.
- B. Section 04 2000 – Unit Masonry for concrete masonry unit (CMU) wall substrate.
- C. Section 05 4000 – Cold-Formed Metal Framing for metal stud substrate support framing.
- D. Division 06 for requirements for exterior sheathing and wood stud substrate support framing.

Coordinate with Division 07 Sections for cladding, air barriers, insulation, and firestopping to ensure proper sequencing and performance. Update related section numbers as appropriate.

- E. Section 07 2500 for Weather Barriers for air, water, vapor barrier at exterior wall.
- F. Division 07 for exterior wall panel systems.
- G. Section 07 9200 – Joint Sealants for perimeter sealant.
- H. Section XX XX XX (**Insert Spec Section Name Here**) for (**Insert Description of what item is for here**)

1.03 REFERENCE STANDARDS

- A. ASCE – Design Guide for FRP Composite Connections.
- B. ASCE 7 – Minimum Design Loads and Associated Criteria for Buildings and Other Structures
- C. ASTM A653/A653M – Standard Specification for Steel Sheet, Zing-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- D. ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- E. ASTM C1363 – Thermal Performance of Envelope Assemblies by Means of a Hot Box Apparatus.
- F. ASTM D638 – Tensile Properties of Plastics.
- G. ASTM D790 – Flexural Properties of Plastics.
- H. ASTM E84 – Surface Burning Characteristics of Building Materials.
- I. ASTM E119 – Fire Tests of Building Construction and Materials.
- J. ASTM E330/E330M – Structural Performance by Uniform Static Air Pressure Difference.
- K. NFPA 285 – Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.

1.04 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct preinstallation (**teleconference**) (**conference at Project site**).
 - 1. Attendees: Invite Contractor, Architect, Owner's representative, and Installer to preinstallation conference.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate installation of continuous insulation sub-framing support system as indicated on drawings for proper drainage, flashing, trim, backup support, soffits, and other related Work.
 - 1. Review and finalize construction schedule.
 - 2. Verify availability of materials, installer's personnel, equipment, and facilities needed to meet established schedule.
 - 3. Review means and methods related to installation in accordance with manufacturer's installation instructions.
 - 4. Examine support conditions for compliance with installation requirements, including alignment and attachment to structural support system.
 - 5. Review flashings, wall cladding details, wall penetrations, drainage plane, openings, and condition of other construction that is related to this Work.
 - 6. Review temporary protection requirements for during and after installation of this Work.

1.06 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data for each type of product and component included in composite cladding support system.
- B. Shop Drawings: Submit details on layout, spacing, sizes, thicknesses, and types of composite cladding systems including, fabrication, fastening, and anchorage details.
 - 1. Provide details on accessories, connections, and attachment to adjacent work.
 - 2. Provide a list of locations where composite cladding support systems are to be used and indicate depth of product at each location.
- C. Certificates:
 - 1. Any other manufacturer must certify that products meet or exceed specified requirements.
 - 2. Certificate of compliance with Buy America Act, verifying that all materials meet applicable domestic production requirements.
 - 3. Certificate confirming all system components, including sub-framing members and fasteners, are manufactured in the United States.

Retain "Delegated Design Submittals" Paragraph below if structural calculations for sub-framing are required.

- D. Delegated Design Submittals: Submit comprehensive structural analysis for composite cladding support systems in compliance with performance requirements and design criteria, signed and sealed by the qualified professional engineer responsible for preparation.
- E. Structural Composite Sub-Framing Submittal:
 - 1. Provide professional engineer stamped calculations for the composite sub-framing system carrying the associated cladding system considering the following:
 - a. Anisotropic properties of the sub-framing.
 - b. Point loading of the fasteners and representative dynamics of the cladding system.
 - c. Uniform loading calculations are not allowed as they are not representative of composite wall systems.
 - d. Calculations for eccentric cantilever conditions.
 - 2. Calculations providing a safety factor minimum of 4 at the high service temperature of 180 degrees Fahrenheit.

3. Fastener Creep and Durability Test for FRP sub-girts, certified by third party/PE. Test to be completed in accordance with specified fastener creep and durability testing requirements.
4. Provide finite element analysis (FEA) to model and evaluate areas of the longest composite girt cantilever span possible between intermediate framing members/attachment.
 - a. FEA shall include maximum dead load and wind load conditions.
 - b. FEA shall include point loads representative of fastener locations.
 - c. FEA for composite materials shall:
 1. Provide crosswise material properties of tensile strength and modulus of elasticity.
 2. Provide lengthwise material properties of tensile strength and modulus of elasticity.
 3. Failure to provide tested crosswise material properties are cause for product rejection.
 - d. Maximum directional stresses in model shall have a safety factor of 4 or greater.
 - e. Stresses shall be indicated and analyzed in 3 directions.
 - f. FEA shall accurately replicate the wall system and physical loading dynamics.
 - g. Report shall be furnished with submittal.

Retain "Sustainable Design Submittals" Paragraph below if required to attain sustainability rating or to track sustainability submittals. Coordinate with sustainability consultant to determine if there are requirements for additional documentation for a particular sustainability accreditation.

F. Sustainable Design Submittals:

1. Environmental Product Declarations (EPDs): CMH Manufacturer shall provide a product-specific EPD Type III report in accordance with EN 15805 and ISO 14025.
2. System components to be manufactured in a process meeting net-zero energy emissions criteria.
3. CMH system to be registered as red list chemical free with the Declare Label.
4. The components shall be certified to be halogen/bromine free.
5. CMH composite member shall utilize a minimum of 25 percent post-consumer recycled material content.

G. Warranty: Provide five (5)-year manufacturer's warranty for composite metal hybrid (CMH) sub-framing support system commencing on the date of manufacture or date of substantial completion.

Informational Reference:

"FRP Fails, CMH Prevails: What Designers Need to Know to Prevent 'Unavoidable Failure' in Continuous Insulation Systems"

Overview of the structural and thermal performance issues associated with fiber-reinforced polymer (FRP) Z-girts and the advantages of composite metal hybrid (CMH) and steel alternatives.

Available at: <https://greengirt.com/articles/frp-fails-cmh-prevails-what-designers-need-to-know-to-prevent-unavoidable-failure-in-continuous-insulation-systems>

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least ten years of documented experience.

1. Engineering Review: Manufacturer to provide Technical Engineering Report (TER) based on **SMARTci®** support system and cladding system design.
2. Sub-framing materials, fasteners, components, and accessories shall be furnished by a single manufacturer to ensure system compatibility and performance.
3. Code Conformance: **SMARTci®** system to have been evaluated by IAPMO Uniform Evaluation Service and found satisfactory for compliance with 2018 International Building Code.

4. Components shall be manufactured in the United States, with all primary manufacturing processes performed domestically, including but not limited to extrusion, forming, and coating.
- B. Installer Qualifications: Company specializing in performing work as indicated in this section with at least three years of documented experience and approved by manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site without damage or deformation in manufacturer's original unopened containers and with labels that clearly identify product name and manufacturer.
- B. Storage: Store materials in clean, dry, and level interior or exterior areas for limited duration in accordance with manufacturer's written instructions.
- C. Protect components during transportation, handling, and installation from moisture, excessive temperatures, and other construction operations in accordance with manufacturer's written instructions.
- D. Handle components in accordance with manufacturer's written instructions and in a manner to prevent bending, warping, twisting, and surface, edge, or corner damage.

1.09 SITE CONDITIONS

- A. Weather Limitations: Proceed with installation when existing and forecasted weather conditions allow for assembly of this Work in accordance with manufacturer's written installation instructions.

PART 2 - PRODUCTS

2.01 PRODUCTS, GENERAL

- A. Provide sub-framing components and accessories from a single manufacturer to ensure material compatibility, uniformity, and sole-source responsibility for system performance and warranty.
- B. Components specified in this Section shall be manufactured in the United States of America.

2.02 MANUFACTURER

The CMH system is a best practice solution, and substitution requests should be evaluated carefully. Ensure structural equivalence and thermal performance match the specified system before considering alternates.

- A. Advanced Architectural Products (A2P):
 1. 959 Industrial Drive, Allegan, Michigan, 49010
 2. Phone: (269) 355-1818
 3. Website: www.GreenGirt.com
- B. Basis of Design Products:
 1. **SMARTci®** system.

2.03 PRODUCT DESCRIPTION

- A. Cladding Support System: High-performance building enclosure system designed to eliminate thermal bridging and support exterior insulation and cladding assemblies and composed of the following:
1. Non-metallic composite sub-framing members (Z-girts), mechanically fastened to structural framing.
 2. Sub-framing configured to receive rigid polyisocyanurate insulation panels with factory-applied dual foil facers and profiled edges to permit interlocking alignment.
 3. Integrated pressure-seal components to assist in maintaining continuity of air and water-resistive barriers.
 4. Assembly to provide continuity of thermal insulation and environmental control layers at the exterior wall.
 5. Insulation materials complying with ASTM E84, Class A surface burning characteristics.

2.04 SYSTEM COMPONENTS

A. **GreenGirt®** CMH™ Z-Girts:

1. Composite metal hybrid construction combining fiber-reinforced polymer with steel reinforced flanges with minimum thickness of 0.17 inches. Steel reinforcements to be G90 coated.

Review depth and select as appropriate for project from the following.

2. Depth: **(1.5) (2) (2.5) (3) (3.5) (4) (4.5) (5) (5.5) (6) (8)** inches.
3. Standard length: 8 feet.

Select horizontal or vertical installation as appropriate for project from the following.

4. Orientation: **(Horizontal) (Vertical)** installation:
 - a. Horizontal Spacing: **(16 inches) (24 inches) (32 inches) or (48 inches)** on center.
 - b. Vertical Spacing: **(16 inches) (24 inches) (32 inches) or (48 inches)** on center.

Manufacturer's standard color is green, but an optional black finish is available upon request

5. Color: Manufacturer's standard green.

B. Insulation Panels (Polyiso or XPS):

1. Insulation Panel Edges: Provide factory-profiled/routed edges on insulation panels that interlock with CMH system components. Back side of insulation must be flush with back side of **GreenGirt®** component and installed flat against the substrate. If insulation panels and **GreenGirt®** are the same depth, face of insulation must be flush with face of **GreenGirt®** component to create a smooth drainage plane.

Select Polyiso or XPS type insulation

2. Polyisocyanurate Panel Insulation:
 - a. Surface Burning Characteristics:
 1. Flame Spread Index (FSI): 25 or less when tested in accordance with ASTM E84.
 2. Smoke Developed Index (SDI): 450 or less when tested in accordance with ASTM E84.

- b. Comply with fire-resistance requirements as indicated on drawings and as part of an exterior non-load-bearing wall assembly, tested in accordance with NFPA 285.
 - c. Acceptable Products:
 - 1. Hunter Panels, LLC; Product Hunter Xci.
 - 2. DuPont; Product DuPont Thermax Sheathing.
 - 3. Substitutions: See Section 01 6000 – Product Requirements.
- 3. Extruded Polystyrene (XPS) Board Insulation:
 - a. Flame Spread Index (FSI): 25 or less when tested in accordance with ASTM E84.
 - b. Smoke Developed Index (SDI) 450 or less when tested in accordance with ASTM E84.
 - c. Acceptable Products:
 - 1. DuPont; Product Styrofoam XPS.
 - 2. Owens Corning Corporation; Product Foamular NGX.
 - 3. Kingspan Insulation, LLC; Product GreenGuard XPS.
 - 4. Substitutions: See Section 01 6000 – Product Requirements.
- C. Pressure Seals:
 - 1. Provide factory-integrated pressure seals within insulation panels to form dual, three-point compression seals at panel interfaces.
 - 2. Pressure seals shall enhance air and water resistance, ensure retention of insulation, and prevent thermal bridging or bypass.
- D. Continuous Insulation Accommodation:
 - 1. Girt profile shall be engineered to support continuous insulation applications in exterior wall assemblies. Composite Metal Hybrid (CMH) system shall include an integral **ThermaLock™** feature to retain insulation without separate mechanical fasteners.
 - 2. System shall maintain uniform insulation thickness over variable substrate conditions.
 - 3. Insulation retention design shall support compliance with thermal performance requirements of ASHRAE 90.1 and the International Energy Conservation Code (IECC).
 - 4. System shall accommodate rigid insulation boards in thicknesses from 1 inch to 8 inches.
- E. Structural Support: Manufacturer shall perform engineering analysis to determine the following:
 - 1. Structural capacity to support cladding systems in accordance with project loading requirements.
 - 2. Compatibility with multiple cladding attachment methods.

2.05 PERFORMANCE CHARACTERISTICS

Coordinate with design team to confirm project-specific wind load, dead load, and thermal requirements. Adjust safety factors or additional testing requirements as needed.

- A. System Performance Requirements: System shall meet the following:
 - 1. Minimize thermal bridging between structural framing and exterior cladding.
 - 2. Enhance continuity and effectiveness of the building thermal envelope.
 - 3. Maintain structural alignment and fastening integrity under design loads.
- B. Thermal Efficiency:

1. Cladding support systems shall contribute to assembly thermal performance with R-value retention between 92 and 99 percent by minimizing or eliminating thermal bridging.

C. Structural Capacity:

1. Fastener pull-out capacity shall meet or exceed the performance of 16-gauge cold-formed steel framing.
2. System shall exhibit a high strength-to-weight ratio suitable for vertical and lateral cladding loads.
3. Comply with structural design requirements of ASCE 7, including wind load and component/support criteria.
4. Fastener Creep and Durability Test: For fasteners anchored into an FRP substrate without metal backer/retention system, perform test in accordance with ASTM D7332 B, seven-day continuous fastener loading at the project's specified high service temperature of 180 degrees F.
5. The fastener thread pull-out test is to be performed for self-drilling screws anchored solely into an FRP substrate. Test with ASTM D7332-B fixture using a fixture with a clearance opening of 34mm (1.313") in diameter. The pulling yoke is to be attached to the fastener head, with the load transferring into the anchoring threads. Ramp loading for no less than 30 seconds and no more than 120 seconds.
 - a. Testing to be performed inside a climate chamber at a temperature of 180 degrees F for a period of 7 days at ultimate fastener load. Passing load values to be considered ultimate pull-out values for project engineering purposes.
 - b. Test for 5 samples at same loading and temperature without pull-out. Testing to be certified by independent 3rd party.
 - c. Test results of fastener head/thread pull-through performed at room temperature with static ASTM D7332-B are not considered valid for creep and durability testing and are not to be used for determining Tensile Properties.
6. Flexural Properties: Engineered lengthwise and crosswise flexural properties of CMH sub-framing comply with performance loading criteria and specified safety factors in accordance with ASTM D790.
7. Modulus of Elasticity: CMH sub-framing is engineered to meet performance loading criteria and specified safety factors in accordance with ASTM D638.
 - a. Lengthwise 29,000,000 psi and crosswise 3,300,000 psi, minimum.
 - b. Failure to provide tested crosswise material properties are cause for product rejection.

D. Air and Water Tightness:

Note: Closed framing installations may utilize Polyiso or XPS insulation

1. Closed framing installations shall achieve the following performance criteria:
 - a. Water penetration resistance up to 1.57 pounds per square foot (psf).
 - b. Air infiltration resistance up to 6 psf.

Note: Open framing systems may only be used with Polyiso insulation

2. Open framing installations shall achieve the following performance criteria:
 - a. Combined air and water resistance up to 20 psf.

E. Fire Resistance Ratings:

1. Provide CMH sub-framing support system with fire testing in accordance with ASTM E119 test methods and applied by approved testing agency acceptable to authorities having jurisdiction (AHJ).
2. Surface Burning Characteristics: Test in accordance with ASTM E84 test method for continuous insulation, composite metal hybrid (CMH), and interior surfaces as follows:
 - a. Flame Spread Index (FSI): 25 or less.
 - b. Smoke Developed Index (SDI): 450 or less.
3. Immediate Scale Multistory Fire Test: If required by code, comply with NFPA 285 and/or IBC acceptance criteria for wall height above grade and fire separation distances when wall type and other noted conditions require such testing or compliance with requirements as indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are clean, dry, structurally sound, and free from oil, grease, debris, or irregularities that would impair system performance.
- B. Ensure framing is installed to meet project tolerances for alignment and spacing per contract documents and manufacturer requirements.
- C. Confirm that environmental conditions are suitable for installation, including ambient temperature, wind conditions, and moisture levels.
- D. Verify compatibility and continuity with adjacent assemblies including sheathing, air/water barriers, fenestrations, and transitions.

3.02 PREPARATION

- A. Closed Framing:
 1. Ensure sheathing is flush, securely fastened, and continuous across the wall surface.
 2. Confirm water resistant barrier installation is complete, lapped per code, and fully adhered/sealed at all seams and penetrations.
- B. Open Framing:
 1. Ensure framing members are spaced and aligned per manufacturer's requirements (typically 16 or 24 inches o.c. max).
 2. Confirm that open framing does not require additional sheathing for system performance.

3.03 INSTALLATION, GENERAL

- A. Align and fasten **GreenGirt®** CMH Z-girts directly to framing or sheathing, using manufacturer-approved fasteners sized to penetrate the structural framing member.
- B. Install **SMARTci®** components in strict accordance with manufacturer's current published instructions and approved shop drawings.
- C. Maintain consistent spacing and alignment of Z-girts, both vertically and horizontally, to support insulation panels and cladding system per design load requirements.

3.04 INSULATION PANEL AND SEALS INSTALLATION

- A. Install pre-profiled **SMARTci®** polyisocyanurate insulation panels between Z-girts, ensuring tight fit with no visible gaps.
- B. Panels shall compress evenly against **ThermaLock™** or integrated seal components to create dual three-point compression seals at all interfaces.
- C. Apply manufacturer-specified pressure-sealing components as required to ensure continuity at joints, penetrations, and transitions.
- D. Cut insulation cleanly to fit around windows, doors, or mechanical penetrations, sealing all cuts with sealant or tape per manufacturer's instructions.

3.05 ADJACENT ASSEMBLY INTEGRATION/INSTALLATION

- A. Coordinate the installation of the **SMARTci®** system with air/vapor barriers, flashings, and transition membranes to maintain continuity of the building envelope.
- B. Integrate **SMARTci®** system with:
 - 1. Roof and foundation transitions
 - 2. Window and door openings (coordinate with rough opening details and back dams)
 - 3. Control joints, expansion joints, and deflection joints
- C. Ensure cladding attachment aligns with the Z-girt layout and complies with wind load requirements and fastener pull-out capacity.

3.06 FIELD QUALITY CONTROL

- A. Inspect system during and after installation for:
 - 1. Proper girt spacing and alignment
 - 2. Tight compression of insulation panels
 - 3. Secure mechanical fastening
 - 4. Integrity of sealant and pressure-seal components
 - 5. Continuity of insulation across entire surface with no voids or bypasses
- B. Conduct blower door testing or other air barrier validation if required by the project.
- C. Correct any deficiencies before proceeding with cladding installation.

3.07 CLEANING AND PROTECTION

- A. Remove construction debris from installation area.
- B. Protect installed **SMARTci®** components from damage caused by weather, other trades, and subsequent construction.
- C. Replace damaged or non-performing materials with new components as approved by the manufacturer.

END OF SECTION