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1 GENERAL

1.1 SUMMARY OF WORK

A. This Section specifies stone fiber board insulation for cavity wall, curtain wall, sandwich panel systems, and, other board insulation applications.

1.2 RELATED REQUIREMENTS

A. Section [07 44 00 - Curtain Walls and Glazed Assemblies].

B. Section [07 92 19 - Acoustical Joint Sealants].

1.3 REFERENCE STANDARDS

A. ASTM International (ASTM).

1. ASTM C165 - [2012], Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
2. ASTM C356 - [2010], Standard Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat.
3. ASTM C411 - [2011], Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
4. ASTM C518 - [2010], Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
5. ASTM C612 - [2010], Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
6. ASTM C665 - [2011], Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
7. ASTM C795 - [2013], Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
8. ASTM C1104/C1104M - [2013], Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
9. ASTM E84 - [2012b], Standard Test Method for Surface Burning Characteristics of Building Materials.
10. ASTM E96/E96M - [2010], Standard Test Methods for Water Vapor Transmission of Materials.
11. ASTM E136 - [2011], Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

B. US Green Building Council (USGBC).

1. LEED v4-[2014], LEED (Leadership in Energy and Environmental Design): Green Building Rating System.

C. Underwriters' Laboratories (UL).

1. UL Fire Resistance Directory U654 [2012], Fire Resistance Ratings, 1 Hour Assembly - Interior Surface.
2. UL Fire Resistance Directory U655 [2012], Fire Resistance Ratings, 2 Hour Assembly - Interior Surface.
3. UL Fire Resistance Directory U658 [2012], Fire Resistance Ratings, 1 Hour Assembly - Interior and Exterior Surfaces.
4. UL Fire Resistance Directory U659 [2012], Fire Resistance Ratings, 2 Hour Assembly - Interior and Exterior Surfaces.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with roofing or deck work and with work of other trades for proper time and sequence to avoid construction delays.
- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and [one week] before starting work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
 - 1. Comply with Section 01 31 19 - Project Meetings and co-ordinate with other similar pre-installation meetings.
 - 2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
 - a. Owner;
 - b. Consultant;
 - c. Board Insulation Installation Subcontractor;
 - d. Manufacturer's Technical Representative.
 - 3. Ensure meeting agenda includes review of methods and procedures related to insulation installation including co-ordination with related work.
 - 4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit product data including manufacturer's literature for insulation materials and accessories, indicating compliance with specified requirements and material characteristics.
 - 1. Submit list on insulation manufacturer's letterhead of materials and accessories to be incorporated into Work.
 - 2. MSDS report.
 - 3. Include product name.
 - 4. Include preparation instructions and recommendations, installation methods, and storage and handling requirements.
 - 5. Include contact information for manufacturer and their representative for this Project.
- C. Samples:
 - 1. Submit [6 x 6] inches minimum sample of insulation in thickness used on Project.
- D. Test Reports:
 - 1. Submit evaluation service reports or other independent testing agency reports showing compliance with specified performance characteristics and physical properties.
- E. Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.
- F. Sustainable Design (LEED).
 - 1. LEED Submittals: In accordance with Section [01 35 21 – LEED Requirements]
 - 2. Submit verification for items as follow:
 - a. EA Credit 1: Thermal value of insulation contributing to overall energy performance of building.
 - b. MR Credits 4: Recycled content of insulation indicating percentages by weight of preconsumer and postconsumer recycled content.
 - c. MR Credits 5: Verify location where insulation is extracted, processed and manufactured.
- G. Insulation Installer Qualifications:
 - 1. Submit letter verifying insulation installer's experience with work similar to work of this Section.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Supply maintenance data for insulation materials for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- B. Sustainable Design Closeout Documentation (LEED).

1. Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates for work of this Section demonstrating percentage of construction wastes which were recycled.
 2. Submit verification from recycling facility showing receipt of materials.
- C. Record Documentation: In accordance with Section 01 78 00 - Closeout Submittals.
1. List materials used in insulation work.
 2. Warranty: Submit warranty documents specified.

1.7 QUALITY ASSURANCE

- A. Board Insulation Installer Quality Assurance: Work experience of [5] years minimum with work similar to work of this Section.
- B. Sustainability Standards Certification (LEED).
1. LEED submittals: In accordance with Section 01 35 21 - LEED Requirements.

1.8 DELIVERY STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
1. Deliver material in accordance with Section 01 61 00 - Common Product Requirements.
 2. Deliver materials and accessories in insulation manufacture's original packaging with identification labels intact and in sizes to suit project.
 3. Ensure insulation materials are not exposed to moisture during delivery.
 4. Replace wet or damaged insulation materials.
- B. Storage and Handling Requirements: Store materials off ground in dry location and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
1. Store in original packaging until installed.
- C. Packaging Waste Management:
1. Separate and recycle waste packaging materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
 2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.
 3. Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling [in accordance with Waste Management Plan].

1.9 WARRANTY

- A. Project Warranty: Refer to Contract Conditions for project warranty provisions.
- B. Manufacturer's warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.
- C. Warranty period: [1] years commencing on Date of Substantial Performance of Work.

2 PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: ROCKWOOL™, 8024 Esquesing Line, Milton, Ontario, L9T 6W3, Phone: 905-878-8474, Toll Free: 1-800-265-6878, e-mail: contactus@rockwool.com, URL: www.rockwool.com.

2.2 DESCRIPTION

- A. Non-combustible, lightweight, water repellent, rigid insulation board with rigid upper surface to ASTM C612 Type IVB.
- B. Non-combustible, rigid, water repellent, mineral wool insulation board for building foundations to ASTM C612 Type IVA.

- C. Non-combustible, semi-rigid, water repellent, mineral wool insulation board for exterior curtain wall systems to ASTM C612, Type IVB.
- D. Non-combustible, rigid, mineral wool fire rated insulation board to ASTM C612, Type IVB.
- E. [Faced] [Unfaced] non-combustible, semi-rigid, mineral wool insulation board to ASTM C612.
- F. Non-combustible, rigid, water repellent, mineral wool insulation board for exterior non-structural commercial and industrial high performance insulation sheathing applications to ASTM C612, Type IVB.

2.3 PERFORMANCE CRITERIA

- A. Board insulation for exterior cavity wall: To ASTM C612 Type IVB.
 - 1. Fire performance:
 - a. Non-combustibility: To ASTM E136.
 - b. Maximum use temperature: 1200 °F.
 - c. Surface Burning Characteristics: To ASTM E84.
 - 1) Flame spread: 0.
 - 2) Smoke developed: 0.
 - 2. Thermal resistance (R value/1 inch at 75 °F: [4.2] [4.3] h ft² °F/Btu to ASTM C518.
 - 3. Water vapour permeance: 27.2 Perm minimum.
 - 4. Moisture sorption: 1 % maximum to ASTM C1104/C1104M.
 - 5. Fungi resistance: Zero mould growth to ASTM C1338.
 - 6. Corrosive resistance:
 - a. Steel to ASTM C665: Pass.
 - b. Stainless steel to ASTM C795: Conforms.
 - 7. Recycled content: [40] [16] % minimum.
 - 8. Acoustical performance sound absorption co-efficients to ASTM C423.

Sound Absorption Co-efficient at Frequencies

Thickness (inches)	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	NRC
3	0.72	0.93	0.88	0.84	0.90	0.97	0.90

- C. Board insulation for exterior curtain wall systems: To ASTM C612, Type IVB.
 - 1. Fire performance:
 - a. Non-combustibility: To ASTM E136.
 - b. Surface Burning Characteristics: To ASTM E84.
 - 1) Flame spread: 0.
 - 2) Smoke developed: 0.
 - 2. Thermal resistance (R value/1 inch at 75 °F: [4.2] h ft² °F/Btu to ASTM C518.
 - 3. Water vapour permeance: [31.62] Perm minimum.
 - 4. Moisture sorption: 1 % maximum to ASTM C1104/C1104M.
 - 5. Dimensional stability: 2 % maximum linear shrinkage at 1200 °F to ASTM C356.
 - 6. Corrosive resistance:
 - a. Steel to ASTM C665: Pass.
 - b. Stainless steel to ASTM C795: Conforms.
 - 7. Service temperature hot surface performance: 1200 °F maximum to ASTM C411.
 - 8. Density: 3.5 lb/ft³ nominal to ASTM C612.
 - 9. Recycled content: [40] [16] % minimum.
 - 10. Acoustical performance sound absorption co-efficients to ASTM C423.

Sound Absorption Co-efficiencies at Frequencies

Thickness (Inches)	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	NRC
2	0.26	0.68	1.12	1.10	1.03	1.04	1.00
3	0.63	0.95	1.14	1.01	1.03	1.04	1.05
4	1.03	1.07	1.12	1.04	1.07	1.08	1.10

- D. Board insulation for exterior fire rated wall are required for metal building systems: To ASTM C612, Type IVB.

1. Fire performance:
 - a. Non-combustibility: To ASTM E136.
 - b. Surface Burning Characteristics: Flame spread: 0, to ASTM E84.
 - c. 1 hour interior side only fire rating to UL Fire Resistance Directory U654.
 - d. 1 hour interior side and exterior fire rating to UL Fire Resistance Directory U658.
 - e. 2 hour interior side only fire rating to UL Fire Resistance Directory U655.
 - f. 2 hour interior side and exterior fire rating to UL Fire Resistance Directory U659.
 2. Thermal resistance (R value/1 inch at 75 °F: [4.2] [4.3] h ft² °F/Btu to ASTM C518.
 3. Moisture sorption: 1 % maximum to ASTM C1104/C1104M.
 4. Dimensional stability: 1 % maximum linear shrinkage at 1200 °F to ASTM C356.
 5. Corrosive resistance:
 - a. Steel to ASTM C665: Pass.
 - b. Stainless steel to ASTM C795: Conforms.
 6. Recycled content: [40] [16] % minimum.
- E. General purpose use board insulation: To ASTM C612, Type [IVA] [IVB].
1. Fire performance:
 - a. Non-combustibility: To ASTM E136.
 - b. Surface Burning Characteristics: To ASTM E84.
 - 1) Flame spread unfaced: 0.
 - 2) Smoke developed unfaced: 0.
 2. Thermal resistance (R value/1 inch at 75 °F: [4.1] [4.2] h ft² °F/Btu to ASTM C518.
 3. Water vapour permeance:
 - a. Unfaced; [30] Perm maximum.
 4. Moisture sorption: 1 % to ASTM C1104/C1104M.
 5. Dimensional stability: 1 % maximum linear shrinkage at 1200 °F to ASTM C356.
 6. Fungi resistance: Passed to ASTM C1338.
 7. Corrosive resistance:
 - a. Steel to ASTM C665: Pass.
 - b. Stainless steel to ASTM C795: Conforms.
 8. Density: [3.5] [4] [6] [8] lb/ft³ nominal to ASTM C612.
 9. Recycled content: [40] [16] % minimum.
 10. Acoustical performance sound absorption co-efficients to ASTM C423.

Sound Absorption Co-efficiencies at Frequencies

Thickness (inches)	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	NRC
1	0.08	0.23	0.66	0.93	1.02	1.02	0.70
1.5	0.15	0.47	0.98	1.06	1.02	1.02	0.90
2	0.26	0.68	1.14	1.13	1.06	1.07	1.00
3	0.62	1.03	1.20	1.10	1.08	1.10	1.10
4	1.07	1.01	1.07	1.06	1.07	1.06	1.05

- F. Board insulation for exterior curtain wall systems: To ASTM C612, Type IVB.
1. Fire performance:
 - a. Surface Burning Characteristics: To ASTM E84.
 - 1) Flame spread: 0.
 - 2) Smoke developed: 0.
 2. Thermal resistance (R value/inch at 75 ° F: [4.0] hr ft² F/Btu to ASTM C518.
 3. Moisture resistance:
 - a. Moisture sorption: 0.28 % maximum to ASTM C1104/C1104M.
 - b. Water vapour transmission: 35 perm to ASTM E96, Desiccant Method.
 - c. Water absorption: 1.2 % to ASTM C209.
 4. Dimensional stability: 0.38 % maximum linear shrinkage at 1200 °F to ASTM C356.
 5. Corrosive resistance:
 - a. Steel to ASTM C665: Non-corrosive.
 - b. Aluminum to ASTM C665: Non-corrosive.
 - c. Stainless steel to ASTM C795: Non-corrosive.

6. Density: 11.0 lb/ft³ nominal to ASTM C612.
7. Compressive strength: To ASTM C165.
 - a. 584 psf at 10 %.
 - b. 1566 psf at 25 %.
8. Recycled content: [40] % minimum.
9. Fungi resistance: To ASTM C1338.
10. Acoustical performance sound absorption co-efficients to ASTM C423.

Sound Absorption Co-efficiencies at Frequencies

Thickness (inches)	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	NRC
1	0.13	0.49	0.85	0.89	0.89	0.97	0.80
2	0.50	0.71	0.85	0.90	0.96	1.01	0.85

2.4 MATERIALS

- A. Non-combustible, lightweight, water repellent, rigid insulation board with rigid upper surface to ASTM C612 Type IVB.
 1. Size: [16] [24] x 48 inches.
 2. Thickness: and weight: [1] [1.5] [2] [2.5] [3] [3.5] [4] [4.5] [5] inches.
 3. Density:
 - a. Inner layer: 4.4 lb/ft³ to ASTM C612.
 - b. Outer layer: 6.24 lb/ft³ to ASTM C612.
 - c. Inner layer: 3.75 lb/ft³ to ASTM C612.
 4. Acceptable Material: ROCKWOOL™, [CAVITYROCK®]
- B Non-combustible, lightweight, water repellent, rigid stone wool board insulation to ASTM C612, Type IVA
 1. Size: [24 x 48] [36 x 48] [48 x 72] [48 x 96] inches.
 2. Thickness: [1.25] [1.5] [2] [3] inches.
 3. Acceptable Material: ROCKWOOL™, COMFORTBOARD™ 80.
- C. Non-combustible, [semi-]rigid, water repellent, mineral wool insulation board to ASTM C612, Type-IVB.
 1. Size: [24 x 48] [24 x 60] [36 x 48] [36 x 60] [48 x 72] inches.
 2. Thickness: [1] [1.5] [2] [2.5] [3] [3.5] [4] [5] [6] inches.
 3. Acceptable Material: ROCKWOOL™, [CURTAINROCK®][CURTAINROCK® 40] [CURTAINROCK™ 80]
- D. Non-combustible, rigid, mineral wool fire rated insulation board to ASTM C612, Type IVB.
 1. Size: [24] [31.5] [32] x 48 inches.
 2. Thickness: [3] [4] inches.
 3. Acceptable Material: ROCKWOOL™, ROXUL SAFET™ [55] [65].
- E. Non-combustible, rigid, mineral wool fire rated insulation board to ASTM C612, Type [IVA] [IVB]
 1. Facing: [Unfaced]
 2. Compressive resistance:
 - a. At 10 %: [71] [90] [353] [743] psf to ASTM C165.
 - b. At 25 %: [209] [226] [587] [1269] psf to ASTM C165.
 3. Size: 24 x 48 inches.
 4. Thickness: [1] [1.5] [2] [2.5] [3] [3.5] [4] [5] [6] inches.
 5. Acceptable Material: ROCKWOOL™, ROCKBOARD® [40] [60] [80] [with [RFF] [BLACK MAT] facer].
- F Non-combustible, rigid, water repellent, mineral wool insulation board to ASTM C612, Type IVB.
 1. Size: [610 x 1219] [1219 x 1829] mm.
 2. Thickness: [25] [32] [50] [65] [76] mm.
 3. Acceptable Material: ROCKWOOL™, COMFORTBOARD™ 110.

2.5 ACCESSORIES

- A. Mechanical fasteners in accordance with insulation manufacturer's written recommendations.
 1. Foundation insulation board: 1.5 inches concrete nails with 3/4 inch washers.

- B. Insulation Clips: in accordance with curtain wall manufacturer's written recommendations [and Section [07 44 00 - Curtain Walls and Glazed Assemblies].
- C. Foundation Sealing Compound: Bitumen sealing compound in accordance with Section [07 92 00 - Joint Sealants].
- D. Adhesive: All purpose construction adhesive in accordance with insulation manufacturer's written recommendations.
- E. Facings: Use only facings in accordance with insulation manufacturer's written recommendations as follows:
 - 1. RFF facer: Aluminum foil with fiberglass reinforcement to ASTM.
 - a. Acceptable material: ROCKWOOL™, RFF FACER.
 - 4. Black mat facer: Black mat with non-woven fiberglass.
 - a. Acceptable material: ROCKWOOL™, BLACK MAT FACER.

2.6 SOURCE QUALITY CONTROL

- A. Ensure insulation components and accessories are supplied or approved in writing by single manufacturer.

2.7 PRODUCT SUBSTITUTIONS

- A. Substitutions: [In accordance with Section 01 23 13 - Product Substitution Procedures] [No substitutions permitted].

3 EXECUTION

3.1 INSTALLERS

- A. Use only installers with [5] years minimum experience with work similar to work of this Section.

3.2 EXAMINATION

- A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for insulation installation in accordance with manufacturer's written recommendations.
 - 1. Visually inspect substrate in presence of Consultant.
 - 2. Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.
 - 3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.
- B. Start of insulation installation indicates installer's acceptance of substrate installation conditions.

3.3 INSTALLATION

- A. General:
 - 1. Install insulation in accordance with manufacturer's written recommendations.
 - 2. Install insulation to maintain continuity of thermal protection to building elements and spaces.
 - 3. Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
 - 4. Keep insulation minimum [3] inches from heat emitting devices such as recessed light fixtures, and minimum [2] inches from sidewalls of chimneys and vents.
 - 5. Do not enclose insulation until before inspection and receipt of Consultant's written approval.
- B. Installation of Insulation Board for Exterior Cavity Wall Installations:
 - 1. Install insulation board in accordance with insulation manufacturer's written recommendations.
 - 2. Seal joints with acoustical joint sealant in accordance with Section [07 92 19 - Acoustical Joint Sealants].

- C. Installation of Insulation Board for Curtain Wall Applications:
 - 1. Install insulation board in accordance with insulation manufacturer's and curtain wall manufacturer's written recommendations.
 - 2. Attach insulation using insulation clips in accordance with curtain wall manufacturer's written recommendations.
 - 3. Seal joints with acoustical joint sealant in accordance with Section [07 92 19 - Acoustical Joint Sealants].
- D. Installation of Insulation Board for Metal Sandwich panel System;
 - 1. Install insulation board in accordance with insulation manufacturer's and metal sandwich panel manufacturer's written recommendations.
- E. Installation of Insulation Board for Metal Sandwich panel System;
 - 1. Install insulation board in accordance with insulation manufacturer's written recommendations.
- F. Installation of Insulation Board for Foundations:
 - 1. Install insulation board on foundation using all purpose construction adhesive in accordance with insulation manufacturer's written recommendations.
 - 2. Attach insulation board with 1.5 inches concrete nails and seal with bitumen sealing compound..
 - 3. Seal joints with acoustical joint sealant in accordance with Section [07 92 19 - Acoustical Joint Sealants].

3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with Section [01 45 00 - Quality Control].
- B. Manufacturer's Services:
 - 1. Coordinate manufacturer's services with Section [01 45 00 - Quality Control].
 - a. Arrange for payment for manufacturer's services.
 - b. Have manufacturer review work involved in handling, installation, protection, and cleaning of insulation and accessories, and submit written reports in acceptable format to verify compliance of Work with Contract conditions.
 - 2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
 - a. Report any inconsistencies from manufacturer's recommendations immediately to Consultant.
 - 3. Schedule site visits to review work at stages listed:
 - a. After delivery and storage of drainage sheet and accessories, and when preparatory work on which Work of this Section depends is complete, but before installation begins.
 - b. Twice during progress of work at 25% and 60% complete.
 - c. Upon completion of Work, after cleaning is carried out.
 - d. Obtain reports within three days of review and submit immediately to Consultant.

3.5 CLEANING

- A. Progress Cleaning: Perform cleanup as work progresses [in accordance with Section 01 74 00 - Cleaning and Waste Management].
 - 1. Leave work area clean at end of each day.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment [in accordance with Section 01 74 00 - Cleaning and Waste Management].
- C. Waste Management:
 - 1. Co-ordinate recycling of waste materials with 01 74 19 - Construction Waste Management and Disposal.
 - 2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.
 - 3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

- A. Protect installed products and accessories from damage during construction.
- B. Repair damage to adjacent materials caused by insulation installation.

END OF SECTION 07 21 13 – BOARD INSULATION