Thermal and Air Barrier Wall System with CI-GIRT and Metal Support Framing/Attachment and Finish Panel System

PART 1 – GENERAL

DISCLAIMER: The manufacturer has reviewed the product information contained in this short form specification. The information is organized and presented to assist the specification writer working on a construction project to select the appropriate products and to save time in writing the project specification Section. The specification writer is responsible for product selection as well as the use and application of this information, and should contact the manufacturer to ensure that all options are available and that the associated specification information is valid and correct.

1.01 SUMMARY

A. Provide a thermal and air barrier wall system for exterior cold-formed metal wall assemblies. Work includes:
   1. Provide exterior wall insulation.
   2. Provide interior spray polyurethane foam.
   3. Provide cold-formed metal support framing / attachment system and finish panel creating a true continuous exterior-insulated rain screen wall assembly.

B. Related Sections:
   1. Section 05 40 00 Cold-Formed Metal Framing: Load-bearing, metal exterior wall framing assemblies.
   2. Section 06 10 00 Rough Carpentry
   3. Section 07 21 00 Thermal Insulation
   4. Section 07 25 00 Air Barriers
   5. Section 07 62 00 Sheet Metal Flashing and Trim
   6. Section 07 92 00 Joint Sealants
   7. Section 09 21 16 Gypsum Board Assemblies: Interior gypsum board wall finish.

1.02 REFERENCES

A. Reference standards: Current edition at date of bid of drawings, requirements of the General Conditions, Supplementary Conditions, and Division 1, General Requirements.
1. ASTM International (ASTM):
   a. ASTM C203-[99]: Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
   b. ASTM C209-[98]: Test Method for Cellulosic Fiber Insulating Board.
   e. ASTM C1289-[06]: Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
   g. ASTM D1622-[03]: Test Method for Apparent Density of Rigid Cellular Plastics.
   h. ASTM D2126-[99]: Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
   i. ASTM E84-[05]: Test Method for Surface Burning Characteristics of Building Materials.
   k. ASTM E331-[00]: Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference
   l. ASTM E 2357-[05]: Test Method for Determining Air Leakage of Air Barrier Assemblies.
2. Factory Mutual (FM):
   a. FM 4880: Class I Wall and Ceiling Panels Building Corner Fire Test.
3. Underwriters Laboratories Inc. (UL):
   a. UL 723: Surface Burning Characteristics of Building Materials.
B. American Iron and Steel Institute (AISI)
   1. Code of Standard Practice
   2. TS-1-02 Rotational-Lateral Stiffness Test Method for Beam-to-Panel Assemblies.
   3. TS-3-02 Standard Methods for Determination of Uniform and Local Ductility.
   4. TS-4-02 Standard Test Method for Determining the Tensile and shear Strength of Screws.
   5. TS-5-02 Test Methods for mechanically Fastened Cold-Formed Steel Connections.
C. American Society for Testing and Materials (ASTM)
   1. A 653-06 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc- Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
   6. C 1513 Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Members.
   7. D 294 Method of Tumbler Test for Coke.

1.3 SYSTEM DESCRIPTION/PERFORMANCE REQUIREMENTS
A. Furnish and install an exterior wall system that effectively controls thermal, air and water performance and provides continuity of the building envelope enclosure. The system shall include the following:
   1. Insulated sheathing secured to the exterior of the metal wall framing assembly.
   2. Spray polyurethane foam applied to the interior wall cavity.
   3. Joint, penetration and gap sealing material for sealing component joints, penetrations through the wall system and gaps between the building envelope enclosure components and wall opening frames.
B. Performance Characteristics:
   1. Thermal performance:
      a. Exterior insulation: ASTM C518, Stabilized R-value of 6.5 per inch of thickness with a minimum six month exposure capability to outdoor elements [and 15 year thermal warranty].
      b. Interior spray polyurethane foam: ASTM C518, 140 degree F/90 day Aged R-Value (measured at 75 degree F Mean Temp.), for product with a minimum 30 degree F ambient and substrate application temperature is R6.1/inch and 140 degree F/90 day Aged R-Value (measured at 75 degree F Mean Temp.), for product with a minimum 45 degree F ambient and substrate application temperature is R6.4/inch and 140 degree F/90 day Aged R-Value (measured at 75 degree F Mean Temp.), for product with a minimum 60 degree F ambient and substrate application temperature is R6.1/inch.
   2) Core density: ASTM D1622, Minimum 2.0 pcf.
   2) Acceptable adhesion to substrate based on specific minimum application temperature
   2. Air barrier performance: When tested in accordance with ASTM E2357, at a test pressure of not less than 6.24 psf, air infiltration shall not exceed 0.04 cfm per square foot (0.2 L/s*m2) of fixed wall area. Testing should be conducted at positive and negative sustained wind loading of 12.5psf (600Pa) for one-hour duration in each direction, pressure cycling of the wall at 2000 cycles in both the positive and negative direction, ending with wind gust loading at 25psf.
3. Water penetration: When tested in accordance with ASTM E331, no uncontrolled water penetration shall occur at a minimum differential pressure of 6.24 psf for minimum test duration of 2hrs.

D. Fire Resistance:
2. Fire-stopping measures, per code, should be included at the floor line in the stud cavity when the wall assembly extends beyond the edge of the floor line.

E. All joints, penetrations and gaps of the thermal [and air barrier] wall system shall be made watertight [and air-tight].

F. Structural Design: Exterior/interior wall cladding assemblies capable of withstanding effects of load and stresses from dead loads, wind loads, snow loads and normal thermal movement without evidence of permanent defects of assemblies or components.
1. Dead Load: As required by (applicable building code) ________.
2. Live Load: As required by (applicable building code) ________.
3. Wind Load: Uniform pressure (velocity pressure) of (Insert Design Criteria) lb/sq ft. (Insert Design Criteria), acting inward or outward.
4. Thermal Movements: Provide assemblies that allow for thermal movements resulting from following maximum changes (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components and other detrimental effects:
a. Temperature Change (range): 120 degrees F (67 degrees C), ambient: 180 degrees F (100 degrees C), material surfaces.
b. Panel joints shall allow movement of panels during expansion and contraction while preventing uncontrolled penetration of moisture.
5. Manufacturing, installation, and sealing shall prevent deformation of exposed surfaces.
6. Design panel system to accommodate substructure tolerance of +0 to -1/4 inch.

G. Frequency and spacing of vertical box girts as shown on shop drawings.

H. Additional horizontal “J” mounting track may be required where panel size, penetrations, or vibration and loading dictate.

I. Preformed metal Panel System: Withstand code-imposed design loads, maximum allowable deflection of span: L/175.

J. Panel System Water Penetration: No uncontrolled water penetration as defined in test method when tested to ASTM E 331 at inward static pressure differential of not less than 6.24 psf and not more than 12.0 psf.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s product data and installation instructions for each thermal wall [and air barrier] system component product required. Submit Manufacturer’s product literature and descriptions of testing performed on system components to indicate that they will meet or exceed performance specified herein. Include information and samples of wall panels and fasteners.

B. At bid submission, provide the following evidence to the Architect:
1. Thermal and Air Barrier Wall System Manufacturer Contractor Accreditation
   a. Acceptable Accreditation Methods:
      1) Dow THERMAX™ Wall System Accreditation Program & Knight Wall System – CI-Girt
      2) Or Equal

C. Reports:
1. Submit Test Reports, summarized by Manufacturer of material(s), verifying qualities of thermal [and air barrier] wall system components meet or exceed specified requirements.
   a. Include results of ASTM E2357 air barrier system testing and ASTM E331 water penetration tests.
   b. Include mill certificates indicating steel framing sheet complies with the specified requirements.
2. Submit Field Inspection and Test Reports in accordance with Field Quality Control requirements

D. Samples: Submit following material samples.
1. Insulation panel, 12” square.
2. Insulation fasteners/washers and joint flashing tape, one each.
3. Manufacturer’s color charts showing full range of colors available for units with factory-applied color finishes.
4. Wall panel, 12” square
5. Two 12” vertical box girts and horizontal “J” rail

E. Submit Material Safety Data Sheets (MSDS) for thermal, air barrier wall system components.

F. Sample Warranty: submit, for Owner acceptance, manufacturer standard warranty documents executed by authorized company official.

G. Structural Calculations: Submit comprehensive analysis of design loads, including dead loads, live loads, wind loads and thermal movement.
H. Shop Drawings: Shop drawings from manufacturer, signed and sealed by suitably qualified licensed engineer detailing system installation/attachment.

1.5 QUALITY ASSURANCE

A. Spray Polyurethane Foam Installation: Spray polyurethane foam installer shall be accredited by Thermal and Air Barrier Wall System manufacturer.

B. Installer Qualifications for spray polyurethane foam and air barrier:
1. The air barrier Installer shall be, during the award period as well as for the duration of the installation, officially recognized as a Certified Installer by the Thermal and Air Barrier Wall System Manufacturer (Certified Installer). The Certified Installer shall carry liability insurance and bonding.
2. Each worker who is installing air barriers must be, or accompanied by, a Certified Installer.
3. Each Certified Installer can supervise a maximum of five workers. The Certified Installer shall be thoroughly trained and experienced in the installation of air barriers of the types being applied. Certified Installers shall perform or directly supervise all air/vapor barrier work on the project.
4. Certified Installers shall have their Thermal and Air Barrier Wall System Manufacturer Certification photo-identification cards in their possession and available on the project site, for inspection upon request.

C. Installer Qualifications for rain screen attachment wall system.
1. In good standing with manufacturer as qualified installer for work of the Section.
2. Superintendent or foreman overseeing installation on site during work of this Section.
3. Able to document completed projects of equivalent scope and quality upon request by Architect.

D. Manufacturer’s Qualifications for rain screen attachment wall system:
1. Minimum 5 years experience manufacturing wall panels similar to those specified. Demonstrate conformance to testing requirements.
2. Design shall be provided by a professional engineer experienced in the design of curtain wall systems and licensed in the applicable State.
3. Design of anchors and fasteners for attachment to substrate shall be provided by professional engineer licensed to practice in the applicable State.

E. Pre-installation Meeting: Prior to commencement of application of spray polyurethane foam review and documentation methods and procedures related to installation, including the following:
2. Review metal wall framing assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
3. Review insulated sheathing, spray polyurethane foam methods/procedures related to application, including manufacturer’s installation guidelines, Thermal and Air Barrier Wall System Manufacturer’s Certification Program and rain screen attachment wall system and finish panels.
4. Review construction schedule and confirm availability of products, applicator personnel, equipment and facilities.
5. Review governing regulatory requirements, and requirements for insurance and certificates as applicable.
6. Review field quality control procedures.

F. Mock-Ups:
1. Mock up complete system at location as directed by Architect.
2. Provide as required to illustrate substrate, framing, insulation, panel, corner return and penetrations, and to allow for approval of exterior finishes and aesthetic appearance.
3. Verify mock-up as conforming to manufacturer’s instructions and provisions of Contract Documents.
4. Do not begin work of this Section until after inspection by manufacturer’s representative is complete and mock-up has been accepted in writing by Architect.
5. Protect and maintain accepted mock-up as standard of quality for work of this Section.
6. Accepted mock-ups may be incorporated into the work of this Section.

G. Field measurements: Verify actual supporting and adjoining construction before fabrication: record field measurements on project record shop drawings.

H. Established Dimensions: Where field measurements cannot be made without delaying work, guarantee dimensions and proceed with fabrication of wall panel assemblies corresponding to established dimensions.
1.6 DELIVERY, STORAGE AND HANDLING
A. Deliver Thermal, Air Barrier Wall System materials and Rain Screen Wall System in Manufacturer’s unopened containers or bundles, fully identified by name, brand, type and grade. Exercise care to avoid damage during unloading, storing and installation.
B. Store, protect and handle Thermal, Air Barrier and Rain Screen Wall System materials in accordance with the Manufacturer’s recommendations to prevent damage, contamination and deterioration. Keep materials clean, dry, free of dirt and other foreign matter.

1.7 PROJECT CONDITIONS
A. Environmental Requirements: Install Thermal, Air Barrier and Rain Screen Wall System work only when weather conditions are in compliance with Manufacturer’s specific environmental requirements and conditions will permit work to be performed in accordance with Manufacturer’s recommendations and warranty requirements.
B. Spray polyurethane foam:
   1. Do not proceed with installation of spray polyurethane foam until sheathing substrate construction is complete and openings and penetrating items have been installed and sealed.
   2. Do not proceed with installation of spray polyurethane foam until substrate surface temperatures accepting the spray polyurethane are above the manufacturer’s recommended minimum surface temperatures.
   3. Verify that substrate surfaces to receive spray polyurethane foam are free of frost, oil, grease, oxidation, dirt, loose paint, loose scale, or other deleterious material that would impair bond.
   4. Do not apply spray polyurethane after the 6 months expiry date printed on the label of each container.
   5. Ventilate area to receive spray polyurethane foam by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain nontoxic, unpolluted, safe working conditions.
   6. Provide temporary enclosures to prevent spray and noxious vapors from contaminating air beyond application area.
   7. Protect workers as recommended by spray polyurethane foam manufacturer.
   8. Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.
   9. Dispose of waste foam daily in location designated by Architect [Engineer] and empty drums in accordance with foam manufacturer’s instructions.
C. Rain Screen Wall System:
   1. Site Environment Requirements: do not install materials unless site conditions are as recommended in manufacturer’s literature.
   2. Coordinate construction to ensure that panel assemblies fit properly to supporting and adjoining construction: coordinate schedule with construction in progress to avoid delaying work.

1.8 WARRANTY
A. Submit the following warranties:
   1. Exterior insulation warranty: Six month exposure [and 15 year thermal warranty].
   2. Flashing Tape: Limited Warranty
   3. Spray Polyurethane Foam: Limited Warranty
   4. Rain Screen Wall System Warranty: Standard 20 year materials warranty covering defective materials of cold formed metal framing system and panel attachment. Contractor: 1-year labor warranty, starting from (date of Owner acceptance of work) (substantial Completion), to cover repair of materials found to be defective due to installation errors.

PART 2- PRODUCTS
2.1 INSULATION
A. Exterior Insulation: Glass-fiber-reinforced enhanced polyisocyanurate foam core sheathing faced with nominal 4 mil embossed white or blue acrylic-coated aluminum on one side and 1.25 mil embossed aluminum on the other side, complying with ASTM C1289 and meeting the following physical properties:
   1. ASTM C1289 Type 1, Class 2
   3. Aged Thermal Resistance (ASTM C518, measured at Mean Temp of 75F): [R-6.5 at 1 inch] [RSI 1.06 per 25 mm] of thickness [with 15 year thermal warranty]
   6. Water Vapor Permeance (ASTM E96): <0.3 perms.
   7. Maximum Use Temperature: 250 degrees F.
B. Acceptable Products: The Dow Chemical Company “THERMAX™ Ci Exterior Insulation.”
   1. Panel Size: 4’-0” wide x 8’-0” [12’-0”] long, square edge, shiplap (shiplap on thickness of 1.55” and greater) panels.
   2. Thickness and Stabilized R-Value: Nominal 0.625 inch thickness, R-4.1 [1.0 inch thickness, R-6.5] [1.55 inch thickness, R-10.1] [2 inch thickness, R-13.0] [2.5 inch thickness, R-15.8] [3 inch thickness, R 19]
   a. Acceptable Products: The Dow Chemical Company “WEATHERMATE™ Straight Flashing 4 inch width with butyl rubber adhesive
3. Wall Opening Flashing: Provide insulated sheathing manufacturer’s recommended flashing sealing window and door wall openings.
   a. Acceptable Products: The Dow Chemical Company “WEATHERMATE™ Straight Flashing 6 inch and 9 inch”, with butyl rubber adhesive, at straight opening heads, jambs and sills
   b. When greater widths are required for through wall flashings butyl rubber adhesive is recommended.

   b. Acceptable Products: The Dow Chemical Company “GREAT STUFF PRO™” Window & Door single-component polyurethane low-pressure foam sealant

5. Gap Air Infiltration Filler: Two Component, Quick Cure Polyurethane Foam:
   a. Acceptable Products: The Dow Chemical Company FROTH-PAK™ Foam Insulation two component, quick-cure polyurethane foam
      1) NFPA 286 Approval for Exposed use to the interior of the building without the need for a 15-min thermal barrier
      2) ASTM E-84 Class A

2.2 SPRAY POLYURETHANE FOAM AIR BARRIER
A. Spray Polyurethane Foam: Two-component spray polyurethane cellular plastic foam, complying with the following methods and meeting the following physical properties:
   4. Smoke Developed (ASTM E84, Class A): 450 or less.
   5. Compressive Strength minimum (ASTM D1621, 10% parallel to rise): [20 psi] [182 kPa].
   6. Closed Cell Content (ASTM D2856): minimum 90 percent.
   8. Water Vapour Permeability maximum. (ASTM E96): [3.0 perm-inches] [4.4 ng/(Pa.s.m)].

B. Acceptable Products: The Dow Chemical company STYROFOAM™ Spray Polyurethane Foam Insulation [CM2030], [CM 2045], [CM2060]. Formulation required will be dependent upon surface temperature of substrate. Refer to manufacturers recommendations
   1. STYROFOAM Spray Polyurethane Foam Insulation CM2030:
      b. Maximum/Nominal 1.5 inch thickness: Thermal Resistance (ASTM C518): 140degreeF/90day Aged R-Value, measured at 75F mean Temp: R9.2
2. STYROFOAM Spray Polyurethane Foam Insulation CM2045:
   a. Thermal Resistance (ASTM C518): 140 \degree F/90day Aged R-Value, measured at 75\degree F mean Temp: Minimum R6.4/inch.
   b. Maximum/Nominal 1.5 inch thickness: Thermal Resistance (ASTM C518): 140 \degree F/90day Aged R-Value, measured at 75\degree F mean Temp: R9.6

3. STYROFOAM Spray Polyurethane Foam Insulation CM2060:
   a. Thermal Resistance (ASTM C518): 140 \degree F/90day Aged R-Value, measured at 75\degree F mean Temp: Minimum R6.1/inch.
   b. Maximum/Nominal 1.5 inch thickness: Thermal Resistance (ASTM C518): 140 \degree F/90day Aged R-Value, measured at 75\degree F mean Temp: R9.2

2.3 RAIN SCREEN WALL SYSTEM
A. Manufacturers: Knight Wall, 28308 N. Cedar Road, Deer Park, WA 99006.
   a. Knight Series Panel System.
   b. Knight Wall Systems thermally broken CI-System support / attachment framing system with no thermal bridges.

B. Materials:
   1. Panel Module Dimensions: (__________________).

C. Cold Formed metal Framing:
   1. Provide [minimum grade G90 electro-galvanized steel with a minimum of 0.9 oz of zinc per square foot] [Galvalume steel, ASTM A792, with a minimum grade of AZ50 and nominal coating weight of 0.5 oz per square foot (total both sides)] of gauge and spacing required to comply with metal wall panel's structural requirements as recommended by the panel manufacturer and engineer of record in accordance with approved shop drawings.
   2. Vertical Box Girt: Minimum 0.0475-inch thick (18 gauge) cold formed steel.
      a. Dimensions: 2.0 inches wide by 0.75 inches deep:
      b. Attachment:
         1. Pre-drilled holes at 8 inches on center to receive fasteners and thermally isolated washer assembly for attachment to substructure.
         2. Regularly space, threaded holes in vertical box girt indented to double thickness of metal at opening to facilitate M8 screw attachment of horizontal "J" rail.
      c. Horizontal J Track: Nominal 0.0475 inch thick (18 gauge) cold formed steel.
         1. Dimensions: 0.75 inches at base with 1.125 inch and 1.875 inch legs.
         2. Weep Drains: 0.75 inch diameter along base to allow for drainage.

D. Accessories:
   1. Fasteners: Stainless steel as instructed by panel manufacturer.
      a. M8 hex socket screws to be used to attach horizontal "J" track to vertical box girt.
      b. No. 12 stainless steel self-drill hex-head screw fasteners and washers to be used to attach box girt back through minimum 25 psi rigid insulation to steel stud wall assembly:
         1) Of sufficient length to provide solid attachment through insulation to substructure as indicated on shop drawings.
   2. Flashing: 0.032 minimum thickness
      a. Material, color, and finish to match adjacent wall panels.
      b. Confirm to provisions of Section 07 60.00.
      c. Provide custom metal flashing shapes to suit conditions.
      d. Secure using concealed fasteners.
      e. Cutting and fitting:
         1) Make all cuts neat, square, and true.
         2) Saw-cut panels, de-burr edges, and clean filings from adjacent surfaces.
      3. Galvanic Protection: Utilize tapes and other methods as necessary to separate and prevent contact between dissimilar metals.
      4. Sealants: Conform to section 07 92 00 and manufacturers instructions

E. Fabrication:
   1. Panel Dimension: Allow for field adjustments, as instructed by manufacturer, where final dimensions cannot be established by field measurement before completion of panel manufacturing.

F. Finishes:
   1. Conform to NAAMM Metal Finishes Manual for architectural metal products recommendations for applying and designating finishes.
      a. Panel Finishes: As selected by (owner) (Architect) from manufacturers standard line.
   2. Color: As selected by (Owner) (Architect) from manufacturer’s standard colors.
G. Metal Coating Performance:
3. Cure Test – NCCA 11-18, withstand 50+ double rubs of MEK.
4. Humidity Resistance – ASTM D2247-87, no blisters after 3000 hours of 100 percent humidity at 95 degrees F.
5. Salt Spray Resistance – ASTM B117-85, after 3000 hours of exposure to 5 percent slat fog, at 95 degrees F, scored sample shall show none or few #* blisters, and less than 1/8-inch average creepage from scribe.
7. Chalking Resistance – ASTM D659-86, no chalking greater than #8 after 10 years Florida exposure at 45 degrees south.
8. Color Change – ASTM D2244-74, not exceeding 5 NBS units after 10 years Florida exposure at 45 degrees south.
9. After 5000 hours in Atlas weatherometer, coating shall show no objectionable chalking or color change.
10. Abrasion Resistance – ASTM D968-81; coating shall resist 65+/− 15 liters/mil minimum of falling sand.

PART 3 – EXECUTION

3.1 EXAMINATION
A. Examine substrates and installation conditions for compliance with requirements for installation conditions affecting performance of the work.
1. Verify that metal wall studs, opening framing, bridging, bracing and other framing support members and anchorage have been installed within thermal wall system alignment tolerances and requirements.
2. Verify that substrate surfaces to receive spray polyurethane foam are free of frost, oil, grease, oxidation, dirt, loose paint, loose scale, or other deleterious material that would impair bond.
3. Verify that items required to penetrate the thermal wall system are placed and penetration gaps and cracks are properly sealed before installation of spray polyurethane foam.
4. Do not proceed with thermal and air barrier wall system installation until unsatisfactory conditions have been corrected.
5. Panel Substructure: Verify level and plumb, free of defects detrimental to work and erected in conformance with established building tolerances.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.2 INSULATION INSTALLATION
A. Install insulation in accordance with manufacturer’s recommendations. Fasten to exterior face of exterior metal stud wall framing using sheathing manufacturer’s recommended type and length screw fasteners with washers. Abut panels tightly together and around openings and penetrations.
1. Install sheathing panels horizontally with blue aluminum facing to exterior. Use maximum lengths to minimize number of joints. Locate edge joints parallel to and on framing. Center end joints over supports and stagger in each course. Provide additional framing wherever panel joints do not bear against framing, plates or sill members.
2. Fasten panels to each support with fasteners spaced 12 inches on center at perimeter and 16 inches on center in panel field. Set back perimeter fasteners 3/8” from edges and ends of panel units. Drive fasteners to bear tight and flush with surface of insulation. Do not countersink. Perimeter fasteners can be detailed to bridge the gap of abutting board joints due to the 1.75” diameter of the washer used to fasten the board to the studs. Maximum of two board joints may be bridged per fastener.
3. Install flashing joint tape at end and edge joints with sufficient hand pressure to ensure seal and in accordance with sheathing manufacturer’s joint sealing recommendations.
4. Install flashing tape behind wall tie and mechanical fastening assemblies for rain screen claddings.
5. Seal sheathing joints and penetrations of sheathing in accordance with sheathing manufacturer’s joint and penetration sealing recommendations.
6. After base flashing, which may include a termination bar running horizontally along the top edge of the flashing, is installed on exterior of insulated sheathing, install WEATHERMATE™ Flashing 6 inch or 9 inch”, with butyl rubber adhesive to the exterior sheathing and lapped over the top edge of the base flashing.
3.3 SPRAY POLYURETHANE FOAM INSTALLATION

A. Preparation
1. Mask and cover adjacent areas to protect from overspray.
2. Apply primers for special conditions as recommended by manufacturer.
3. Cover wide joints with transition sheet membrane as specified in Section 07 27 50
4. Clean work area prior to application of sprayed insulation.
5. Verify substrate temperature meets manufacturer’s requirements for specific formulations used.
6. Ensure that all stud cavity fire-stopping is installed prior to application of spray foam.

B. Application: Spray apply polyurethane foam in accordance with ASTM C1029 and manufacturer’s installation guidelines; complying with preparation methods outlined in 3.3.A.
1. Apply spray polyurethane foam by picture framing around the interior studs at the insulated sheathing – steel stud interface and one pass across all board joints and penetrations.
2. Finish applying spray polyurethane foam with one pass not exceeding 1.5 inches in thickness. Two passes are acceptable to reach maximum thickness of 1.5 inch.
3. If more than one layer is being applied, allow the layer applied first to cool to the max. substrate temperature or less recommended for the STYROFOAM™ Spray Polyurethane Foam Insulation (CM Series).
4. Avoid formation of sub-layer air pockets.
5. Apply spray polyurethane foam in overlapping layers, in a manner to obtain a smooth, uniform surface. Total thickness as indicated.
6. Maintain 3 inch [75 mm] clearance around chimneys, heating vents, steam pipes, recessed lighting fixtures and other heat sources.
7. Do not apply spray polyurethane foam to inside of exit openings or electrical junction boxes.
8. Maintain a continuous layer of spray foam from floor to floor to roof to complete air barrier.

9. Site Tolerances: Maximum Variation in Applied Thickness - minus [1/4 inch] [6 mm], plus [5/8 inch] [10 mm].

C. Field Quality Control. Submit spray polyurethane foam field inspection and test reports for the following:
1. The Certified Installer shall complete the Daily Work Record and record all information required including the results of the testing. The Daily Work Record shall be kept on site for routine inspection. Copies of the Daily Work Record shall be forwarded to the manufacturer, owner or owner’s representative upon request.
2. The costs incurred for daily testing and inspection by the Certified Installer and the completion of the Daily Work Record shall be borne by the Accredited Contractor.
3. If required by the owner, arrange for site inspections by a qualified third party inspector. The frequency and cost of inspections shall be included in the bid at the owner’s request. If the site inspection reveals any defects, the Accredited Contractor shall immediately rectify all such defects at his cost.
4. The Certified Installer’s daily work record shall verify conformance with the Thermal and Air Barrier Wall System Manufacturer’s instructions, the standard ULC S705.2-02 Installation standard and this section of the project specification.
   a) Follow Manufacturer guidelines for proper temperature settings regarding spray equipment as stated on Manufacturer product information sheets.
   b) Follow Manufacturer guidelines for proper spray polyurethane foam formulation based on substrate and ambient temperatures product will be applied to.
   c) Test completed application daily for core density and cohesion/adhesion to substrate. Record results daily in test reports.
   d) After product has properly cured, conduct tests to verify adhesion between the spray polyurethane foam and the substrate.
   e) Conduct adhesion tests on all corners and building angles, at wall-to-slab junctions, and at wall-to-roof junctions.
   f) Perform one adhesion test for every wall less than [100 feet] [30 meters] in length. Perform two tests for every wall greater than [100 feet] [30 meters] and less than [200 feet] [60 meters] in length, with an additional test conducted for every additional [100 feet] [30 meters], or part thereof, in wall length.
   g) Transition membranes shall be pull tested in accordance with the Certified Installer training program requirements before installing the spray polyurethane air barrier material.

3.4 Cold Metal Framing Installation:
A. Use a laser or chalk line to mark starting height of vertical box girt.
B. Mount vertical box first at 16 or 24 inches on center (as determined by the engineer of record) overtop of installed rigid insulation, using one self-tapping screw for each attachment hole or for every second attachment hole in box girt, as indicated on shop drawings.
1. Check plumb of vertical girts both parallel and perpendicular to the structure. Use slots in girt to ensure parallel alignment of face of framing.
2. Tighten screws that attach vertical girt through insulation to substructure to 95 in/lbs of torque. If installed using hand tools, verify for each installer at beginning of project using snug tight criteria.
3. Where vertical obstructions are present and unavoidable (i.e. window openings), use laser or chalk line to restart vertical girt, ensuring horizontal alignment of screw holes for horizontal "J" track.

C. Mount lowest (first) horizontal "J" track to lowest holes in vertical box girt using M8 screws. Install next "J" track appropriately above the lowest (first) "J" track, as indicated on shop drawings, such that a bearing surface will be created for proper pane attachment and the successive panel above may be attached. Tighten to between 90-100 in/lbs of torque. Verify equivalent snug tight condition for installers using hand tools.
   1. Install successive horizontal "J" tracks as indicated on shop drawings for proper panel alignment.
   2. When encountering windows and other openings, mount horizontal "J" track so that fastening points are as close to the lower and upper edges of window and other openings as possible.

3.6 Field Quality Control:
A. Prior to panel installation, perform a visual survey of vertical and horizontal framing components (box girts and "J" tracks). Spot-check torque on M8 hex socket screws and confirm plumb of framing members.

3.7 Cleaning:
A. Remove protective film immediately following installation.
B. Leave panel surfaces clean and free of debris and residue. Where necessary, clean exposed surfaces with water and mild soap or other detergent not harmful to finishes. Thoroughly rinse surfaces and dry using non-abrasive measures.
C. Protect wall panels from damage during construction. Touch up of minor abrasions is not recommended unless performed with Kynar paint.

PRODUCT DATA SHEET 1 - Cleaning
1.1 Remove overspray from non-prescribed surfaces without causing damage to surfaces.
1.2 Remove protective covers from adjacent surfaces.

NOTICE: No freedom from any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer’s use and for ensuring that Customer’s workplace and disposal practices are in compliance with applicable laws and other government enactments. The product shown in this literature may not be available for sale and/or available in all geographies where Dow is represented. The claims made may not have been approved for use in all countries or regions. Dow assumes no obligation or liability for the information in this document. References to “Dow” or the “Company” mean the Dow legal entity selling the products to Customer unless otherwise expressly noted. NO EXPRESS WARRANTIES ARE GIVEN EXCEPT FOR ANY APPLICABLE WRITTEN WARRANTIES SPECIFICALLY PROVIDED BY DOW. ALL IMPLIED WARRANTIES INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

FROTH-PAK™ Spray Polyurethane Foam contains isocyanate, hydrofluorocarbon blowing agent and polyol. Read the instructions and (Material) Safety Data Sheets ((M)SDS) carefully before use. Wear protective clothing (including long sleeves), gloves, goggles or safety glasses, and proper respiratory protection. Do not breathe vapor or mist. Use only with adequate ventilation; follow ventilation requirements. It is recommended that applicators and those working in the spray area wear respiratory protection. Increased ventilation significantly reduces the potential for isocyanate exposure, however, supplied air or an approved air-purifying respirator equipped with an organic vapor sorbent and a particulate filter may still be required to maintain exposure levels below ACGIH, OSHA, WEEIL or other applicable limits. For situations where the atmospheric levels may exceed the level for which an air-purifying respirator is effective, use a positive-pressure, air-supplying respirator (air line or self-contained breathing apparatus). Spraying large amounts of foam indoors may require the use of a positive pressure, air-supplying respirator. Contents under pressure.

GREAT STUFF™ sealant and adhesive products contain isocyanate and a flammable blowing agent. Read all instructions and (Material) Safety Data Sheets ((M)SDS) carefully before use. Wear protective clothing (including long sleeves), gloves, goggles or safety glasses, and proper respiratory protection. Do not breathe vapor or mist. Use only with adequate ventilation; follow ventilation requirements. It is recommended that applicators and those working in the spray area wear respiratory protection. Increased ventilation significantly reduces the potential for isocyanate exposure, however, supplied air or an approved air-purifying respirator equipped with an organic vapor sorbent and a particulate filter may still be required to maintain exposure levels below ACGIH, OSHA, WEEIL or other applicable limits. For situations where the atmospheric levels may exceed the level for which an air-purifying respirator is effective, use a positive-pressure, air-supplying respirator (air line or self-contained breathing apparatus). Spraying large amounts of foam indoors may require the use of a positive pressure, air-supplying respirator. Contents under pressure.

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WARNING: Rigid foam insulation does not constitute a working walkable surface or qualify as a fall protection product.

STYROFOAM™ Brand SPF should be installed by a trained SPF applicator. Provide adequate ventilation. Contents under pressure. STYROFOAM™ Brand SPF should be installed by a trained SPF applicator. Provide adequate ventilation. Contents under pressure.