

## SECTION 07 21 13

### CONTINUOUS INSULATION

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#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Continuous Insulation for Walls:
  - 1. ECOMAXci Wall Solution.
  - 2. Thermasheath-SI Wall Solution.
  - 3. ECOMAXci.
  - 4. ECOMAXci with composite panels (R-Trac HVHZ by Altech).
  - 5. ECOBASEci.
  - 6. Thermabase-CI.
  - 7. TSX-8500.
  - 8. TSX-8510.
  - 9. Thermasheath-SI.
  - 10. Thermasheath-3.
  - 11. Thermasheath-XP.
  - 12. R-Matte Plus-3.
  - 13. Durasheath-3.
  
- B. Continuous Insulation for Roofs:
  - 1. Multi-Max FA-3.
  - 2. Tapered Thermarroof-3.
  - 3. Ultra-Max.
  - 4. Tapered Ultra-Max.
  - 5. Re-Cover Board-3.
  - 6. Nailable Base-3.
  - 7. Vented Nailable Base-3.
  - 8. Multi-Vent Nailable Base-3.
  - 9. Thermarroof Plus-3.
  
- C. Flashings and tapes.
  
- D. Insulation clips.
  
- E. Nailboard fasteners.
  
- F. Rainscreen metal panel system. (ECOMAXci with Altech R-Trac HVHZ)

##### 1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete.
  
- B. Section 03 41 16 - Precast Concrete Slabs.

- C. Section 05 40 00 - Cold-Formed Metal Framing.
- D. Section 04 40 00 - Stone Assemblies .
- E. Section 04 26 00 - Terra Cotta Panels\*.
- F. Section 06 10 00 - Rough Carpentry.
- G. Section 07 26 00 - Vapor Retarders.
- H. Section 07 27 26 - Fluid-Applied Membrane Air Barriers .
- I. Section 07 50 00 - Membrane Roofing.
- J. Section 09 22 16.13 - Non-Structural Metal Stud Framing.
- K. Section 09 25 23 - Lime Based Plastering.

### 1.3 REFERENCES

- A. AAMA 2605 - ANSI/SBCA FS 100-2012 Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies.
- B. AATCC Test Method 127 - Water Resisitance: Hydryostatic Pressure Test
- C. ASTM International (ASTM):
  1. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board.
  2. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
  3. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
  4. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
  5. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.
  6. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
  7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  8. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
  9. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
  10. ASTM E 564 - Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings.
  11. ASTM E 2126 - Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings.
  12. ASTM E 2178 - Standard Test Method for Air Permeance of Building Materials.
  13. ASTM E 2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
- D. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

- E. NFPA 286: Standard Methods Of Fire Tests For Evaluating Contribution Of Wall And Ceiling Interior Finish To Room Fire Growth
- F. SBCRI Single Element Lateral Load Testing.
- G. UL 1715 - Fire Test of Interior Finish Material.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation methods.
- C. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
  1. Accessories: Include details of all integral panel components and their interface with adjacent materials.
  2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Verification Samples: For each finish product specified, two samples, minimum size 4 inches by 6 inches (102mm x 150 mm).

#### 1.5 RAINSCREEN METAL PANEL PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide metal wall panel assemblies that comply with performance requirements specified within this section. Manufacturers' standard assemblies indicated for this Project shall have been tested by a certified 3rd party testing and inspecting agency.
- B. Structural Performance: Provide metal wall panel assemblies and continuous insulation sheathings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330.
  1. Wind Loads: Determine loads based on the following minimum design wind pressures: Uniform pressure of 25 psf, inward or outward. Maximum design pressure of 120 PSF inward or outward
  2. Deflection Limits: Metal wall panel assemblies shall be shown to withstand test pressures with deflection no greater than 1/180 perimeter and L/60 of the span and no evidence of material failure, structural distress, or permanent deformation exceeding 0.4 percent of the clear span.
- C. Rain Screen: Specified panel system shall be a pressure equalized rain screen system tested and passed to AAMA 508. Also, system shall have been tested and compliant with AAMA 509 requirements with a water rating of .40 Fl oz/FT<sup>2</sup> and an air rating of .57 CFM/FT<sup>2</sup>.
- D. Product Test Reports: Florida Product Approval # 16406.
- E. Large Missile Impact: Provide metal panel system which has been successfully tested to and is compliant with the requirements of (Testing Application Standard for the State of Florida) TAS 201, 202 and 203. Panel system shall have achieved ipass<sup>1</sup> status without the use of supplemental materials such as plywood or panel

stiffeners.

- F. Insulation: Polyisocyanurate insulation shall meet ANSI/SBCA FS 100-2012 Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies.
- G. Surface-Burning Characteristics:
  - 1. Provide metal wall panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 under a testing and inspecting agency acceptable to authorities having jurisdiction:
    - a. PE Core: Flame-spread index, less than 25; Smoke-developed index, less than 450.
    - b. FR Core: Flame-spread index, less than 25; smoke-developed index, less than 450.
  - 2. Provide Class A rigid foil-faced Polyisocyanurate continuous insulation with the following surface-burning characteristics as determined by testing per ASTM E 84 under a testing and inspecting agency acceptable to authorities having jurisdiction:
    - a. ECOMAXci: Flame-spread index, less than 25; smoke-developed index, less than 450.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.
- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish areas designated by Architect.
  - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
  - 3. Remodel mock-up area as required to produce acceptable work.
- D. Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, foundation/structural system/substrate conditions, and insulation manufacturer's installation instructions.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle products per manufacturer's instructions until ready for installation.

#### 1.8 SEQUENCING

- A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

#### 1.9 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products

under environmental conditions outside manufacturer's recommended limits.

## 1.10 WARRANTY

- A. Insulation Warranty: At project closeout, provide to Owner an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.
- B. Rainscreen Metal Panel Warranty: At project closeout, provide to Owner an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage  
Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following: Structural failures, including rupturing, cracking, or puncturing. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 2. Warranty Period: Two years from date of Substantial Completion.
- C. Rainscreen Metal Panel Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Panel Finish: Finish deterioration shall be defined as: Color fading more than 5 Hunter units when tested according to ASTM D 2244. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: Twenty years from date of Substantial Completion.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Rmax Operating, LLC, which is located at: 13524 Welch Rd.; Dallas, TX 75244-5227; Toll Free Tel: 800-527-0890; Tel: 972-387-4500; Fax: 972-387-4673; Email: [request info \(rmax@rmax.com\)](mailto:request_info(rmax@rmax.com)); Web: [www.rmax.com](http://www.rmax.com)
  - 1. Rmax Operating, LLC; 13524 Welch Rd., Dallas, TX 75244. Toll Free Tel: 800-527-0890. Tel: 972-387-4500. Fax: 972-387-4673. Email: [specs@rmax.com](mailto:specs@rmax.com). Web: [www.rmax.com](http://www.rmax.com) .
  - 2. Rmax Operating, LLC; 210 Lyon Dr., Fernley, NV 89408. Toll Free Tel: 800-762-9462. Tel: 775-575-4849. Fax: 775-575-5035. Email: [specs@rmax.com](mailto:specs@rmax.com). Web: [www.rmax.com](http://www.rmax.com) .
  - 3. Rmax Operating, LLC; 1649 S. Batesville Rd., Greer, SC 29650. Toll Free Tel: 800-845-4455. Tel: 864-297-1382. Fax: 864-234-7548. Email: [specs@rmax.com](mailto:specs@rmax.com). Web: [www.rmax.com](http://www.rmax.com) .
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

### 2.2 CONTINUOUS INSULATION FOR WALLS

- A. ECOMAXci Wall Solution: Exterior continuous insulation solution for commercial walls including board insulation, tape, and flashing to provide continuous thermal and moisture protection of the vertical building exterior.
  - 1. Fire Performance in accordance with NFPA 285.

2. Air Barrier System Performance in accordance with ASTM E2357 and CAN/ULC S742 (A1), less than 0.05
  3. Water-Resistive Barrier (WRB) per AC71 (ASTM E331, AATCC Test Method 127)
  4. Compliance:
    - a. ASTM C1289 Type I, Class 1
    - b. ASHRAE 90.1
    - c. International Energy Conservation Code (IECC)
    - d. International Building Code (IBC) Section 2603, Foam Plastic
    - e. DrJ TER 1212-03
    - f. California Code of Regulations, Title 24
    - g. Tested per NFPA 285 to comply with Section 2603.5.5 of the IBC
    - h. Class A Flame Spread and Smoke Developed Indices per IBC Chapter 8, Interior Finishes
    - i. 1, 2, 3 or 4 hour Fire Rated Assemblies as shown in the UL Fire Resistance Directory Design No.: U026, U326, U330, U354, U424, U460, U902, U904, U905, U906, U907, V454, V499
  5. Continuous Insulation: ECOMAXci - Thickness/R Value: 1.0 inches (25mm)/R-6.5.
  6. Continuous Insulation: ECOMAXci - Thickness/R Value: 1.5 inches (38mm)/R-10.
  7. Continuous Insulation: ECOMAXci - Thickness/R Value: 2.0 inches (51mm)/R-13.1.
  8. Continuous Insulation: ECOMAXci - Thickness/R Value: 2.5 inches (64mm)/R-16.7.
  9. Continuous Insulation: ECOMAXci - Thickness/R Value: 3.0 inches (76mm)/R-20.3.
  10. Continuous Insulation: ECOMAXci - Thickness/R Value: 3.5 inches (89mm)/R-23.9.
  11. Continuous Insulation: ECOMAXci - Thickness/R Value: 4.0 inches (102mm)/R-27.4.
  12. Continuous Insulation: ECOMAXci - Thickness/R Value: 4.5 inches (114mm)/R-31.
  13. Flashing Tape: R-SEAL 3000.
  14. Flashing Tape: R-SEAL 6000.
  15. Cavity Insulation: Glass fiber batt Insulation; faced.
  16. Cavity Insulation: Glass fiber batt Insulation; unfaced.
  17. Cavity Insulation: Noncombustible insulation as specified in another section.
  18. Cavity Insulation: None.
- B. Thermasheath-SI Wall Solution: Exterior continuous insulation solution for residential walls including structural insulation board, tape, and flashing to provide continuous thermal and moisture protection of the vertical building exterior.
1. Compliance:
    - a. ASTM C1289 Type I, Class 1 Polyiso
    - b. International Residential Code (IRC)
    - c. International Building Code (IBC), Type V Construction
    - d. International Energy Conservation Code (IECC)
    - e. ASHRAE 90.1
    - f. DrJ TER 1207-01
    - g. California Code of Regulations, Title 24
    - h. Tested per NFPA 286 to comply with ICC-ES AC12 Appendix B
    - i. Water Resistive Barrier (WRB) per AC71 (ASTM E331, AATCC Test Method 127)
    - j. Air Barrier Material per ASTM E2178
    - k. 1, 2, 3 or 4 hour Fire Rated Assemblies as shown in the UL Fire

Resistance Directory. Design No.: U026, U326, U330, U354, U424, U460, U902, U904, U905, U906, U907, V454, V499

2. Structural Performance in accordance with ASTM E72.
  3. Structural Performance in accordance with ASTM E564.
  4. Structural Performance in accordance with ASTM E2126.
  5. Structural Performance in accordance with SBCRI Single Element Lateral Load testing.
  6. Insulation: Thermasheath-SI - Thickness/R Value: 0.5 inches (13mm)/R-3.2.
  7. Insulation: Thermasheath-SI - Thickness/R Value: 0.75 inches (19mm)/R-5.0.
  8. Insulation: Thermasheath-SI - Thickness/R Value: 1.0 inches (25mm)/R-6.0.
  9. Flashing Tape: R-SEAL Construction Tape.
  10. Flashing Tape: R-SEAL 3000.
  11. Flashing Tape: R-SEAL 6000.
- C. ECOMAXci: Closed-cell polyisocyanurate insulation with a 12mil glass fiber reinforced foil facer on one side and a 10mil glass fiber reinforced foil facer on the other side.
1. Compliance:
    - a. ASTM C1289 Type I, Class 1
    - b. ASHRAE 90.1
    - c. International Energy Conservation Code (IECC)
    - d. International Building Code (IBC) Section 2603, Foam Plastic
    - e. DrJ TER 1212-03
    - f. California Code of Regulations, Title 24
    - g. Tested per NFPA 285 to comply with Section 2603.5.5 of the IBC
    - h. Class A Flame Spread and Smoke Developed Indices per IBC Chapter 8, Interior Finishes
    - i. 1, 2, 3 or 4 hour Fire Rated Assemblies as shown in the UL Fire Resistance Directory Design No.: U026, U326, U330, U354, U424, U460, U902, U904, U905, U906, U907, V454, V499
  2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  3. Compressive Strength in accordance with ASTM D1621: 25 psi.
  4. Flame Spread in accordance with ASTM E84: 25 or less.
  5. Smoke Developed in accordance with ASTM E84: 450 or less.
  6. Water Vapor Transmission in accordance with ASTM E96: Less than 0.03 perms.
  7. Water Absorption in accordance with ASTM C209: Less than 0.2 percent by volume.
  8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  9. Air Permeance in accordance with ASTM E2178: Less than 0.02 L/(s.m2)
  10. Thickness: 1.0 inches (25mm).
    - a. Thermal Resistance (R): 6.5.
  11. Thickness: 1.5 inches (38mm).
    - a. Thermal Resistance (R): 10.0.
  12. Thickness: 2.0 inches (51mm).
    - a. Thermal Resistance (R): 13.1.
  13. Thickness: 2.5 inches (64mm).
    - a. Thermal Resistance (R): 16.7.
  14. Thickness: 3.0 inches (76mm).
    - a. Thermal Resistance (R): 20.3.
  15. Thickness: 3.5 inches (89mm)
    - a. Thermal Resistance (R): 23.9.
  16. Thickness: 4.0 inches (102mm)
    - a. Thermal Resistance (R): 27.4.
  17. Thickness: 4.5 inches (114mm)

- a. Thermal Resistance (R): 31.0.
- D. ECOBASEci: Closed-cell polyisocyanurate (polyiso) foam insulation with inorganic, polymer coated glass fiber mat facers bonded to fire retardant treated plywood (FRTP)
1. Compliance:
    - a. ASTM C1289 Type V.
    - b. ASHRAE 90.1.
    - c. DrJ TER 1504-04
    - d. International Energy Conservation Code (IECC).
    - e. IBC Section 2603.
    - f. NFPA 285 Section 2603.5.5 of the IBC.
    - g. California Code of Regulations, Title 24
    - h. 1, 2, 3 or 4 hour Fire Rated Assemblies as shown in the UL Fire Resistance Directory Design No.: U026, U326, U330, U354, U424, U460, U902, U904, U905, U906, U907, V454, V499
  2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  3. Compressive Strength in accordance with ASTM D1621: 20 psi.
  4. Flame Spread, Core in accordance with ASTM E84: 75 or less.
  5. Smoke Developed, Core in accordance with ASTM E84: 450 or less.
  6. Water Vapor Transmission in accordance with ASTM E96: Less than 1.5 perms.
  7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  9. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  10. Plywood Thickness: 5/8 inch (16 mm).
  11. Plywood Thickness: 3/4 inch (10 mm).
  12. Insulation Thickness: 0.75 inches (19mm).
    - a. Overall Thickness: 1-3/8 inches (35 mm).
    - b. Thermal Resistance (R): 5.2.
  13. Insulation Thickness: 1.0 inches (25mm).
    - a. Overall Thickness: 1-5/8 inches (41 mm).
    - b. Thermal Resistance (R): 6.7.
  14. Insulation Thickness: 1.5 inches (38mm).
    - a. Overall Thickness: 2-1/8 inches (54 mm).
    - b. Thermal Resistance (R): 9.7.
  15. Insulation Thickness: 2.0 inches (51mm).
    - a. Overall Thickness: 2-5/8 inches (67 mm).
    - b. Thermal Resistance (R): 12.8.
  16. Insulation Thickness: 2.5 inches (64mm).
    - a. Overall Thickness: 3-1/8 inches (79 mm).
    - b. Thermal Resistance (R): 16.0.
  17. Insulation Thickness: 3.0 inches (76mm).
    - a. Overall Thickness: 3-5/8 inches (92 mm).
    - b. Thermal Resistance (R): 19.2.
  18. Insulation Thickness: 3.5 inches (89mm).
    - a. Overall Thickness: 4-1/8 inches (105 mm).
    - b. Thermal Resistance (R): 22.4.
  19. Insulation Thickness: 4.0 inches (102mm).
    - a. Overall Thickness: 4-5/8 inches (117 mm).
    - b. Thermal Resistance (R): 25.7.
  20. Insulation Thickness: 4.5 inches (114mm).
    - a. Overall Thickness: 5-1/8 inches (130 mm).



- b. Thermal Resistance (R): 29.0.
- 21. Insulation Thickness: 0.75 inches (19mm).
  - a. Overall Thickness: 1-1/2 inches (38 mm).
  - b. Thermal Resistance (R): 5.4.
- 22. Insulation Thickness: 1.0 inches (25mm).
  - a. Overall Thickness: 1-3/4 inches (44 mm).
  - b. Thermal Resistance (R): 6.9.
- 23. Insulation Thickness: 1.5 inches (38mm).
  - a. Overall Thickness: 2-1/4 inches (57 mm).
  - b. Thermal Resistance (R): 9.9.
- 24. Insulation Thickness: 2.0 inches (51mm).
  - a. Overall Thickness: 2-3/4 inches (70 mm).
  - b. Thermal Resistance (R): 13.0.
- 25. Insulation Thickness: 2.5 inches (64mm).
  - a. Overall Thickness: 3-1/4 inches (83 mm).
  - b. Thermal Resistance (R): 16.2.
- 26. Insulation Thickness: 3.0 inches (76mm).
  - a. Overall Thickness: 3-3/4 inches (95 mm).
  - b. Thermal Resistance (R): 19.4.
- 27. Insulation Thickness: 3.5 inches (89mm).
  - a. Overall Thickness: 4-1/4 inches (108 mm).
  - b. Thermal Resistance (R): 22.6.
- 28. Insulation Thickness: 4.0 inches (102mm).
  - a. Overall Thickness: 4-3/4 inches (121 mm).
  - b. Thermal Resistance (R): 25.9.
- 29. Insulation Thickness: 4.5 inches (114mm).
  - a. Overall Thickness: 5-1/4 inches (133 mm).
  - b. Thermal Resistance (R): 29.2.

E. Thermabase-CI: Closed-cell polyisocyanurate (polyiso) foam insulation layer bonded to a nailing surface.

- 1. Insulation Layer: Rmax Thermasheath-3.
- 2. Insulation Layer: Rmax Durasheath-3.
- 3. Nailing Surface (standard): 7/16 inch (11mm) OSB (APA rated).
- 4. Compliance:
  - a. ASTM C1289 Type V.
  - b. ASHRAE 90.1.
  - c. International Energy Conservation Code (IECC).
  - d. IRC (International Residential Code).
  - e. California Code of Regulations, Title 24
- 5. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
- 6. Compressive Strength in accordance with ASTM D1621: 20 psi.
- 7. Flame Spread, Core in accordance with ASTM E84: 75 or less.
- 8. Smoke Developed, Core in accordance with ASTM E84: 450 or less.
- 9. Water Vapor Transmission in accordance with ASTM E96: Less than 0.3 perms.
- 10. Water Absorption in accordance with ASTM C209: Less than 0.2 percent by volume.
- 11. Water Vapor Transmission in accordance with ASTM E96: Less than 1.5 perms.
- 12. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
- 13. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
- 14. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).

15. Composite Insulation and Wood Thickness: 1.0 inches (25mm).
    - a. Thermal Resistance (R): 3.8.
  16. Composite Insulation and Wood Thickness: 1.25 inches (32mm).
    - a. Thermal Resistance (R): 5.3.
  17. Composite Insulation and Wood Thickness: 1.5 inches (38mm).
    - a. Thermal Resistance (R): 6.6.
  18. Composite Insulation and Wood Thickness: 2.0 inches (51mm).
    - a. Thermal Resistance (R): 10.2.
  19. Composite Insulation and Wood Thickness: 2.5 inches (64mm).
    - a. Thermal Resistance (R): 13.7.
  20. Composite Insulation and Wood Thickness: 3.0 inches (76mm).
    - a. Thermal Resistance (R): 17.3.
  21. Composite Insulation and Wood Thickness: 3.5 inches (89mm).
    - a. Thermal Resistance (R): 20.9.
  22. Composite Insulation and Wood Thickness: 4.0 inches (102mm).
    - a. Thermal Resistance (R): 24.5.
  23. Composite Insulation and Wood Thickness: 4.5 inches (114mm).
    - a. Thermal Resistance (R): 28.0.
  24. Composite Insulation and Wood Thickness: 5.0 inches (127mm).
    - a. Thermal Resistance (R): 31.6.
  25. Composite Insulation and Wood Thickness: 1.0 inches (25mm).
    - a. Thermal Resistance (R): 3.6.
  26. Composite Insulation and Wood Thickness: 1.25 inches (32mm).
    - a. Thermal Resistance (R): 5.1.
  27. Composite Insulation and Wood Thickness: 1.5 inches (38mm).
    - a. Thermal Resistance (R): 6.6.
  28. Composite Insulation and Wood Thickness: 2.0 inches (51mm).
    - a. Thermal Resistance (R): 9.6.
  29. Composite Insulation and Wood Thickness: 2.5 inches (64mm).
    - a. Thermal Resistance (R): 12.7.
  30. Composite Insulation and Wood Thickness: 3.0 inches (76mm).
    - a. Thermal Resistance (R): 15.9.
  31. Composite Insulation and Wood Thickness: 3.5 inches (89mm).
    - a. Thermal Resistance (R): 19.1.
  32. Composite Insulation and Wood Thickness: 4.0 inches (102mm).
    - a. Thermal Resistance (R): 22.3.
  33. Composite Insulation and Wood Thickness: 4.5 inches (114mm).
    - a. Thermal Resistance (R): 25.6.
  34. Composite Insulation and Wood Thickness: 5.0 inches (127mm).
    - a. Thermal Resistance (R): 28.9.
- F. TSX-8500: Exposed use, closed-cell polyisocyanurate insulation with a 12 mil glass fiber reinforced foil facer on one side and a 10mil glass fiber reinforced foil facer on the other side.
1. Compliance:
    - a. ASTM C1289 Type I, Class 1.
    - b. ASHRAE 90.1.
    - c. International Energy Conservation Code (IECC).
    - d. International Building Code (IBC) Section 2603, Foam Plastic.
    - e. DRJ TER 1309-03.
    - f. ESR-1864, ICC Evaluation Service.
    - g. Miami-Dade County Product Control Approved.
    - h. RR 25322, City of Los Angeles Research Report.
    - i. California Code of Regulations, Title 24.
    - j. Class A Flame Spread and Smoke Developed Indices per IBC Chapter 8, Interior Finishes.

- k. Tested per UL1715 to comply with IBC Section 2603, Special Approval paragraph:
      - 1) Up to 4.5 inches (114 mm) on walls.
      - 2) Up to 12 inches (305 mm) on ceilings.
    - l. Tested per NFPA 285 to comply with IBC Section 2603.5.5
    - m. Water-Resistive Barrier (WRB) per AC71 (ASTM E331, AATCC Test Method 127)
    - n. Air Barrier Material per ASTM E2178
    - o. 1,2,3 or 4 hour Fire Rated Assemblies as shown in the UL Fire Resistance Directory
      - 1) Design No: U026, U326, U330, U354, U424, U460, U902, U904, U905, U906, U907, V454 and V499.
  - 2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  - 3. Compressive Strength in accordance with ASTM D1621: 20 psi.
  - 4. Flame Spread in accordance with ASTM E84: 25 or less.
  - 5. Smoke Developed in accordance with ASTM E84: 450 or less.
  - 6. Water Vapor Transmission in accordance with ASTM E96: Less than 0.3 perms.
  - 7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  - 8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  - 9. Air Permeance in accordance with ASTM E2178: Less than 0.02 L/(s.m2)
  - 10. Fire Performance in accordance with UL 1715.
  - 11. Fire Performance in accordance with NFPA 285.
  - 12. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  - 13. Thickness: 1.0 inches (25mm).
    - a. Thermal Resistance (R): 6.0.
  - 14. Thickness: 1.5 inches (38mm).
    - a. Thermal Resistance (R): 9.6.
  - 15. Thickness: 2.0 inches (51mm).
    - a. Thermal Resistance (R): 13.1.
  - 16. Thickness: 2.5 inches (64mm).
    - a. Thermal Resistance (R): 16.7.
  - 17. Thickness: 3.0 inches (76mm).
    - a. Thermal Resistance (R): 20.3.
  - 18. Thickness: 3.5 inches (89mm).
    - a. Thermal Resistance (R): 23.9.
  - 19. Thickness: 4.0 inches (102mm).
    - a. Thermal Resistance (R): 27.4.
  - 20. Thickness: 4.5 inches (114mm).
    - a. Thermal Resistance (R): 31.0.
- G. TSX-8510: Exposed use, closed-cell polyisocyanurate insulation with a 12mil glass fiber reinforced white coated foil facer on one side and a 10mil glass fiber reinforced foil facer on the other side.
  - 1. Compliance:
    - a. ASTM C1289 Type I, Class 1.
    - b. ASHRAE 90.1.
    - c. International Energy Conservation Code (IECC).
    - d. International Building Code (IBC) Section 2603, Foam Plastic
    - e. DRJ TER 1309-03
    - f. ESR-1864, ICC Evaluation Service
    - g. Miami-Dade County Product Control Approved
    - h. RR 25322, City of Los Angeles Research Report

- i. California Code of Regulations, Title 24
  - j. Class A Flame Spread and Smoke Developed Indices per IBC Chapter 8, Interior Finishes
  - k. Tested per UL1715 to comply with IBC Section 2603, Special Approval paragraph:
    - 1) Up to 4.5 inches on walls
    - 2) Up to 12 inches on ceilings
  - l. Tested per NFPA 285 to comply with IBC Section 2603.5.5
  - m. Water-Resistive Barrier (WRB) per AC71 (ASTM E331, AATCC Test Method 127)
  - n. Air Barrier Material per ASTM E2178
  - o. 1,2,3 or 4 hour Fire Rated Assemblies as shown in the UL Fire Resistance Directory
    - 1) Design No: U026, U326, U330, U354, U424, U460, U902, U904, U905, U906, U907, V454, V499
2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  3. Compressive Strength in accordance with ASTM D1621: 20 psi.
  4. Flame Spread in accordance with ASTM E84: 25 or less.
  5. Smoke Developed in accordance with ASTM E84: 450 or less.
  6. Water Vapor Transmission in accordance with ASTM E96: Less than 0.03 perms.
  7. Water Absorption in accordance with ASTM C209: Less than 0.2 percent by volume.
  8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  9. Air Permeance in accordance with ASTM E2178: Less than 0.02 L/(s.m2)
  10. Fire Performance in accordance with UL 1715.
  11. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  12. Thickness: 1.0 inches (25mm).
    - a. Thermal Resistance (R): 6.0.
  13. Thickness: 1.5 inches (38mm).
    - a. Thermal Resistance (R): 9.6.
  14. Thickness: 2.0 inches (51mm).
    - a. Thermal Resistance (R): 13.1.
  15. Thickness: 2.5 inches (64mm).
    - a. Thermal Resistance (R): 16.7.
  16. Thickness: 3.0 inches (76mm).
    - a. Thermal Resistance (R): 20.3.
  17. Thickness: 3.5 inches (89mm).
    - a. Thermal Resistance (R): 23.9.
  18. Thickness: 4.0 inches (102mm).
    - a. Thermal Resistance (R): 27.4.
  19. Thickness: 4.5 inches (114mm).
    - a. Thermal Resistance (R): 31.0.
- H. Thermasheath-SI: Composite product made up of an insulation and structural component. The insulation component is a closed-cell polyisocyanurate insulation with reinforced foil facer on each side. Performance data for polyiso insulation only.
1. Compliance:
    - a. ASTM C1289 Type I, Class 1 Polyiso.
    - b. International Residential Code (IRC).
    - c. International Building Code (IBC) Type V Construction.
    - d. International Energy Conservation Code (IECC).
    - e. ASHRAE 90.1.
    - f. DrJ TER 1207-01.

- g. Structural:
  - 1) ASTM E72, ASTM E564, ASTM 2126 and SBCRI Single Element Lateral Load testing.
- h. Tested per NFPA 286 to comply with ICC-ES AC12 Appendix B
- i. Water-Resistive Barrier (WRB) per AC71 (ASTM E331, AATCC Test Method 127)
- j. Air Barrier Material per ASTM E2178
- k. 1,2,3 or 4 hour Fire Rated Assemblies as shown in the UL Fire Resistance Directory:
  - 1) Design No: U026, U326, U330, U354, U424, U460, U902, U904, U905, U906, U907, V454, V499
- 2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
- 3. Compressive Strength in accordance with ASTM D1621: 20 psi.
- 4. Flame Spread in accordance with ASTM E84: 75 or less.
- 5. Smoke Developed in accordance with ASTM E84: 450 or less.
- 6. Water Vapor Transmission in accordance with ASTM E96: Less than 0.03 perms.
- 7. Water Absorption in accordance with ASTM C209: Less than 0.2 percent by volume.
- 8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
- 9. Air Permeance in accordance with ASTM E2178: Less than 0.02 L/(s.m2)
- 10. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
- 11. Thickness: 0.5 inches (13mm).
  - a. Thermal Resistance (R): 3.2.
- 12. Thickness: 0.75 inches (19mm).
  - a. Thermal Resistance (R): 5.0.
- 13. Thickness: 1.0 inches (25mm).
  - a. Thermal Resistance (R): 6.0.
- I. Thermasheath-3: Closed-cell polyisocyanurate insulation with reinforced foil facer on each side.
  - 1. Compliance:
    - a. ASTM C1289 Type I, Class 1
    - b. ASHRAE 90.1.
    - c. International Energy Conservation Code (IECC).
    - d. International Building Code (IBC) Section 2603, Foam Plastic.
    - e. DrJ TER 1309-03.
    - f. ESR-1864, ICC Evaluation Service.
    - g. Miami-Dade County Product Control Approved.
    - h. RR 25322, City of Los Angeles Research Report.
    - i. California Code of Regulations, Title 24.
    - j. Canadian Construction Materials Centre Evaluation #CCMC 13381-L manufactured to conform to CAN/ULC-S704-03 Type 1, Class 1.
    - k. Air Barrier Material per ASTM E2178.
    - l. 1,2,3 or 4 hour Fire Rated Assemblies as shown in the UL Fire Resistance Directory:
      - 1) Design No: U026, U326, U330, U354, U424, U460, U902, U904, U905, U906, U907, V454, V499
  - 2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  - 3. Compressive Strength in accordance with ASTM D1621: 20 psi.
  - 4. Flame Spread in accordance with ASTM E84: 75 or less.
  - 5. Smoke Developed in accordance with ASTM E84: 450 or less.
  - 6. Water Vapor Transmission in accordance with ASTM E96: Less than 0.03 perms.

7. Water Absorption in accordance with ASTM C209: Less than 0.2 percent by volume.
  8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  9. Air Permeance in accordance with ASTM E2178: Less than 0.02 L/(s.m<sup>2</sup>)
  10. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  11. Thickness: 0.5 inches (13mm).
    - a. Thermal Resistance (R): 3.2.
  12. Thickness: 0.75 inches (19mm).
    - a. Thermal Resistance (R): 5.0.
  13. Thickness: 1.0 inches (25mm).
    - a. Thermal Resistance (R): 6.0.
  14. Thickness: 1.5 inches (38mm).
    - a. Thermal Resistance (R): 9.6.
  15. Thickness: 2.0 inches (51mm).
    - a. Thermal Resistance (R): 13.1.
  16. Thickness: 2.5 inches (64mm).
    - a. Thermal Resistance (R): 16.7.
  17. Thickness: 3.0 inches (76mm).
    - a. Thermal Resistance (R): 20.3.
  18. Thickness: 3.5 inches (89mm).
    - a. Thermal Resistance (R): 23.9.
  19. Thickness: 4.0 inches (102mm).
    - a. Thermal Resistance (R): 27.4.
  20. Thickness: 4.5 inches (114mm).
    - a. Thermal Resistance (R): 31.0.
- J. Thermasheath-XP: Closed-cell polyisocyanurate (polyiso) foam, which is bonded on both sides with highly durable, embossed aluminum facers. One side has a white modified acrylic coating and the other side has a reflective surface with a clear coating. .
1. Compliance:
    - a. ASTM C1289 Type I, Class 1
    - b. International Residential Code (IRC).
    - c. International Building Code (IBC) Section 2603, Foam Plastic.
    - d. International Energy Conservation Code (IECC).
    - e. ASHRAE 90.1.
    - f. DrJ TER 1309-03.
    - g. California Code of Regulations, Title 24
    - h. Air Barrier Material per ASTM E2178.
    - i. Class A Flame Spread and Smoke Developed Indices per IBC Chapter 8, Interior Finishes.
    - j. Tested per UL1715 to comply with IBC Section 2603, Special Approval paragraph:
      - 1) Up to 12 inches on ceilings.
      - 2) Up to 4.5 inches on walls.
    - k. 1,2,3 or 4 hour Fire Rated Assemblies as shown in the UL Fire Resistance Directory:
      - 1) Design No: U026, U326, U330, U354, U424, U460, U902, U904, U905, U906, U907, V454 and V499.
  2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  3. Compressive Strength in accordance with ASTM D1621: 20 psi.
  4. Flame Spread in accordance with ASTM E84: 25 or less.
  5. Smoke Developed in accordance with ASTM E84: 450 or less.
  6. Water Vapor Transmission in accordance with ASTM E96: Less than 0.03

- perms.
- 7. Water Absorption in accordance with ASTM C209: Less than 0.2 percent by volume.
- 8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
- 9. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
- 10. Thickness: 0.75 inches (19mm).
  - a. Thermal Resistance (R): 5.0.
- 11. Thickness: 1.0 inches (25mm).
  - a. Thermal Resistance (R): 6.0.
- 12. Thickness: 1.5 inches (38mm).
  - a. Thermal Resistance (R): 9.6.
- 13. Thickness: 2.0 inches (51mm).
  - a. Thermal Resistance (R): 13.1.
- 14. Thickness: 2.5 inches (64mm).
  - a. Thermal Resistance (R): 16.7.
- 15. Thickness: 3.0 inches (76mm).
  - a. Thermal Resistance (R): 20.3.
- 16. Thickness: 3.5 inches (89mm).
  - a. Thermal Resistance (R): 23.9.
- 17. Thickness: 4.0 inches (102mm).
  - a. Thermal Resistance (R): 27.4.
- 18. Thickness: 4.5 inches (114mm).
  - a. Thermal Resistance (R): 31.0.

K. R-Matte Plus-3: Closed-cell polyisocyanurate insulation with reinforced foil facer on each side; reflective on one side and non-glare matte on the other side.

- 1. Compliance:
  - a. ASTM C1289 Type I, Class 1.
  - b. ASHRAE 90.1.
  - c. International Energy Conservation Code (IECC).
  - d. International Building Code (IBC) Section 2603, Foam Plastic
  - e. Miami-Dade County Product Control Approved.
  - f. California Code of Regulations, Title 24.
  - g. Air Barrier Material per ASTM E2178.
- 2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
- 3. Compressive Strength in accordance with ASTM D1621: 20 psi.
- 4. Flame Spread in accordance with ASTM E84: 75 or less.
- 5. Smoke Developed in accordance with ASTM E84: 450 or less.
- 6. Water Vapor Transmission in accordance with ASTM E96: Less than 0.3 perms.
- 7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
- 8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
- 9. Air Permeance in accordance with ASTM E2178: Less than 0.02 L/(s.m2)
- 10. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
- 11. Thickness: 0.5 inches (13mm).
  - a. Thermal Resistance (R): 3.2.
- 12. Thickness: 0.75 inches (19mm).
  - a. Thermal Resistance (R): 5.0.
- 13. Thickness: 1.0 inches (25mm).
  - a. Thermal Resistance (R): 6.0.
- 14. Thickness: 1.5 inches (38mm).

- a. Thermal Resistance (R): 9.6.
  - 15. Thickness: 2.0 inches (51mm).
    - a. Thermal Resistance (R): 13.1.
  - 16. Thickness: 2.5 inches (64mm).
    - a. Thermal Resistance (R): 16.7.
  - 17. Thickness: 3.0 inches (76mm).
    - a. Thermal Resistance (R): 20.3.
  - 18. Thickness: 3.5 inches (89mm).
    - a. Thermal Resistance (R): 23.9.
  - 19. Thickness: 4.0 inches (102mm).
    - a. Thermal Resistance (R): 27.4.
  - 20. Thickness: 4.5 inches (114mm).
    - a. Thermal Resistance (R): 31.0.
- L. Durasheath-3: Closed-cell polyisocyanurate insulation with an inorganic polymer coated glass fiber mat facer on each side.
- 1. Compliance:
    - a. ASTM C1289 Type II, Class 2
    - b. ASHRAE 90.1.
    - c. International Building Code (IBC) Section 2603, Foam Plastic
    - d. California Code of Regulations, Title 24
    - e. 1,2,3 or 4 hour Fire Rated Assemblies as shown in the UL Fire Resistance Directory:
      - 1) Design No: U026, U326, U330, U354, U424, U460, U902, U904, U905, U906, U907, V454, and V499.
  - 2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  - 3. Compressive Strength in accordance with ASTM D1621: 20 psi.
  - 4. Flame Spread in accordance with ASTM E84: 75 or less.
  - 5. Smoke Developed in accordance with ASTM E84: 450 or less.
  - 6. Water Vapor Transmission in accordance with ASTM E96: Less than 1.5 perms.
  - 7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  - 8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  - 9. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  - 10. Thickness: 0.5 inches (13mm).
    - a. Thermal Resistance (R): 3.0.
  - 11. Thickness: 0.75 inches (19mm).
    - a. Thermal Resistance (R): 4.5.
  - 12. Thickness: 1.0 inches (25mm).
    - a. Thermal Resistance (R): 6.0.
  - 13. Thickness: 1.5 inches (38mm).
    - a. Thermal Resistance (R): 9.0.
  - 14. Thickness: 2.0 inches (51mm).
    - a. Thermal Resistance (R): 12.1.
  - 15. Thickness: 2.5 inches (64mm).
    - a. Thermal Resistance (R): 15.3.
  - 16. Thickness: 3.0 inches (76mm).
    - a. Thermal Resistance (R): 18.5.
  - 17. Thickness: 3.5 inches (89mm).
    - a. Thermal Resistance (R): 21.7.
  - 18. Thickness: 4.0 inches (102mm).
    - a. Thermal Resistance (R): 25.0.
  - 19. Thickness: 4.5 inches (114mm).



- a. Thermal Resistance (R): 28.3.

## 2.3 CONTINUOUS INSULATION FOR ROOFS

- A. Multi-Max FA-3: Closed-cell polyisocyanurate roof insulation with glass fiber / organic mat facer on each side.
  - 1. Compliance:
    - a. ASTM C1289 Type II, Class 1.
    - b. International Building Code (IBC) Section 2603, Foam Plastic.
    - c. ASHRAE 90.1.
    - d. Miami-Dade County Product Control Approved.
    - e. RR 25378, City of Los Angeles Research Report.
    - f. California Code of Regulations, Title 24.
    - g. Factory Mutual - Class 1 roofing per FM Standard 4470 (1.5 inches minimum thickness). Multi-Max FA-3 is subject to the conditions of approval such as a roof insulation when installed as described in the current edition of the FMRC "Approval Guide." Refer to FM Approvals RoofNav for specific system details.
    - h. Underwriters Laboratories - UL listed and labeled as shown in UL Certifications Directory:
      - 1) Class A for External Flame - UL Standard 790.
      - 2) Class A for Internal Flame - UL Standard 1256.
      - 3) Fire Rated Roof/Ceiling Assemblies - UL Standard 263.
  - 2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  - 3. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type II, 20 psi (138 kPa) minimum for Grade 2 and 25 psi (172 kPa) for Grade 3.
  - 4. Flame Spread in accordance with ASTM E84: 25 to 60.
  - 5. Smoke Developed in accordance with ASTM E84: 75 to 160.
  - 6. Water Vapor Transmission in accordance with ASTM E96: Less than 1.5 perms.
  - 7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  - 8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  - 9. Class 1 roof insulation per FM Standard 4450.
  - 10. Class A for external flame per UL Standard 790.
  - 11. Class A for internal flame per UL Standard 1256.
  - 12. Fire rated roof/ceiling assemblies per UL Standard 263.
  - 13. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  - 14. Thickness: 1.5 inches (38mm).
    - a. Long Term Thermal Resistance (LTTR): 8.6.
  - 15. Thickness: 2.0 inches (51mm).
    - a. Long Term Thermal Resistance (LTTR): 11.4.
  - 16. Thickness: 2.5 inches (64mm).
    - a. Long Term Thermal Resistance (LTTR): 14.4.
  - 17. Thickness: 3.0 inches (76mm).
    - a. Long Term Thermal Resistance (LTTR): 17.4.
  - 18. Thickness: 3.5 inches (89mm).
    - a. Long Term Thermal Resistance (LTTR): 20.5.
  - 19. Thickness: 4.0 inches (102mm).
    - a. Long Term Thermal Resistance (LTTR): 23.6.
- B. Tapered TherमारooF-3: Closed-cell polyisocyanurate roof insulation with glass fiber / organic mat facer on each side.
  - 1. Compliance:

- a. ASTM C1289 Type II, Class 1
  - b. International Building Code (IBC) Section 2603, Foam Plastic.
  - c. ASHRAE 90.1.
  - d. Miami-Dade County Product Control Approved
  - e. RR 25378, City of Los Angeles Research Report
  - f. California Code of Regulations, Title 24
  - g. Factory Mutual - Class 1 roofing per FM Standard 4470 (1.5 inches minimum thickness). Tapered Thermaroof-3 is subject to the conditions of approval such as a roof insulation when installed as described in the current edition of the FMRC "Approval Guide." Refer to FM Approvals RoofNav for specific system details
  - h. Underwriters Laboratories - UL listed and labeled as shown in UL Certifications Directory:
    - 1) Class A for External Flame - UL Standard 790.
    - 2) Class A for Internal Flame - UL Standard 1256.
    - 3) Fire Rated Roof/Ceiling Assemblies - UL Standard 263.
2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  3. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type II, 20 psi (138 kPa) minimum for Grade 2 and 25 psi (172 kPa) for Grade 3.
  4. Flame Spread in accordance with ASTM E84: 25 to 60.
  5. Smoke Developed in accordance with ASTM E84: 75 to 160.
  6. Water Vapor Transmission in accordance with ASTM E96: Less than 1.5 perms.
  7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  9. Class 1 roof insulation per FM Standard 4450.
  10. Class A for external flame per UL Standard 790.
  11. Class A for internal flame per UL Standard 1256.
  12. Fire rated roof/ceiling assemblies per UL Standard 263.
  13. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  14. Panel Label AA, Slope: 1/8 inch. Average Thickness: .75 inches (19mm).
    - a. Nominal Thickness 0.50 inches (13mm) to 1.00 inches (25mm);
    - b. Long Term Thermal Resistance (LTTR): 4.3.
  15. Panel Label A, Slope: 1/8 inch. Average Thickness: 1.25 inches (32mm).
    - a. Nominal Thickness 1.00 inches (25mm) to 1.50 inches (38mm)
    - b. Long Term Thermal Resistance (LTTR): 7.1.
  16. Panel Label B, Slope: 1/8 inch. Average Thickness: 1.75 inches (44mm).
    - a. Nominal Thickness 1.50 inches (38mm) to 2.00 inches (51mm)
    - b. Long Term Thermal Resistance (LTTR): 9.9.
  17. Panel Label C, Slope: 1/8 inch. Average Thickness: 2.25 inches (57mm).
    - a. Nominal Thickness 2.00 inches (51mm) to 2.50 inches (64mm)
    - b. Long Term Thermal Resistance (LTTR): 12.9.
  18. Panel Label D, Slope: 1/8 inch. Average Thickness: 2.75 inches (70mm).
    - a. Nominal Thickness 2.50 inches (64mm) to 3.00 inches (76mm)
    - b. Long Term Thermal Resistance (LTTR): 15.9.
  19. Panel Label E, Slope: 1/8 inch. Average Thickness: 3.25 inches (83mm).
    - a. Nominal Thickness 3.00 inches (76mm) to 3.50 inches (89mm)
    - b. Long Term Thermal Resistance (LTTR): 18.9.
  20. Panel Label F, Slope: 1/8 inch. Average Thickness: 3.75 inches (95mm).
    - a. Nominal Thickness 3.50 inches (89mm) to 4.00 inches (102mm)
    - b. Long Term Thermal Resistance (LTTR): 22.0.
  21. Panel Label X, Slope: 1/4 inch. Average Thickness: 1.00 inches (25mm).
    - a. Nominal Thickness 0.50 inches (13mm) to 1.50 inches (38mm)

- b. Long Term Thermal Resistance (LTTR): 5.7.
  - 22. Panel Label G, Slope: 1/4 inch. Average Thickness: 1.50 inches (38mm).
    - a. Nominal Thickness 1.00 inches (25mm) to 2.00 inches (51mm)
    - b. Long Term Thermal Resistance (LTTR): 8.6.
  - 23. Panel Label Y, Slope: 1/4 inch. Average Thickness: 2.0 inches (51mm).
    - a. Nominal Thickness 1.50 inches (38mm) to 2.50 inches (64mm)
    - b. Long Term Thermal Resistance (LTTR): 11.4.
  - 24. Panel Label H, Slope: 1/4 inch. Average Thickness: 2.50 inches (64mm).
    - a. Nominal Thickness 2.00 inches (51mm) to 3.00 inches (76mm)
    - b. Long Term Thermal Resistance (LTTR): 14.4.
  - 25. Panel Label Z, Slope: 1/4 inch. Average Thickness: 3.00 inches (76mm).
    - a. Nominal Thickness 2.50 inches (64mm) to 3.50 inches (89mm)
    - b. Long Term Thermal Resistance (LTTR): 17.4.
  - 26. Panel Label I, Slope: 1/4 inch. Average Thickness: 3.5 inches (89mm).
    - a. Nominal Thickness 3.00 inches (76mm) to 4.00 inches (102mm)
    - b. Long Term Thermal Resistance (LTTR): 20.5.
  - 27. Panel Label Q, Slope: 1/2 inch. Average Thickness: 1.5 inches (38mm).
    - a. Nominal Thickness 0.50 inches (13mm) to 2.50 inches (64mm)
    - b. Long Term Thermal Resistance (LTTR): 8.6.
- C. Ultra-Max: Closed-cell polyisocyanurate roof insulation with an inorganic polymer coated glass fiber mat facer on each side.
  - 1. Compliance:
    - a. ASTM C1289 Type II, Class 2
    - b. International Building Code (IBC) Section 2603, Foam Plastic.
    - c. ASHRAE 90.1.
    - d. California Code of Regulations, Title 24.
    - e. Factory Mutual - Class 1 roofing per FM Standard 4470 (1.5 inches minimum thickness). Ultra-Max is subject to the conditions of approval such as a roof insulation when installed as described in the current edition of the FMRC "Approval Guide." Refer to FM Approvals RoofNav for specific system details
    - f. Underwriters Laboratories - UL listed and labeled as shown in UL Certifications Directory:
      - 1) Class A for External Flame - UL Standard 790.
      - 2) Class A for Internal Flame - UL Standard 1256.
      - 3) Fire Rated Roof/Ceiling Assemblies - UL Standard 263.
  - 2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  - 3. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type II, 20 psi (138 kPa) minimum for Grade 2 and 25 psi (172 kPa) for Grade 3.
  - 4. Flame Spread in accordance with ASTM E84: 25 to 60.
  - 5. Smoke Developed in accordance with ASTM E84: 75 to 160.
  - 6. Water Vapor Transmission in accordance with ASTM E96: Less than 1.5 perms.
  - 7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  - 8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  - 9. Class 1 roof insulation per FM Standard 4450.
  - 10. Class A for external flame per UL Standard 790.
  - 11. Class A for internal flame per UL Standard 1256.
  - 12. Fire rated roof/ceiling assemblies per UL Standard 263.
  - 13. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  - 14. Thickness: 1.5 inches (38mm).
    - a. Long Term Thermal Resistance (LTTR): 8.6.

15. Thickness: 2.0 inches (51mm).
    - a. Long Term Thermal Resistance (LTTR): 11.4.
  16. Thickness: 2.5 inches (64mm).
    - a. Long Term Thermal Resistance (LTTR): 14.4.
  17. Thickness: 3.0 inches (76mm).
    - a. Long Term Thermal Resistance (LTTR): 17.4.
  18. Thickness: 3.5 inches (89mm).
    - a. Long Term Thermal Resistance (LTTR): 20.5.
  19. Thickness: 4.0 inches (102mm).
    - a. Long Term Thermal Resistance (LTTR): 23.6.
- D. Tapered Ultra-Max: Closed-cell polyisocyanurate roof insulation with an inorganic polymer coated glass fiber mat facer on each side.
1. Compliance:
    - a. ASTM C1289 Type II, Class 2
    - b. International Building Code (IBC) Section 2603, Foam Plastic.
    - c. ASHRAE 90.1.
    - d. California Code of Regulations, Title 24
    - e. Factory Mutual - Class 1 roofing per FM Standard 4470 (1.5 inches minimum thickness). Tapered Ultra-Max is subject to the conditions of approval such as a roof insulation when installed as described in the current edition of the FMRC "Approval Guide." Refer to FM Approvals RoofNav for specific system details
    - f. Underwriters Laboratories - UL listed and labeled as shown in UL Certifications Directory:
      - 1) Class A for External Flame - UL Standard 790.
      - 2) Class A for Internal Flame - UL Standard 1256.
      - 3) Fire Rated Roof/Ceiling Assemblies - UL Standard 263.
  2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  3. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type II, 20 psi (138 kPa) minimum for Grade 2 and 25 psi (172 kPa) for Grade 3.
  4. Flame Spread in accordance with ASTM E84: 25 to 60.
  5. Smoke Developed in accordance with ASTM E84: 75 to 160.
  6. Water Vapor Transmission in accordance with ASTM E96: Less than 1.5 perms.
  7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  9. Class 1 roof insulation per FM Standard 4450.
  10. Class A for external flame per UL Standard 790.
  11. Class A for internal flame per UL Standard 1256.
  12. Fire rated roof/ceiling assemblies per UL Standard 263.
  13. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  14. Panel Label AA, Slope: 1/8 inch. Average Thickness: .75 inches (19mm).
    - a. Nominal Thickness 0.50 inches (13mm) to 1.00 inches (25mm);
    - b. Long Term Thermal Resistance (LTTR): 4.3.
  15. Panel Label A, Slope: 1/8 inch. Average Thickness: 1.25 inches (32mm).
    - a. Nominal Thickness 1.00 inches (25mm) to 1.50 inches (38mm)
    - b. Long Term Thermal Resistance (LTTR): 7.1.
  16. Panel Label B, Slope: 1/8 inch. Average Thickness: 1.75 inches (44mm).
    - a. Nominal Thickness 1.50 inches (38mm) to 2.00 inches (51mm)
    - b. Long Term Thermal Resistance (LTTR): 9.9.
  17. Panel Label C, Slope: 1/8 inch. Average Thickness: 2.25 inches (57mm).
    - a. Nominal Thickness 2.00 inches (51mm) to 2.50 inches (64mm)

- b. Long Term Thermal Resistance (LTTR): 12.9.
  - 18. Panel Label D, Slope: 1/8 inch. Average Thickness: 2.75 inches (70mm).
    - a. Nominal Thickness 2.50 inches (64mm) to 3.00 inches (76mm)
    - b. Long Term Thermal Resistance (LTTR): 15.9.
  - 19. Panel Label E, Slope: 1/8 inch. Average Thickness: 3.25 inches (83mm).
    - a. Nominal Thickness 3.00 inches (76mm) to 3.50 inches (89mm)
    - b. Long Term Thermal Resistance (LTTR): 18.9.
  - 20. Panel Label F, Slope: 1/8 inch. Average Thickness: 3.75 inches (95mm).
    - a. Nominal Thickness 3.50 inches (89mm) to 4.00 inches (102mm)
    - b. Long Term Thermal Resistance (LTTR): 22.0.
  - 21. Panel Label X, Slope: 1/4 inch. Average Thickness: 1.00 inches (25mm).
    - a. Nominal Thickness 0.50 inches (13mm) to 1.50 inches (38mm)
    - b. Long Term Thermal Resistance (LTTR): 5.7.
  - 22. Panel Label G, Slope: 1/4 inch. Average Thickness: 1.50 inches (38mm).
    - a. Nominal Thickness 1.00 inches (25mm) to 2.00 inches (51mm)
    - b. Long Term Thermal Resistance (LTTR): 8.6.
  - 23. Panel Label Y, Slope: 1/4 inch. Average Thickness: 2.0 inches (51mm).
    - a. Nominal Thickness 1.50 inches (38mm) to 2.50 inches (64mm)
    - b. Long Term Thermal Resistance (LTTR): 11.4.
  - 24. Panel Label H, Slope: 1/4 inch. Average Thickness: 2.50 inches (64mm).
    - a. Nominal Thickness 2.00 inches (51mm) to 3.00 inches (76mm)
    - b. Long Term Thermal Resistance (LTTR): 14.4.
  - 25. Panel Label Z, Slope: 1/4 inch. Average Thickness: 3.00 inches (76mm).
    - a. Nominal Thickness 2.50 inches (64mm) to 3.50 inches (89mm)
    - b. Long Term Thermal Resistance (LTTR): 17.4.
  - 26. Panel Label I, Slope: 1/4 inch. Average Thickness: 3.5 inches (89mm).
    - a. Nominal Thickness 3.00 inches (76mm) to 4.00 inches (102mm)
    - b. Long Term Thermal Resistance (LTTR): 20.5.
  - 27. Panel Label Q, Slope: 1/2 inch. Average Thickness: 1.5 inches (38mm).
    - a. Nominal Thickness 0.50 inches (13mm) to 2.50 inches (64mm)
    - b. Long Term Thermal Resistance (LTTR): 8.6.
- E. Re-Cover Board-3: Closed-cell polyisocyanurate roof insulation with either glass fiber / organic mat facer on each side or inorganic polymer coated glass fiber mat facer on each side.
- 1. Compliance:
    - a. ASTM C1289 Type II, Class 1.
    - b. International Building Code (IBC) Section 2603, Foam Plastic.
    - c. ASHRAE 90.1.
    - d. Miami-Dade County Product Control Approved.
    - e. RR 25378, City of Los Angeles Research Report.
    - f. California Code of Regulations, Title 24.
  - 2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  - 3. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type II, 20 psi (138 kPa) minimum for Grade 2 and 25 psi (172 kPa) for Grade 3.
  - 4. Flame Spread in accordance with ASTM E84: 25 to 60.
  - 5. Smoke Developed in accordance with ASTM E84: 75 to 160.
  - 6. Water Vapor Transmission in accordance with ASTM E96: Less than 1.5 perms.
  - 7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  - 8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  - 9. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  - 10. Fiber/organic mat facer: like that of Rmax Multi-Max FA-3.

11. Inorganic polymer coated glass fiber mat facer: like Rmax Ultra-Max3.
  12. Thickness: 1.0 inches (25mm).
    - a. Long Term Thermal Resistance (LTTR): 5.7.
  13. Thickness: 1.1 inches (28mm).
    - a. Long Term Thermal Resistance (LTTR): 6.3.
  14. Thickness: 1.2 inches (30mm).
    - a. Long Term Thermal Resistance (LTTR): 6.8.
  15. Thickness: 1.25 inches (32mm).
    - a. Long Term Thermal Resistance (LTTR): 7.1.
  16. Thickness: 1.3 inches (33mm).
    - a. Long Term Thermal Resistance (LTTR): 7.4.
  17. Thickness: 1.4 inches (36mm).
    - a. Long Term Thermal Resistance (LTTR): 8.0.
- F. Nailable Base-3: Composite product composed of a closed-cell polyisocyanurate roof insulation with glass fiber / organic mat facer on one side and a nailing panel on the top surface, such 7/16 inch or 5/8 inch OSB or CDX plywood (APA rated). Following physical properties are for the insulation component only.
1. Compliance:
    - a. ASTM C1289 Type V.
    - b. International Building Code (IBC) Section 2603, Foam Plastic.
    - c. ASHRAE 90.1.
    - d. RR 25378, City of Los Angeles Research Report.
    - e. California Code of Regulations, Title 24.
    - f. Factory Mutual - Class 1 roofing per FM Standard 4470 (2.0 inches minimum thickness). Vented Nailable Base-3 is subject to the conditions of approval such as a roof insulation when installed as described in the current edition of the FMRC "Approval Guide." Refer to FM Approvals RoofNav for specific system details.
  2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  3. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type II, 20 psi (138 kPa) minimum for Grade 2 and 25 psi (172 kPa) for Grade 3.
  4. Flame Spread in accordance with ASTM E84: 25 to 60.
  5. Smoke Developed in accordance with ASTM E84: 75 to 160.
  6. Water Vapor Transmission in accordance with ASTM E96: Less than 1.5 perms.
  7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  9. Class 1 roof insulation per FM Standard 4450 (2 inches minimum thickness).
  10. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  11. Thickness: 1.5 inches (38mm).
    - a. Long Term Thermal Resistance (LTTR): 6.3.
  12. Thickness: 2.1 inches (53mm).
    - a. Long Term Thermal Resistance (LTTR): 9.7.
  13. Thickness: 2.5 inches (64mm).
    - a. Long Term Thermal Resistance (LTTR): 12.0.
  14. Thickness: 2.7 inches (69mm).
    - a. Long Term Thermal Resistance (LTTR): 13.2.
  15. Thickness: 3.0 inches (76mm).
    - a. Long Term Thermal Resistance (LTTR): 15.0.
  16. Thickness: 3.3 inches (84mm).
    - a. Long Term Thermal Resistance (LTTR): 16.8.
  17. Thickness: 3.5 inches (89mm).

- a. Long Term Thermal Resistance (LTTR): 18.0.
  - 18. Thickness: 3.8 inches (97mm).
    - a. Long Term Thermal Resistance (LTTR): 19.8.
  - 19. Thickness: 4.0 inches (102mm).
    - a. Long Term Thermal Resistance (LTTR): 21.1.
  - 20. Thickness: 4.5 inches (114mm).
    - a. Long Term Thermal Resistance (LTTR): 24.2.
  
- G. Vented Nailable Base-3: Composite product composed of a closed-cell polyisocyanurate roof insulation with glass fiber / organic mat facer on each side, furring strips and a nailing panel on the top surface, such 7/16 inch or 5/8 inch OSB or CDX plywood (APA rated). Following physical properties and thermal properties are for the insulation component only.
  - 1. Compliance:
    - a. ASTM C1289 Type V.
    - b. International Building Code (IBC) Section 2603, Foam Plastic.
    - c. ASHRAE 90.1.
    - d. California Code of Regulations, Title 24.
  - 2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  - 3. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type II, 20 psi (138 kPa) minimum for Grade 2 and 25 psi (172 kPa) for Grade 3.
  - 4. Flame Spread in accordance with ASTM E84: 25 to 60.
  - 5. Smoke Developed in accordance with ASTM E84: 75 to 160.
  - 6. Water Vapor Transmission in accordance with ASTM E96: Less than 1.5 perms.
  - 7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  - 8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  - 9. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  - 10. Thickness: 2.5 inches (64mm).
    - a. Long Term Thermal Resistance (LTTR): 5.7.
  - 11. Thickness: 3.0 inches (76mm).
    - a. Long Term Thermal Resistance (LTTR): 8.6.
  - 12. Thickness: 3.5 inches (89mm).
    - a. Long Term Thermal Resistance (LTTR): 11.4.
  - 13. Thickness: 4.0 inches (102mm).
    - a. Long Term Thermal Resistance (LTTR): 14.4.
  - 14. Thickness: 4.5 inches (114mm).
    - a. Long Term Thermal Resistance (LTTR): 17.4.
  - 15. Thickness: 5.0 inches (127mm).
    - a. Long Term Thermal Resistance (LTTR): 20.5.
  - 16. Thickness: 5.5 inches (140mm).
    - a. Long Term Thermal Resistance (LTTR): 23.6.
  
- H. Multi-Vent Nailable Base-3: Composite product composed of a closed-cell polyisocyanurate roof insulation with glass fiber / organic mat facer on each side, vent blocks and a nailing panel on the top surface, such 7/16 inch or 5/8 inch OSB or CDX plywood (APA rated). Following physical properties and thermal properties are for the insulation component only.
  - 1. Compliance:
    - a. ASTM C1289 Type V
    - b. International Building Code (IBC) Section 2603, Foam Plastic
    - c. ASHRAE 90.1.
    - d. California Code of Regulations, Title 24

2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  3. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type II, 20 psi (138 kPa) minimum for Grade 2 and 25 psi (172 kPa) for Grade 3.
  4. Flame Spread in accordance with ASTM E84: 25 to 60.
  5. Smoke Developed in accordance with ASTM E84: 75 to 160.
  6. Water Vapor Transmission in accordance with ASTM E96: Less than 1.5 perms.
  7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  9. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  10. Thickness: 2.5 inches (64mm).
    - a. Long Term Thermal Resistance (LTTR): 5.7.
  11. Thickness: 3.0 inches (76mm).
    - a. Long Term Thermal Resistance (LTTR): 8.7.
  12. Thickness: 3.5 inches (89mm).
    - a. Long Term Thermal Resistance (LTTR): 11.4.
  13. Thickness: 4.0 inches (102mm).
    - a. Long Term Thermal Resistance (LTTR): 14.4.
  14. Thickness: 4.5 inches (114mm).
    - a. Long Term Thermal Resistance (LTTR): 17.4.
  15. Thickness: 5.0 inches (127mm).
    - a. Long Term Thermal Resistance (LTTR): 20.5.
  16. Thickness: 5.5 inches (140mm).
    - a. Long Term Thermal Resistance (LTTR): 23.6.
- I. Therमारoof Plus-3: Closed-cell polyisocyanurate roof insulation with a reinforced aluminum foil facer on each side.
1. Compliance:
    - a. ASTM C1289 Type I
    - b. International Building Code (IBC) Section 2603, Foam Plastic
    - c. ASHRAE 90.1.
    - d. RR 25378, City of Los Angeles Research Report
    - e. California Code of Regulations, Title 24
    - f. Factory Mutual - Class 1 roofing per FM Standard 4470 (1.5 inches minimum thickness). Therमारoof Plus-3 is subject to the conditions of approval such as a roof insulation when installed as described in the current edition of the FMRC "Approval Guide." Refer to FM Approvals RoofNav for specific system details.
  2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  3. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type II, 20 psi (138 kPa) minimum for Grade 2 and 25 psi (172 kPa) for Grade 3.
  4. Flame Spread in accordance with ASTM E84: 25 to 60.
  5. Smoke Developed in accordance with ASTM E84: 75 to 160.
  6. Water Vapor Transmission in accordance with ASTM E96: Less than 0.3 perms.
  7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  9. Class 1 roof insulation per FM Standard 4450 (1.5 inches minimum).
  10. Service temperature: -40 degree F to +250 degree F (-38 degree C to 121 degree C).
  11. Thickness: 1.0 inches (25mm).



- a. Thermal Resistance (R): 6.0.
- 12. Thickness: 1.5 inches (38mm).
  - a. Thermal Resistance (R): 9.6.
- 13. Thickness: 2.0 inches (51mm).
  - a. Thermal Resistance (R): 13.1.
- 14. Thickness: 2.5 inches (64mm).
  - a. Thermal Resistance (R): 16.7.
- 15. Thickness: 3.0 inches (76mm).
  - a. Thermal Resistance (R): 20.3.
- 16. Thickness: 3.5 inches (89mm).
  - a. Thermal Resistance (R): 23.9.
- 17. Thickness: 4.0 inches (102mm).
  - a. Thermal Resistance (R): 27.4.

## 2.4 FLASHINGS AND TAPES

- A. R-SEAL 3000: Foil insulation flashing tape with acrylic pressure sensitive adhesive.
  - 1. Backing: 2mil Aluminum foil.
  - 2. Width: 4 inches (102mm).
  - 3. Width: 5 inches (127mm).
  - 4. Thickness: 3.4 mils (0.08mm).
- B. R-SEAL 3000W: Foil insulation flashing tape with acrylic pressure sensitive adhesive.
  - 1. Backing: 2mil White Aluminum foil.
  - 2. Width: 3 inches (76mm).
  - 3. Thickness: 3.8 mils (0.10mm).
- C. R-SEAL 6000: Woven polyethylene penetration flashing membrane with butyl rubber adhesive.
  - 1. Liner: Low Density Polyethylene (LDPE).
  - 2. Width: 9 inches (229mm).
  - 3. Width: 12 inches (305mm).
  - 4. Thickness: 35 mils (0.89mm).
- D. R-SEAL Construction Tape: Film insulation construction tape with acrylic pressure sensitive adhesive.
  - 1. Backing: 3mil White OPP film.
  - 2. Width: 3 inches (76mm).
  - 3. Thickness: 3.0 mils (0.076mm).

## 2.5 INSULATION CLIPS

- A. Flex-Tite Insulation Clips: Two piece (male/female) interlocking extrusions to seal insulation joints.
  - 1. Material: PVC Extrusions. UL Tested - Class A material, tested by Underwriters Laboratories (UL 723 - test for surface burning characteristics of building materials). Flame spread is 0 and smoke developed equals 190.
  - 2. Finish: White (standard).
  - 3. Insulation Thickness: 1.0 inches (25mm).
    - a. Male Part #MA0100 and Female Part #FE0100.
  - 4. Insulation Thickness: 1.5 inches (38mm).
    - a. Male Part #MA0150 and Female Part #FE0100.
  - 5. Insulation Thickness: 2.0 inches (51mm).
    - a. Male Part #MA0200 and Female Part #FE0200.
  - 6. Insulation Thickness: 2.5 inches (64mm).
    - a. Male Part #MA0155 and Female Part #FE0200.

7. Insulation Thickness: 3.0 inches (276mm).
    - a. Male Part #MA0200 and Female Part #FE0300.
  8. Insulation Thickness: 3.5 inches (89mm).
    - a. Male Part #MA0155 and Female Part #FE0300.
- B. Quick Clip Insulation Retaining System: One piece extrusions to seal insulation joints.
1. Material: PVC Extrusions. UL Tested - Class A material, tested by Underwriters Laboratories (UL 723 - test for surface burning characteristics of building materials). Flame spread is 0 and smoke developed equals 190.
  2. Finish: White (standard).
  3. Insulation Thickness: 1.0 inches (25mm)..
    - a. Quick Clip Part # QC0100.
  4. Insulation Thickness: 1.5 inches (38mm)..
    - a. Quick Clip Part # QC0150.
  5. Insulation Thickness: 2.0 inches (51mm)..
    - a. Quick Clip Part # QC0200.
  6. Insulation Thickness: 2.5 inches (64mm)..
    - a. Quick Clip Part # QC0250.
  7. Insulation Thickness: 3.0 inches (76mm)..
    - a. Quick Clip Part # QC0300.
- C. J-Channel: Extruded shape to terminate exposed edges of installed insulation.
1. Material: PVC Extrusions. UL Tested - Class A material, tested by Underwriters Laboratories (UL 723 - test for surface burning characteristics of building materials). Flame spread is 0 and smoke developed equals 190.
  2. Finish: White (standard).
  3. Insulation Thickness: 1.0 inches (25mm).
    - a. J-Channel Part # JC0100
  4. Insulation Thickness: 1.5 inches (38mm).
    - a. J-Channel Part # JC0150
  5. Insulation Thickness: 2.0 inches (51mm).
    - a. J-Channel Part # JC0200
  6. Insulation Thickness: 2.5 inches (64mm).
    - a. J-Channel Part # JC0250
  7. Insulation Thickness: 3.0 inches (76mm).
    - a. J-Channel Part # JC0275

## 2.6 NAILBOARD FASTENERS

- A. Nailboard Fasteners: Insulation Panel fasteners for use in vented or composite nail board application
1. Head: 5/8 inch (15.85 mm) oversized flat head.
  2. Thread Major Diameter: 0.245 inch (6.22 mm).
  3. Shank Diameter: 0.190 inch (4.82 mm).
  4. Point: #14 #3 square drive, drill point.
  5. Finish: Standard gray e-coating.
  6. 2-5/8 Inches (66 mm): Material No. 1119456.
  7. 3 Inches (76 mm): Material No. 1119468.
  8. 3-1/2 Inches (89 mm): Material No. 1119481.
  9. 4 Inches (101 mm): Material No. 1119482.
  10. 4-1/2 Inches (114 mm): Material No. 1119484.
  11. 5 Inches (127 mm): Material No. 1119486.
  12. 5-1/2 Inches (139 mm): Material No. 1119494.
  13. 6 Inches (152 mm): Material No. 1119495.
  14. 6-1/2 Inches (165 mm): Material No. 1119497.

15. 7 Inches (177 mm): Material No. 1119501.
16. 7-1/2 Inches (190 mm): Material No. 1119505.
17. 8 Inches (203 mm): Material No. 786137.
18. 8-1/2 Inches (215 mm): Material No. 1119513.
19. 9 Inches (228 mm): Material No. 1119516.
20. 10 Inches (254 mm): Material No. 1119539.

## 2.7 RAINSCREEN PANEL SYSTEM - ECOMAXci WITH R-Trac HVHZ Rainscreen system

### A. Pressure Equalized Rainscreen: iDry seal R-Trac HVHZ system by Altech Panel Systems. Featuring Rmax ECOMAXci and Alpolc composite material by Mitsubishi Plastics Composites America Inc.

#### 1. Composite Metal Panel System

- a. Panel system shall be nominal two-inch depth with shop applied, concealed continuous perimeter extrusions. (Note: Intermittent extrusions at panel perimeter are not acceptable.) Panel system shall employ shop attached clips with sliding capability for exact location over supports, while allowing for thermal movement in all four directions. To minimize thermal stresses on the panels, fixed attachment systems that don't allow free movement are not permissible.
- b. Panel system shall have minimal 1/2 inch (12 mm) or as indicated at the drawings vertical and horizontal joinery. Panel system shall be of rainscreen type with no exposed sealants permissible in the panel to panel joinery. Caulking is allowed only for non-exposed areas (e.g. top of roof coping).
- c. Panel joints to utilize an integral spline of the same composition as the panels. Splines to be held in place by slots in the perimeter panel extrusions. Bonding of metal material within the joinery to simulate an encapsulated spline is not permissible.
- d. All rivets and fasteners that are used to attach the MCM sheet to the extrusions shall be countersunk, painted the same color as the panel and uniformly aligned both vertically and horizontally.
- e. All internal weeps shall be baffled and aligned vertically
- f. All panel corners shall be reinforced with aluminum angles
- g. All routed folds at panel perimeter shall be reinforced with continuous extrusion system.
- h. Panel system shall be provided in panel modules and lengths as indicated on the Contract drawings (up to 60 inches (1524 mm) in the short direction and up to 240 inches (6096 mm) in the long direction).
- i. Panel system to be applied over properly installed Rmax ECOMAXci continuous insulation
- j. No caulks or sealants are allowed at the external reveal.

### B. MCM - Aluminum Composite Material: Formed with 0.020-inch thick coil-coated aluminum sheet facings. MCM sheets to be formed in a continuous, in-line process:

1. MCM Thickness: 0.157 inch (4 mm).
2. Core: Standard PE.
3. Core: Fire Retardant FR.
4. Bond Strength: (ASTM D1781): 22 in-lb/in minimum.
5. Coil coated with a fluoropolymer paint finish that meets or exceeds values expressed in AAMA 2605.
6. Exposed Finish:
  - a. 2-Coat Fluoropolymer: 0.8 mil nominal coil coated color with a fluoropolymer paint finish. Color coat to be applied over 0.2 mil nominal coil coated primer coat.

- b. 3-Coat Fluoropolymer: 0.8 mil coil coated fluoropolymer clear coat finish applied over a coil coated 0.8 mil fluoropolymer color coat. Fluoropolymer based coats to be applied subsequent to 0.2 mil nominal coil coated primer coat.
  - c. 2-coat Mica: 0.8 nominal coil coated fluoropolymer color coat containing Mica flakes within the paint finish. Color coat to be applied over 0.2 mil coil coated primer coat.
  - d. 3-coat coil coated Mica/Pearlescent fluoropolymer based finish.
- C. Continuous Insulation: Rmax ECOMAXci Continuous Insulation and its accompanying tape and flashing as underlayment sheathing system for above described MCM panels.
  - 1. Closed-cell Polyisocyanurate insulation with a 12mil glass fiber reinforced foil facer on one side and a 10mil glass fiber reinforced foil facer on the other side.
  - 2. Density (Nominal) in accordance with ASTM D1622: 2.0 pcf.
  - 3. Compressive Strength in accordance with ASTM D1621: 25 psi.
  - 4. Flame Spread in accordance with ASTM E84: 25 or less.
  - 5. Smoke Developed in accordance with ASTM E84: 450 or less.
  - 6. Water Vapor Transmission in accordance with ASTM E96: Less than 0.3 perms.
  - 7. Water Absorption in accordance with ASTM C209: Less than 1 percent by volume.
  - 8. Dimensional Stability in accordance with ASTM D2126: Less than 2 percent linear change.
  - 9. Air Permeance in accordance with ASTM E2178: Less than 0.02 l/ssm.
  - 10. Thickness: 2.0 inches (51mm). Thermal Resistance (R): 13.1.
  - 11. Thickness: 2.5 inches (64mm). Thermal Resistance (R): 16.7.
  - 12. Thickness: 3.0 inches (76mm). Thermal Resistance (R): 20.3.
- D. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, splines, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
- E. Fabrication: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacture's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
  - 1. Form panel lines, breaks and angles to be sharp and true, with surfaces free from warp and buckle.
  - 2. Fabricate metal wall panels in a manner that would weep any possible condensation to the exterior.
  - 3. Provide panel profile for full length of panel.
  - 4. Fabricate metal wall panel joints in a manner that will minimize noise from movements within panel assembly.
  - 5. Fabricate panels, as required to comply with deflection limits, without the use of backside panel stiffeners.
  - 6. Fabricate panels with sharply cut edges, with no displacement of face sheets or external exposure of core material.
  - 7. Dimensional Tolerances:
    - a. Length: Plus 0.375 inch (9.5 mm).
    - b. Width: Plus 0.188 inch (4.8 mm).
    - c. Thickness: Plus or minus 0.008 inch (0.2 mm).
    - d. Panel Bow: 0.8 percent maximum or panel length or width.

- e. Squareness: 0.2 inch (5 mm) maximum.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.3 INSTALLATION, GENERAL

- A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction.

### 3.4 INSTALLATION, RAINSCREEN PANEL SYSTEM

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on approved shop drawings. Install panels perpendicular to girts and subgirts, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
- B. Install attachment system required to support wall panels and to provide a complete weathertight wall system, including Polyisocyanurate sheathing, tapes, flashing, subgirts, perimeter extrusions, tracks, panel clips, and anchor channels as may be required. Sealants shall be utilized at typical vertical or horizontal joints, where applicable. Panel joints shall include a spline fabricated from same ACM system as panels.
- C. Installation Tolerances: Shim and align metal wall panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), non-accumulative, on level, plumb, and location lines as indicated and within 1/8 inch (3 mm) offset of adjoining faces and of alignment of matching profiles

### 3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION