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Short Form Guide Specification

**THERMAL,
WATER, AND AIR
BARRIER WALL ASSEMBLY
[Public Bid]**

March 2016

SECTION 072166 –THERMAL, WATER, AND AIR BARRIER SYSTEM [Public Bid]

PART 1 - GENERAL

1.1 SUMMARY

- A. SECTION INCLUDES- Contractors choice of one of the following wall assembly types, “Foam on Foam” or “Foam on Sheathing” to form complete a continuous thermal, air and water barrier system.
1. Foam on Foam: Patented THERMAX™ Wall System consisting of rigid insulation and spray foam insulation to form a continuous thermal, air, and water barrier system.
 2. Foam on Sheathing: System consisting of rigid insulation over air/water barrier, over gypsum sheathing with spray polyurethane foam insulation within the stud cavity.

1.2 WORK SPECIFIED IN OTHER SECTIONS

- A. Section 061600, “Sheathing,” for substrate materials.
- B. Section 072726, “Fluid Applied Air Barriers” for requirements of fluid applied barriers.
- C. **[Continue as appropriate for the project].**

1.3 ACTION SUBMITTALS

- A. Product Data: Submit product data for each type of product indicated.

1.4 PREINSTALLATION MEETINGS

- A. Pre-installation Meeting: Prior to commencement of application of wall system, review and document methods and procedures related to installation, including the following:
1. Participants: Authorized representatives of the Contractor, [Construction Manager,] [Owner,] Architect, [Engineer,] Applicator, [Independent Inspector] and [Manufacturer].
 2. Review metal wall framing assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
 3. Review insulated sheathing, flashing and [spray polyurethane foam] methods and procedures related to application including manufacturer’s installation guidelines.
 4. Review construction schedule and confirm availability of products, applicator personnel, equipment and facilities.

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5. Review governing regulatory requirements, and requirements for insurance and certificates as applicable.
6. Review field quality control procedures.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Submit evaluation reports published by independent laboratory indicating evidence of compliance with specified criteria.
 1. NFPA 285 Compliance: Contractor must submit documentation showing all components in the wall assembly are in compliance with NFPA 285.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications (Spray Polyurethane Foam): Spray polyurethane foam installer shall be certified by wall system manufacturer at the time of bid. The spray foam installer shall be the certified individual that submitted certification at time of bid.
- B. Provide mock-up wall section for chosen wall assembly.
- C. Comply with Manufacturer's recommendations for the proper storage and handling of materials.

1.7 FIELD CONDITIONS

- A. Application Temperatures: Comply with Manufacturer's recommendations for product applications.

1.8 WARRANTY

- A. Follow all Manufacturer's requirements for acquiring warranty.
 1. Foam on Foam- System Warranty: Exposure-6 month, Thermal-15 year, Water Resistance- 15 year when used in conjunction with The Dow Chemical Company "LIQUIDARMOR™ -CM" spray flashing and sealant
 2. Foam on Gypsum- Product Warranty as available per manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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A. System Performance Characteristics:

1. Thermal performance:
 - a. Exterior insulation: ASTM C518, Stabilized R-value of minimum of 6.0 per inch with a six month exposure capability to outdoor elements and 15 year thermal warranty.
 - b. Interior spray polyurethane foam: ASTM C518, 140 degree F/90day Aged R-value (measured at 75 degree F mean Temp.), for product with a minimum 45 degree F ambient and substrate application temperature is R 6.4 per inch and 140 degree F/90day Aged R-value (measured at 75 degree F Mean Temp.), for product with a minimum 30 degree F ambient and substrate application temperature is R 6.0 per inch.
 - 1) Core density: ASTM D1622, Minimum 2.0 pcf.
 - 2) Acceptable adhesion to substrate based on specific minimum application temperature and proper substrate conditions.
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 (0.2L/*m2) of fixed wall area. Testing should be conducted at positive and negative sustained wind loading of 12.5 psf (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 2 hours.
4. Mold resistance: Wall system components shall provide non-food source for fungal growth.
5. Code Compliance: Wall system and component materials shall comply with the following requirements:
 - a. Exterior Insulation:
 - 1) Class A (< and/or = 25 Flame spread Index and < 450 Smoke Developed Index) classified at max thickness per UL 723 criteria or ASTM E84 criteria.
 - 2) Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - b. Spray Polyurethane foam:
 - 1) Class A (< and/or = 25 Flame Spread Index and < 450 Smoke Developed Index) Classified at max thickness per UL 723 criteria or ASTM E84 criteria.
 - 2) Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - c. System complies with ASTM E2357: Test Method for determining Air Leakage of Air Barrier Assemblies.

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- d. System complies with NFPA 285: Standard method of Testing for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies containing Combustible components using the Intermediate Scale, Multi-Story Test Apparatus.

2.2 FOAM ON FOAM ASSEMBLY

- A. System Description: Furnish and install the patented THERMAX™ Wall System that effectively controls thermal, air, vapor and water performance and provides continuity of the building envelope enclosure. The system shall include the following:
 1. Insulated sheathing secure to the exterior of the metal wall framing assembly.
 2. 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.
 3. Spray Polyurethane Foam insulation in stud cavity.
- B. Components:
 1. Foil Faced Polyisocyanurate Foam Board Insulation:
 - a. The Dow Chemical Company “THERMAX XARMOR™ ci Exterior Insulation.”
 - 1) Panel Size: 4'-0" wide x 8'-0" [12'-0"] long, square edge, shiplap (shiplap on thickness of 1.55 inches and greater) panels.
 2. Spray Polyurethane Foam: Two-component spray polyurethane cellular plastic foam.
 - a. Acceptable Products:
 - 1) STYROFOAM™ Spray Polyurethane Foam CM Series
 - 2) FROTH-PAK™ Ultra low pressure spray foam
 3. Seam Treatment:
 - a. Acceptable Products:
 - 1) The Dow Chemical Company “LIQUIDARMOR™ -CM” spray flashing and sealant.
 - 2) The Dow Chemical Company “WEATHERMATE™” Straight Flashing 4 inches, 6 inches, and 9 inches at straight openings at heads, jambs and sills.
 4. Accessories:
 - a. Fasteners: Provide insulated sheathing Manufacturer’s recommended polymer or other corrosion protective coated steel screw fasteners for anchoring sheathing to metal wall framing. Fastener length and size based on wall sheathing thickness.
 - 1) Acceptable Products:
 - a) Rodenhouse, Inc. 2 inches diameter “THERMAL-GRIP ci Prong washers” plastic washers which can be installed using either bulk Grip-Deck self-drilling screws or collated Grip-Deck screws. [Use the Grip-

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Lok auto-feed fastening system for high speed application
(recommended for wall assemblies up to 2 inches in thickness).]
Contact Rodenhouse Inc. for more information at 616-454-3100.

- b) Or approved other
- b. Penetration Filler: Provide insulated sheathing Manufacturer's recommended polyurethane foam for sealing penetrations of insulated sheathing.
 - 1) Acceptable Products:
 - a) The Dow Chemical Company "GREAT STUFF PRO™ Gaps & Cracks" single-component polyurethane low-pressure foam sealant.
 - b) The Dow Chemical Company "GREAT STUFF PRO™ Window & Door" single-component polyurethane low-pressure foam sealant.
 - c) The Dow Chemical Company FROTH-PAK™ Foam Insulation two component, quick-cure polyurethane foam.

2.3 FOAM ON SHEATHING ASSEMBLY

- A. System Description: Provide wall assembly that effectively controls thermal, air, vapor and water performance and provides continuity of the building envelope enclosure. The system shall include the following:
 - 1. Rigid insulation over exterior gypsum sheathing, air barrier and water barrier.
 - 2. 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.
 - 3. Spray Polyurethane Foam insulation within stud cavity.
- B. Components:
 - 1. Foil Faced Polyisocyanurate Foam Board Insulation:
 - a. Basis of Design Product: Subject to compliance with the documents, provide Dow Chemical THERMAX™ Sheathing-
 - b. Other approved products:
 - 1) RMax- ECOMAX ci
 - 2) Hunter Panels- Xci Class A
 - 2. Spray Polyurethane Foam: Two-component spray polyurethane cellular plastic foam.
 - a. Basis of Design Product: Subject to compliance with the documents, provide Dow Chemical STYROFOAM™ Spray Polyurethane Foam CM series
 - b. Other Approved Products:
 - 1) Dow Chemical "FROTH-PAK™ Ultra", low pressure spray foam
 - 2) LaPolla- Airtight® CC SPF
 - 3) Demilec- Heatlok XT Series

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3. Gypsum Sheathing
 - a. Provide moisture- and mold-resistant glass-mat gypsum wallboard products, in accordance with Division 06 Section 061600, "Sheathing".
4. Weather Barrier Resistance
 - a. Provide full coverage weather resistance barrier over exterior gypsum layer, in accordance with Division 072726, "Fluid Applied Membrane Barriers"
5. Accessories
 - a. Insulation Adhesive: Provide Manufacturer's recommended high strength, heavy-bodied, thermoplastic rubber adhesive formulated to bond insulation to metal, concrete or masonry surfaces.
 - b. Fasteners: Provide sheathing Manufacturer's recommended polymer or other corrosion protective coated steel screw fasteners for anchoring sheathing to metal wall framing. Fastener length and size based on wall sheathing thickness.
 - c. Penetration Filler: Provide sheathing Manufacturer's recommended polyurethane foam for sealing penetrations of sheathing.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Inspect areas to receive insulation. Ensure that substrates intended for adhesive fastening are clean and free from moisture or other materials that may have a deleterious effect on adhesion. Prepare report identifying conditions that may be detrimental to the performance of the insulation and proceed with installation only after the conditions noted have been properly addressed.

3.2 INSTALLATION, GENERAL

A. Foam on Foam

1. Foil Faced Polyisocyanurate Foam Board Insulation:
 - 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.
 - b. Install sheathing panels horizontally with labeled 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 in each course. Provide additional framing wherever panel joints do not bear against framing plate or sill members.

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- c. Fasten panels to each support with fasteners spaced 12 inches on center at perimeter of the wall 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. Maximum of two board joints may be bridged per fastener.
 - d. Install flashing at end and edge joints in accordance with sheathing Manufacturer's joint sealing recommendations.
 - e. Install flashing behind wall tie and mechanical fastening assemblies for rain screen claddings according to Manufacturer's recommendations.
 - f. Seal sheathing joints and penetrations of sheathing in accordance with sheathing Manufacturer's joint and penetration sealing recommendations.
 - g. 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 LIQUIDARMOR™ -CM or WEATHERMATE™ Flashing 6 inch or 9 inch" to the exterior sheathing and lapped over the top edge of the base. If a termination bar is utilized a flat strap must be included in framing at termination bar height to allow proper fastening of the termination bar.
2. Spray Polyurethane Foam:
- 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 26.
 - 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.
 - 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 inches.
 - 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 CM Series or FROTH-PAK™ Ultra.

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- 4) Maintain 3 inches clearance around chimneys, heating vents, steam pipes, recessed lighting fixtures and other heat sources.
 - 5) Do not apply spray polyurethane foam to inside of exit openings or electrical junction boxes.
 - 6) Maintain a continuous layer of spray foam from floor to floor to roof to complete air barrier.
 - 7) Site Tolerances: Maximum Variation in Applied thickness – minus 1/4 inches, plus 5/8 inches.
3. LIQUIDARMOR™ -CM Flashing and Sealant
- a. Surface and ambient temperatures should be 35 degree F and rising and below 120 degree F during the application.
 - b. Do not apply product on surfaces with standing water or frost.
 - c. LIQUIDARMOR™ -CM tolerates rain shortly after the curing process has begun (typically 1 to 4 hours), avoid installing on days with a high probability of significant rainfall.
 - d. Seal any gaps greater than ¼ inches with GREAT STUFF PRO™ Window and Door Insulating Foam Sealant or compatible sealant according to Manufacturer's recommendations, prior to applying LIQUIDARMOR™ -CM. If facer on insulation board is damaged note the affected area so that additional spray can be applied appropriately. Damaged insulation can also be replaced or WEATHERMATE™ Straight Flashing Tape can be used to tape down facer flaws.
 - e. Flash board joints, penetrations and other fenestration openings as required with a minimum 50 wet mils (+/-5 mils). Spray can be applied on one or two passes depending on site conditions.
 - f. Apply 3 inches (+/-1 inch) over the board joints. Make sure that a minimum of 1 inch of spray covers each side of the joint. Fasteners and washers along the board joints should also be completely covered with LIQUIDARMOR™ -CM. Brick anchors can be installed after the application of LIQUIDARMOR™ -CM.
 - g. For rough openings apply LIQUIDARMOR™ -CM a minimum of 3 inches onto the sheathing face, completely covering the sheathing board edge. In turn extend spray a minimum of 3 inches back onto the rough opening substrate. It is recommended to cover a distance back onto the rough opening equal to what is covered by traditional flashing materials
 - h. For penetrations through the rigid insulation or substrate apply LIQUIDARMOR™ -CM a minimum of 2 inches onto the sheathing face and a minimum of 2 inches onto the penetration substrate or primary flashing substrate.
 - i. Use wet mil thickness gauge to ensure proper installation thickness. A paint brush can be used to even out product application thickness. If product is consistently

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below minimum thickness spray another pass to achieve proper thickness requirements.

- j. LIQUIDARMOR™ -CM typically cures to touch within 1 to 4 hours after application. Depending on humidity, temperature, sun exposure and wind direction this time can be longer. Application will dry to an approximate 30 mil thickness when completely cured.

B. Foam on Gypsum

1. Foil Faced Polyisocyanurate Foam Board Insulation:
 - a. Comply with manufacturer's instructions for installation of polyisocyanurate rigid foam board insulation.
 - b. Do not install polyisocyanurate rigid foam board insulation that has become soiled, wet, or has not been properly protected from sunlight.
 - c. Dry fit polyisocyanurate rigid foam board insulation prior to final installation. Neatly trim board around conduits, pipes, and other items that will penetrate board insulation.
2. Spray Polyurethane Foam:
 - a. Comply with manufacturer's instructions for installation of Spray Polyurethane Foam insulation.
3. Gypsum Sheathing:
 - a. Install, in accordance with Division 06 Section 061600, "Sheathing,"
4. Weather Resistance Barrier
 - a. Install in accordance with Division 07 Section 072726, "Fluid Applied Membrane Air Barriers".

3.3 FIELD QUALITY CONTROL

- A. Field Quality Control for Foam on Foam Assembly: 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 done 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.

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3.4 PROTECTION

- A. Polyisocyanurate rigid foam board insulation from excess moisture, mechanical damage, and exposure to open flame.
- B. Promptly repair damage caused to insulation in a manner that retains integrity and continuity of insulation and facer materials.
- C. Keep Polyisocyanurate boards dry and above jobsite water – keep tarped until ready to install
- D. Cover insulation with cladding promptly, but no later than 180 days after installation of insulation

END OF SECTION