1. **GENERAL**

   .1 All requirements of the contract documents form an integral part of the work specified herein; in particular refer to the general conditions and Division 1 of the specifications.

   .2 Composite Metal Panel System to be Alucobond as manufactured by 3A Composites USA Inc. and fabricated/distributed by:

   Thermal Systems KWC Ltd.
   2780 - 24 Avenue N.E.
   Calgary, AB  T1Y 6V7
   Telephone: (403) 250-5507
   Facsimile: (403) 250-6891

   .3 Cooperate and Coordinate with the requirements of other units of work specified in other Sections.

1.2 **RELATED WORK SPECIFIED ELSEWHERE**

   .1 DIVISION 05: Structural Steel

   .2 DIVISION 05: Exterior Wind Bearing Steel Stud Systems

   .3 DIVISION 07: Air/Vapour Barrier
               Exterior Wall Sheathing Membrane

   .4 DIVISION 07: Insulation

   .5 DIVISION 07: Metal Flashing and Counter Flashing

   .6 DIVISION 07: Firestopping

   .7 DIVISION 07: Sealants

   .8 DIVISION 08: Curtain Wall

1.3 **QUALITY ASSURANCE**

   .1 Composite Panel System shall be fabricated and installed by a company (no sub-contractors) continuously and regularly employed in the manufacture and installation of the specified material for a period of at least ten (10) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location within such a period. At least three (3) of the projects shall have been in successful use for eight (8) years or longer.

   .2 Fabricator/installer shall be acceptable to the manufacturer, 3A Composites USA Inc.

   .3 When possible, take field measurements prior to commencement of shop manufacturing and finishing.

   .4 Panel lines, breaks and angles shall be sharp, true and surfaces free from warp or buckle.
Clearly indicate thickness and dimensions of all parts, fastening and anchoring types and methods, arrangement of sheets and joints, assembly and installation details and methods and special shapes. Verify all dimensions with job conditions before fabricating.

**Tolerances**

1. **Panel Bow**: Maximum 0.8% of panel dimension in width and length of any 1828mm (72") panel dimension.
2. Panel fabrication tolerances for length or width to be maximum of ± 1mm (3/64") and the variation from theoretical diagonal dimensions of the finished panel cannot exceed 3mm (1/8").
3. Joints shall not vary more than 5% of their dimensioned width at any location along the full joint length and shall not be wavy, out of line or of different width from panel to panel.
4. Maximum deviation from vertical and horizontal alignment of erected panels: 6mm (1/4") in 6m (20') non-accumulative.

1.4 **REFERENCES**

   1. Can/ULC-S101-M.
2. National Fire Code
3. Aluminum Association (AA)
   1. AA-C22-A41: Anodized - Clear Coatings
   2. AA-C22-A42: Anodized - Integral Colour Coatings
   1. AAMA 508-07: Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems
   1. ASTM B117-03: Standard Practice for Operating Salt Spray (Fog) Apparatus
   2. ASTM B822-01: Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
   9. ASTM D2244-02 e1: Standard Practice for Calculation of Color Tolerances and Color Difference from Instrumentally Measured Color Coordinates
12. ASTM D3359-02: Standard Test Method for Measuring Adhesion by Tape Test
13. ASTM D3363-00: Standard Test Method for Film Hardness by Pencil Test
16. ASTM E283-04: Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors under Specified Pressure Differences across the Specimen
17. ASTM E330-02: Standard for Testing the Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air pressure Difference
18. ASTM E331-00: Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference
19. ASTM E1233-00: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential

.6 Canadian Standards Association (CSA):
   1. CAN3 S157-M83 (R2002): Strength Design in Aluminum
   2. CSA S136-01: Cold Formed Steel Structure Members
   3. CSA W47.2-M1987 (R2003): Certification of Companies for Fusion Welding of Aluminum

.7 Canadian General Standards Board (CGSB):
   1. CGSB 1.108-M89: Bituminous Solvent Type Paint

.8 Uniform Building Code:
   1. 17-5 - Room Fire Test Standard for Interior of Foam Plastic Systems
   2. 17-3 - Thermal Barrier Evaluation for an Exposed Wall Interior
   3. 17-6 - Multi-story Evaluation

.9 Federal Test Method Standards (RSC 8010):
   1. 141A/6152: Accelerated Weathering (Enclosed ARC Apparatus)
   2. 141A/6160: Conducting Exterior Exposure Tests of Paints on Metals

.10 National Coil Coaters Association:
   1. NCCA II-6: Test Method for Measurement of Impact Resistance of Painted Aluminum, Steel and Galvanized Steel
   2. NCCA II-12: Specification for Determination of Relative Pencil Hardness
   3. NCCA II-16: Test Method for Determination of Film Adhesion by ‘crosshatch’ Tape Test after Reverse Impacting

1.5 SUBMITTALS

.1 Submittals shall be in conformance with SECTION__________.

.2 Samples

.3 OR: Panel Assembly: Two samples each type of assembly, 600mm (24") x 600mm (24") minimum.

.4 Two samples each colour or finish selected, 76mm (3") x 102mm (4") minimum. (Custom color samples will have draw bar lines showing in the metallic finish. These lines will not be on the finished material once coil coated.)
.5 Shop Drawings: Indicate thickness and dimensions of parts, fastening and anchoring methods, detail type and location of joints and gaskets including joints necessary to accommodate thermal movement. Drawings to show Rainscreen Principles, Pressure Equalized Cavity and Compartmentalization where applicable.

.6 Affidavit certifying material meets requirements specified.

.7 Two copies of manufacturer's literature for panel material.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Protect finish and edges in accordance with panel manufacturer's recommendations.

.2 Store material in accordance with panel manufacturer's recommendations. If delivered early, store inside the building if possible.

.3 If outside storage is necessary, situate crates/bundles clear of ground and tilted slightly to ensure that no water is allowed to lie. Take precautions to avoid storage stain or damage to the surface finish of the materials.

2. PRODUCTS

2.1 COMPOSITE PANELS

.1 Alucobond as manufactured by 3A Composites USA Inc. and fabricated/installed by Thermal Systems KWC Ltd. Calgary, AB. Ph. (403) 250-5507

.2 Alucobond thickness: 4mm (0.157’’); OR 3mm (0.118’’); OR Alucobond Plus Core (Fire Rated) thickness: 4mm (0.157’’).

.3 Finishes
   1. Coil coated KYNAR® 500 or HYLAR® 5000 based Polyvinylidene Fluoride (PVDF) OR Fluoro Ethylene – Alkyl Vinyl Ether (FEVE) resin in conformance with the following general requirements of AAMA 2605.

.4 Colour: As selected by the Architect/Engineer from manufacturer's standard colours OR a custom colour to be matched by the panel supplier.
   Coating Thickness: 1.0 mil (±0.2 mil).
   Coating shall withstand reverse impact of 0.0173 kg/m (1.5”/pounds) per mil substrate thickness.
   Coating shall adhere tightly to metal when subjected to #600 Scotch Tape pick-off test. Slight minute cracking permissible. No removal of film to substrate.

.5 Adhesion:
   2. Coating shall not pick off when subjected to a 279mm x 279mm x 1.6mm (11” x 11” x 1/16”) grid and taped with #600 Scotch Tape.

.6 Humidity Resistance
   2. No formation of blisters when subjected to condensing water fog at 100% relative humidity and 38°C (100°F) for 4000 hours.
Salt Spray Resistance:
1. Test Method: ASTM B-117, Expose coating system to 4000 hours, using 5% NaCl solution.
2. Corrosion creepage from scribe line: 1.6 mm max. (1/16”).
3. Minimum blister rating of 8 within the test specimen field.

Outdoor:
1. Ten-year exposure at 45° angle facing south Florida exposure.
2. Maximum color change of 5 Delta E units as calculated in accordance with ASTM D-2244.
3. Maximum chalk rating of 8 in accordance with ASTM D-4214.
4. No checking, crazing, adhesion loss.

Chemical Resistance:
1. ASTM D-1308 utilizing 10% Muriatic Acid for an exposure time of 15 minutes. No loss of film adhesion or visual change when viewed by the unaided eye.
2. ASTM D-1308 utilizing 20% Sulfuric Acid for an exposure time of 18 hours. No loss of film adhesion or visual change when viewed by the unaided eye.
3. AAMA 2605 utilizing 70% reagent grade Nitric Acid vapor for an exposure time of 30 minutes. Maximum color change of 5 Delta E units as calculated in accordance with ASTM D-2244.

Composition
1. Alucobond is a composite consisting of two sheets of 0.51mm (.020") (nominal) gauge aluminum and a low density Polyethylene Core produced with various core thicknesses in a continuous process with no glues or adhesives between dissimilar materials.

OR Alucobond Plus Core (Fire Rated) is a composite consisting of two sheets of 0.51mm (.020") (nominal) gauge aluminum with an extruded thermoplastic material, produced in a continuous process with no glues or adhesives between dissimilar materials.

Fire Resistance
1. Non Fire-Rated Panels:
   1. Must meet the criteria of ASTM E84 Surface Burning Characteristics of Building Materials, and achieving a building material’s surface burning classification NFPA Class A and UBC Class 1 (refer .6 of 2.02).
   2. Materials must not burn when tested in accordance with ASTM E162 Surface Flammability of Materials Using Radiant Heat Energy Source (refer .6 of 2.02).
   3. 4mm thick panels must not contribute to vertical or horizontal flame spread when tested in accordance with ASTM E108 Surface Flame Spread of Exterior Walls (refer .6 of 2.02).

Aluminum Face Sheets
1. Thickness: 0.51mm (.020”).
2. Alloy AA3003 Series (Painted material)

Panel Weight Alucobond
1. 4mm (0.157") 1.12 lbs/sq.ft. (5.47kg/m²)
   OR 3mm (0.118”) 0.92 lbs/sq.ft. (4.50kg/m²)
   OR Panel Weight Alucobond Plus Core 4mm (0.157”) 1.52 lbs/sq.ft. (7.43kg/m²)
### 0.14 Engineering Properties

**Alucobond Material**

Thickness = 4 mm (0.1576") Weight = 1.12 kg/m² (5.47 lb/ft.²)

<table>
<thead>
<tr>
<th>Property</th>
<th>ASTM</th>
<th>Metric</th>
<th>Imperial</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Tensile Yield</td>
<td>D-638</td>
<td>4,850 (N/mm²)</td>
<td>42.7 psi</td>
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<tr>
<td>b) Ult. Tensile</td>
<td>D-638</td>
<td>6,020 (N/mm²)</td>
<td>41.6 psi</td>
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<tr>
<td>c) Elongation</td>
<td></td>
<td>19 %</td>
<td>19 %</td>
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<tr>
<td>d) Tensile Modulus</td>
<td>D-638</td>
<td>1.26x10⁶ (N/mm²)</td>
<td>9.527 psi</td>
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<tr>
<td>e) Flatwise Tensile</td>
<td>C-297</td>
<td>1,820 (N/mm²)</td>
<td>12.6 psi</td>
</tr>
<tr>
<td>f) Ult. Flexural</td>
<td>D-790</td>
<td>13,980 (N/mm²)</td>
<td>100.2 psi</td>
</tr>
<tr>
<td>g) Flex Modulus</td>
<td>D-790</td>
<td>5.05x10⁶ (N/mm²)</td>
<td>11.459 psi</td>
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<tr>
<td>h) Flatwise Compr.</td>
<td>C-365</td>
<td>2,030 (N/mm²)</td>
<td>14 psi</td>
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<tr>
<td>i) Coefficient of Exp.</td>
<td>D-696</td>
<td>1.15x10⁻⁵ (K⁻¹)</td>
<td>2.07x10⁻⁵ (in./ in.° F)</td>
</tr>
<tr>
<td>j) Flatwise Shear</td>
<td>C-273</td>
<td>920 (N/mm²)</td>
<td>6.35 psi</td>
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<tr>
<td>k) Deflection Temp.</td>
<td>D-648</td>
<td>199 (° C)</td>
<td>260 (° F)</td>
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<tr>
<td>l) Water Absorption</td>
<td>D-272</td>
<td>Nil</td>
<td>Nil</td>
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<tr>
<td>m) Thermal Conductivity</td>
<td>C-177</td>
<td>3.21 (W/m²K)</td>
<td>116.4 BTU-in./ ft.²hr.°F</td>
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<td>n) Thermal Resistance</td>
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<td>0.049 (m²K/W)</td>
<td>8.59x10⁻³ hr.°F ft.²/BTU</td>
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<td>o) Sound Transmission</td>
<td>E-90</td>
<td>28 STC</td>
<td>28 STC</td>
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</table>

**Alucobond Plus Material**

Thickness = 4 mm (0.1576") Weight = 1.52 kg/m² (7.43 lb/ft.²)

<table>
<thead>
<tr>
<th>Property</th>
<th>ASTM</th>
<th>Metric</th>
<th>Imperial</th>
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<tbody>
<tr>
<td>a) Tensile Yield</td>
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<td>5,040 N/mm²</td>
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<td>b) Ult. Tensile</td>
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<td>6,230 N/mm²</td>
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<td>12.6 %</td>
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<td>d) Tensile Modulus</td>
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<td>2,690 N/mm²</td>
<td>18,570 ksi</td>
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<td>e) Tensile Yield</td>
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<td>5,000 N/mm²</td>
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<td>f) Ult. Tensile</td>
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<td>6,480 N/mm²</td>
<td>44.7 psi</td>
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<td>g) Elongation</td>
<td>D-638</td>
<td>13.2 %</td>
<td>13.2 %</td>
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<td>h) Tensile Modulus</td>
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<td>2,380 N/mm²</td>
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<td>i) Flatwise Tensile</td>
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<td>1,160 N/mm²</td>
<td>8 psi</td>
</tr>
<tr>
<td>j) Ult. Flexural</td>
<td>D-790</td>
<td>3,400 N/mm²</td>
<td>23.5 psi</td>
</tr>
<tr>
<td>k) Flex Modulus</td>
<td>D-790</td>
<td>663 N/mm²</td>
<td>4,580 ksi</td>
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<td>l) Ult. Flexural</td>
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<td>3,600 N/mm²</td>
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<tr>
<td>m) Flex Modulus</td>
<td>D-790</td>
<td>653 N/mm²</td>
<td>4510 ksi</td>
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<td>n) Flatwise Compr.</td>
<td>C-365</td>
<td>7,050 N/mm²</td>
<td>48.7 psi</td>
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<td>o) Coef. Thermal Exp.</td>
<td>D-696</td>
<td>1.11x10⁻⁵ K⁻¹</td>
<td>2.00x10⁻³ in./in.° F</td>
</tr>
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<td>p) Flatwise Shear</td>
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<td>2,180 N/mm²</td>
<td>15 psi</td>
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<td>q) Deflection Temp.</td>
<td>D-648</td>
<td>185 ° C</td>
<td>85 ° F</td>
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<tr>
<td>r) Deflection Temp.</td>
<td>D-648</td>
<td>189 ° C</td>
<td>87.2 ° F</td>
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<tr>
<td>s) Thermal Conductivity</td>
<td>C-518</td>
<td>6.5 W/m²K</td>
<td>36.9 BTU/hr ft.° F</td>
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<td>t) Thermal Resistance</td>
<td>C-518</td>
<td>0.16 m²K/W</td>
<td>2.89x10⁻⁵ hr.°F ft.²/BTU</td>
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<td>u) Water Absorption</td>
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<td>0.003 %</td>
<td>0.003 %</td>
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<td>v) Bond Integrity</td>
<td>D-1781</td>
<td>32 N/mm²</td>
<td>143 lb/in width</td>
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<tr>
<td>w) Sound Transmission</td>
<td>E-90</td>
<td>30 STC</td>
<td>30 STC</td>
</tr>
<tr>
<td>x) Sound Transmission</td>
<td>E-90</td>
<td>24 OITC</td>
<td>24 OITC</td>
</tr>
</tbody>
</table>
Fire Performance

1. Alucobond PE Core

- ASTM E84: Flame Spread 0, Smoke Developed 0
- ASTM E162: No surface flaming
- UBC 17-5: No flame spread along interior face or penetration through the wall assembly

OR Alucobond Plus Core

- ASTM E84: Flame Spread 0, Smoke Developed 0
- ASTM E162: No surface flaming
- UBC 17-5: No flame spread along interior face or penetration through the wall assembly
- ASTM D2015: BTU Content shall be less than 6000 Btu/ft²
- UBC 26-9: Panels shall meet requirements of the Intermediate Multi-Story Test Procedure
- CAN/ULC-S134-92: Panels shall meet requirements of the Multi-Story Test Procedure.

Bond Integrity

1. When tested for bond integrity in accordance with ASTM D1781-76 (simulating resistance to panel delamination), there shall be no adhesive failure of the bond a) between the core and the skin, nor b) cohesive failure of the core itself below the following values.

   Peel Strength: 115 N mm/mm (22.5 in lb/in) as manufactured
   115 N mm/mm (22.5 in lb/in) after 8 hours in water at 93ºC (200ºF)
   115 N mm/mm (22.5 in lb/in) after 21 days soaking in water at 21ºC (70ºF)

2.2 SYSTEM TYPES

1. Approved panel system shall be Thermal Systems KWC Ltd. AP300 Dry Joint System fabricated and installed to distributor’s/fabricator’s details and recommendations.

2. Fasteners to be non-corrosive and concealed as recommended by panel distributor/fabricator.

3. Panel assembly shall be designed by Thermal Systems KWC Ltd. of Calgary, AB. in accordance with the rain screen principle and be self-draining. It shall be erected without the use of any sealants in the joints.

2.3 SYSTEM PERFORMANCE

1. Pressure Equalization – AAMA 508/ASTM E1233: At 100 cycles of pressure from 0.24 kPa (5 lbs/ft²) to 1.20 kPa (25 lbs/ft²), pressure equalization must occur within 0.08 seconds with a maximum cavity pressure of 12.5 lbs/ft². No water in a continuous stream, or mist/droplets in excess of 5% of the air/water barrier surface.

2. Dynamic Water Penetration – AAMA 508/AAMA 501.1: No uncontrollable water infiltration under dynamic pressure differential of minimum 0.57 kPa (12 lbs/ft²).
3. Static Water Penetration – AAMA 508/ASTM E331: No uncontrolled water infiltration at minimum of 0.57 kPa (12 lbs/ft²). Wall design shall feature provision to drain to the exterior face of the wall any leakage of water at joints and any condensation that may occur within the construction.

4. Air Leakage – AAMA 508/ASTM E283: Maximum air leakage shall be $6.09 \times 10^{-4} \text{ cms/m}^2$ ($0.12 \text{ cfm/ ft}^2$) at $7.51 \times 10^{-2} \text{ kPa}$ ($1.57 \text{ lbs/ft}^2$) wind load. Note: AAMA 508 uses higher air/water barrier leakage to simulate possible defects in as-built conditions.

5. Uniform Load Deflection - ASTM E330: Exterior panels and anchorage shall experience no permanent deformation at 150% of the design positive and negative wind loading, with a maximum allowable deflection of L/60 or a maximum of 19mm (¾”) deflection, whichever is less.

5. System shall be compartmentalized in accordance with “Rainscreen principles” and approved shop drawings.

6. Panel Joints: Extruded aluminum with integral weather stripping as detailed on drawings

2.4 SYSTEM ACCESSORIES

7. Panel Clips: As recommended by distributor/fabricator and per system design.

8. Subgirts: Minimum 1.22mm (18ga.) Z275 galvanized steel as per system design requirements for panel attachment.

9. Gaskets within the panel system shall be as per distributor/fabricator standards.

10. Exposed aluminum extrusion to be finished to match (contrast) Alucobond (specify colour).

11. Fasteners: concealed/exposed, non-corrosive as recommended by the panel manufacturer

3. EXECUTION

3.1 INSPECTION

1. Examine all surfaces to receive panels: shall be even, smooth, sound, clean, dry and free from defects detrimental to work.

2. Notify contractor in writing of conditions detrimental to proper and timely completion of the work.

3. Do not proceed with erection until unsatisfactory conditions have been corrected. Commencement of work implies unconditional acceptance of the surfaces.

3.2 INSTALLATION

1. Fabricator/installer to have a minimum ten (10) years’ experience with installations of similar size and complexity.

2. Fabricator/installer to be approved by the manufacturer, 3A Composites USA Inc., to comply with warranty requirements.

3. Before installation, check wall alignment.
.4 Compartmentalize system in accordance with NRC “Rainscreen principals” and reviewed shop drawings.

.5 Install air/vapour retarder membrane in accordance with Section 07260 and the manufacturer’s instructions.

.6 Install girts in accordance with manufacturer’s instructions. Provide additional metal framing as may be required to conform to performance requirements.

.7 Install girts attached to structural support or wall framing, using recommended fasteners.

.8 Install semi-rigid (mineral wool) insulation between girts forming tight to following applied girt to maintain continuous thermal barrier. Install insulation with disk type fasteners spaced at 305mm vertical o/c spaced evenly from edges of insulation and at 406mm horizontal o/c.

.9 All Fasteners shall penetrate wall framing. Where fastener does not penetrate framing, DO NOT REMOVE fastener. Removal of fastener will damage integrity of air/vapour membrane. Realign fastener location and install new fastener in close proximity to original fastener.

.10 Install Flashings to divert all moisture and condensation to exterior. Trim and Flash around doors, louvers, and windows within scope of work.

.11 Erect panels plumb, level and true in accordance with specified tolerances.

.12 Erect panels with skilled workers in the permanent employ of the fabricator/installer.

.13 Anchor panels securely in place in accordance with distributor/fabricator’s approved shop drawings and system design. Use exposed/concealed approved fasteners.

.14 Conform to distributor/fabricator’s instructions for installation of exposed/concealed fasteners.

.15 Attachment system shall allow for the free noiseless vertical and horizontal thermal movement due to expansion and contraction for a material temperature range of -28°C (-20°F) to +82°C (+180°F). Buckling of panels, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement will not be permitted. Fabrication, assembly and erection procedure shall account for the ambient temperature at the time of the respective operation.

.16 Separate dissimilar metals and use gasketed fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.

3.3 ADJUSTING AND CLEANING

.1 Remove and replace panels damaged beyond repair or panels not meeting specified tolerances. After installation, panel repair and replacement shall become the responsibility of the General Contractor.

.2 Repair panels with minor damage.

.3 Remove protective film from panels as soon as possible after installation. Ensure weep holes and drainage channels are unobstructed. Final cleaning is not part of this section.

END OF SPECIFICATION - SECTION 074243