SECTION 054023
THERMALLY INSULATED COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Manufactured, structurally engineered, thermally insulated, thermally-broken, cold-formed metal framing boxed channel assemblies for exterior perimeter wall framing, parapets, and roof curbs.

1. Insulated, thermally broken box header framing.
2. Insulated king boxed stud framing.
3. Insulated boxed header & sill framing
4. Connection plates.
5. Insulated boxed roof parapet and roof curb units and pre-insulated Skylight curbs.

B. Related Requirements:

1.	Section 054000	-	Cold-Formed Metal Framing: For installation of work of this Section
2.	Section 072113	-	Rigid Foam Board Insulation
3.	Section 072115	-	Semi-Rigid Mineral Board Insulation

1.2 REFERENCES

A. Reference Standards: Conform to provision of Section [014219 -] .

B. American Iron and Steel Institute (AISI): http://www.steel.org/

1.	AISI S100	-	North American Specification for the Design of Cold-Formed Steel Structural Members
2.	AISI S200	-	North American Cold-Formed Steel Framing Standard - General Provisions
3.	AISI S211	-	North American Cold-Formed Steel Framing Standard - Wall Stud Design
4.	AISI S212	-	North American Standard for Cold-Formed Steel Framing - Header Design
5.	AISI S213	-	North American Standard for Cold-Formed Steel Framing - Lateral Design
6.	AISI 911-08	-	Testing by Mayes Testing Laboratory, Lynnwood, WA.

C. ASTM International (ASTM): http://www.astm.org/

1.	ASTM A123	-	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2.	ASTM A653	-	Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
3.	ASTM A792	-	Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
4.	ASTM A875	-	Standard Specification for Steel Sheet, Zinc-5% Aluminum Alloy-Coated by the Hot-Dip Process.
5.	ASTM A1003	-	Standard Specification for Steel Sheet, Carbon, Metallic- and –Nonmetallic-Coated for Cold-Formed Framing Members.
6.	ASTM C272	-	Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions
7.	ASTM C203	-	Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation
8.	ASTM C303	-	Standard Test Method for Dimensions and Density of Preformed Block and Board–Type Thermal Insulation

9. ASTM C518 - Standard Test Method for Steady-State Thermal Means of the Heat Flow Meter Apparatus
10. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
11. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
12. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
13. ASTM C1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
14. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics
15. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
16. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics
17. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
18. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials

1.3 International Code Commission (ICC) Evaluation Services:

1. ICC ES AC46 - Acceptance Criteria for Cold-Formed Framing Members
2. ICC ES AC261 - Acceptance Criteria for Connectors used with Cold-Formed Steel Structural Members

B. Steel Stud Manufacturers Association (SSMA): Product Technical Information. http://www.ssma.com

1. SSMA ICC-ES Legacy Report ER-4943P, Revised Aug 2003 after revision.
2. SSMA Product Technical Information.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Conform to Section 013113 for coordination with work of related Sections.

1. Section 054000 for integrating and installing thermally insulated framing specified by this Section into cold-formed metal framing systems

1.5 SUBMITTALS

A. Conform to submittal requirements of Section 013300.

B. Product Data:

1. Detailed description and fabrication drawings showing configurations, and design criteria for each manufactured product specified by this Section (See website; envirobeam.com for drawings of Installation Instructions for each individual Enviro-Component).
2. Accessories: Include connection plates, and anchoring devices.
3. Light Gage Steel
4. Block Foam & Insulation filler material
5. Adhesive
6. Connection devices

C. Test Results: Include:

1. Structural: Base on AISI S100 Section F methodology by independent testing laboratory. Stamp and sign written report by licensed professional engineer, registered with [the State of Washington] (See Mayes Testing Test Reports included in KPFF Engineering Reports)
    a. Strong Axis in Bending.
    b. Weak Axis in Bending.
2. Thermal Resistance (R-Value) per Insulation Mfg published test data.

D. Structural Design Calculations: Stamp and sign by licensed professional engineer, registered with [the State of Washington].
1. Comprehensive analysis of design loads,

E. Thermal Resistance (R-Value): Insulation type and thermal properties for each fabricated assembly.

F. Manufacturer's Instructions: Include installation instructions, special procedures, and conditions requiring special attention.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:
1. Employ licensed professional engineering personnel experienced in work of this Section and registered in State of Washington.
2. Maintain locally available technical product representation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Conform to provisions of Section 016510 and manufacturers instructions.

B. Ordering: Conform to manufacturer’s ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials on manufacturer’s pallets with identification labels intact.

D. Deliver in bundles, clearly identified with manufacturer's labels intact. Verify undamaged conditions.

E. Store off ground and handle to keep clean, dry, and protected from damage due to weather and construction activities.

1.8 [FIELD CONDITIONS

A. Site Environmental Requirements: Do not install materials until site conditions conform to manufacturer installation instructions.]

B. Installers must strictly adhere to Manufactures written Installation Instructions

1.9 [WARRANTY

A. Cold Formed Framing: Manufacturer’s standard 20-year materials warranty covering defective materials of cold-formed metal framing members.]

B. Installers must strictly adhere to Manufactures written Installation Instructions

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Evolution 1, Envirobeam, specified as basis of design.
1. Cell (206) 455-1978, Email duane@envirobeam.com (Duane Den Adel, Operations Manager)
2. Cell (425) 344-1371, Email ron@envirobeam.com (Ron Den Adel, Production Manager)

3. Website http://www.envirobeam.com

B. Substitution Requests: Conform to provisions of Section 012500. Submit product data indicating conformance to specified provisions of this Section.

2.2 PERFORMANCE / DESIGN CRITERIA

A. See KPFF Engineering Reports ; Enviro-King June 2011, E-Header / Sill January 2012, E-Beam HD February 2012.

B. Thermal Insulation: [Semi-rigid mineral insulation board] [Expanded polystyrene insulation board (EPS)] [Extruded polystyrene insulation board (XPS)] Polyisosanurate insulation board.

1. Design thickness and type of insulation into system assembly.
2. Thermal analysis to be determined by thermal U-factor published by individual Mfg.Iinsulation type .

C. Load Bearing Cold Rolled Steel Framing Members: ASTM C955.

1. Minimum Effective Physical and Structural Properties: As published by the Steel Stud Manufactures Association (SSMA) Product Technical Information, conforming to ICC ER-4943P.
2. Grades:

a. ASTM A1003, Structural Grade 50 Type H (ST50H) (F_y = 50 ksi) for 97, 68, and 54 mil (12, 14 and 16 gauge) framing members.
b. ASTM A1003, [ASTM A792, or ASTM A875] Structural Grade 33 Type H (ST33) (F_y = 33 ksi) for 43 and 33 mil (18 and 20 gauge) framing members.

D. Hot-Dip Aluminum-Zinc Alloy-Coating: Galvanized ASTM A653 G60 [Hot-Dip Aluminum-Zinc Alloy-Coating: ASTM A792, Structural Steel (SS), Grade 50, Class 1 or 4, Coating Destination AZ55].

2.3 THERMALLY INSULATED COLD-FRAMED STEEL WALL PRODUCTS

A. Refer to Enviro-Beam Span Load Tables, suggested installation instructions, and parts list section properties.

1. Thermal Resistance (R-Value): Approximately R-4 per inch of wall thickness

B. E-Beam HD - Pre-Insulated Steel Header Beam:

1. Standard Widths: 6 and 8 inch.
2. Standard Depths: Varies.
3. Available Steel Thickness: 18 gauge (43 mil) through 12 gauge (97 mil).

C. E-Header Sill – Pre-Insulated Steel Header Sill: A lighter duty option to the E-Beam HD

D. E-King – Pre-Insulated Alternative To Standard Dual Stud:

1. Standard Depths: For 4, 6, and 8 inch wall depths.
2. Standard Width: 3 ¼”inch.
3. Available Steel Thickness: 20 gauge (33 mil) through 12 gauge (97 mil).

E. Connection Plate – Connection Plate with Pre-Punched Holes: Refer to manufacturer’s table.

1. Steel Grade: Minimum 33,000 psi.
2. Punched Holes: 25 each plate for No. 10 and No. 8 self-drilling, self-tapping screws.
3. Capacities: As published by manufacturer and as determined by professional engineer of record. [694 pounds to 2836 pounds, two plates on each side of header depending on screw placement, designed to AISI S100 (NAS) 2001 <2012 is current edition> Section E4.3 (Shear).]
4. Thickness: 16 or 14 gauge (54 or 68 mils).

5. Width: 7-1/2 inch.
6. Height: 5-1/2 and 7-1/2 inch.

2.4 THERMALLY INSULATED COLD-FRAMED ROOFING PRODUCTS

A. E-Roof Curb:

B. E-Skylight Curb:

C. E - Mechanical Curb.

2.5 FASTENERS, , CONNECTORS, ANCHORAGE, AND ACCESSORIES

A. Steel Drill Screws: Corrosion-resistant with minimum 3/8 minimum penetration into steel members.

1. Steel Tapping Screws: ASTM C1513 for steel framing connections.
2. Steel Drill Screws: ASTM C954 for connections of gypsum panel products to steel framing members

B. Connector and Anchorage Devices:

1. Power driven and powder actuated anchors, bolts, nuts, and washers [as shown on Structural Drawings, or] as accepted for transfer of design loads, conforming to ICC ES AC308.
2. Galvanize to 1.25 ounce psf conforming to ASTM A123.

2.6 THERMAL INSULATION CORE

A. Semi-Rigid Mineral Insulation Board:

Property	Result	Test Method
Density	4 psf [8 psf] [13 PSF]	ASTM C303
Thermal Resistance (R-Value) at 75 degrees F	R - 4.3 per inch	ASTM C518
Water Vapor Transmission (desiccant method)	30 - 50 perms	ASTM E96
Combustion Characteristics	Non-Combustible	ASTM E136
Surface Burning Characteristics	UL 723 / IBC Class A	ASTM E84
Flame Spread	0	
Smoke Developed	0	
Moisture Resistance	Non-hydroscopic (does not absorb/hold water)	
Sorption	0.03 percent[1] or less	ASTM C1104
Absorption	1.0 percent or less	ASTM E136
Fungi and Bacteria	Does not promote growth	ASTM C1338
Corrosion Resistance	Passes	ASTM C665

[1] ASTM C1104 specifies less than 1 percent.

****OR****

B. Expanded Polystyrene (EPS) Insulation Board: ASTM C578, Type IX.

Property	Result	Test Method
Compressive Resistance	25 psi	ASTM D1621
Thermal Resistance (R-Value) @ 75 degrees F	4.2 per inch	ASTM D518 or ASTM C177
Flexural Strength	50 psi	ASTM C203
Water Vapor Permeance	2.5 perms	ASTM E96
Water Absorption	2 percent	ASTM C272
Dimensional Stability	2 percent max	ASTM D2126
Density	1.60 pcf	ASTM C303
Flame Spread	Less than 20	ASTM E84

Smoke Developed	150-300	ASTM E84

****OR****

C. Extruded Polystyrene (XPS) Insulation Board: ASTM C578, Type IV.

Property	Result	Test Method
Compressive Resistance	25 psi	ASTM D1621
Thermal Resistance (R-Value) @ 75 degrees F	5.0 per inch	ASTM D518 or ASTM C177
Flexural Strength	50 psi	ASTM C203
Water Vapor Permeance	1.5 perms	ASTM E96
Water Absorption	0.3 percent	ASTM D2842
Dimensional Stability	2 percent max	ASTM D2126
Density	1.55 pcf	ASTM C303
Maximum Use Temperature	165 degrees F	

2.7 ACCESSORIES

A. Typically for Field conditions encountered and the responsibility of the installer of Evolution 1 / Enviro-Beam Components. Evolution 1 LLC is not responsible for these conditions. The Field Installer is required to strictly adhere to Evolution 1 Installation Instructions for each individual Enviro-Component published on the envirobeam.com web site

B. Galvanic Protection: Utilize tapes and other methods as necessary to separate and prevent contact between dissimilar metals.

C. [Insulation Board Joint Tape: Dow Chemical Company, WEATHERMATE, 6 inch and 9 inch wide butyl adhesive tape, or equal and as instructed by manufacturer.]

D. [Insulation Board Gap Filler: Dow Chemical Company, FROTH-PAK, two-component, quick-cure polyurethane foam, or equal and as instructed by manufacturer.]

E. See Installation Instructions for Enviro-Roof Curbs regarding sheet metal covers for safety rail posts and exposed corner conditions.

2.8 SOURCE QUALITY CONTROL

A. Single Source Responsibility: Furnish engineered design and fabrication by or under direct responsibility of single manufacturer; Evolution 1 LLC.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify conditions ready to receive work of this Section before beginning.

3.2 PREPARATION

A. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.

3.3 INSTALLATION

A. Conform to manufacturer's instructions, ASTM C1007, and provisions of Contract Documents.

B. Strictly Adhere to Evolution 1 LLC Installation Instructions published on envirobeam.com web site for each individual Enviro-Component.

C. Touch-up shop-applied protective coatings damaged during handling and installation.

3.4 ERECTION TOLERANCES

A. Maximum Framing Member Variation from True Position: 1/8 inch.

B. Maximum Framing Member Variation from Plane:

1. Individual Framing Members: Do not exceed 1/8 inch in 10 foot.
2. Accumulative Over-all Variation for Wall and Floor System: Do not exceed 1/8 inch.

C. Conformance subject to Project Architect and General Contractor for Individual Projects

3.5 FIELD QUALITY CONTROL

A. Manufacturer’s Field Technical Service:.

1. Evolution 1 Field Technical Service available on request for site visits to be paid for by the requester, typically the General Contractor, Project Architect or the Owners Rep.

3.6 ADJUSTING

A. Inspect and adjust after installation. Replace or repair defective work.

END OF SECTION