

1 General

1.1 **SUMMARY**

.1 Section Includes

- .1 Labour, Products, equipment and services necessary to complete the Work of this section.

1.2 **REFERENCES**

.1 Conform to the latest edition of the following:

- .1 CAN/ULC-S701 - Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering
- .2 CAN/ULC-S702 - Standard for Thermal Insulation, Mineral Fibre, for Buildings
- .3 ULC CAN4-S101-M - Standard Methods of Fire Endurance Tests of Building Construction and Materials
- .4 AODA - Accessibility for Ontarians with Disabilities Act

1.3 **DELIVERY, STORAGE AND HANDLING**

- .1 Deliver materials to Site, clean and undamaged, and in manufacturer's distinctly identified cartons or wrappings. Remove unsatisfactory materials from Site and replace at no cost to the Owner.
- .2 Take precautionary measures to avoid fires and abide by fire protection regulations.
- .3 Place suitable forms or skids under the insulation upon delivery to protect the insulation from absorbing dampness from the surrounding terrain or floor. Cover material with approved tarpaulins and secure. Do not store insulation in direct contact with the earth, road surface, or floors.
- .4 Store materials indoors at Site, in an area at a temperature of not less than 4°C (39°F) for a minimum of twelve hours prior to use.

1.4 **PROTECTION**

- .1 Place protective covers, boards, tapes and take other measures to protect all surfaces, and in particular the building cladding, from being marred or contaminated.
- .2 Supervise the Work of other trades where such Work is closely associated with the Work of this section and report any damage.

1.5 **SUBMITTALS**

.1 Submit the following in accordance with Section 01 33 00.

- .1 Samples: Submit representative samples of each specified insulation material, insulation clips, adhesives, fasteners, and other material for review.
- .2 Manufacturer's Product data:
- .1 Submit manufacturer's Product data sheets for Products proposed for use in the Work of this section.

- .2 Submit data and installation instructions for materials and prefabricated devices, providing descriptions sufficient for identification at the place of the Works.
- .3 Submit data from manufacturer's or independent laboratory indicating compatibility and adhesive results of proposed materials.

2 Products

2.1 **MATERIALS - INSULATION**

- ~~.1 Mineral Wool: Exterior Thermal Batt Insulation for exterior steel frame wall, floor and ceiling construction~~
  - ~~.1 Performance characteristics: Mineral fibre, non-combustible, semi-rigid mineral wool batt insulation, manufactured from basalt rock and slag, in accordance with CAN/ULC S702 Type 1 or ASTM C665, Type I. Non-combustible in accordance with CAN/ULC S114~~
  - ~~.2 Facing options: Unfaced or foil faced.~~
  - ~~.3 Thickness: as indicated on Drawings~~
  - ~~.4 Acceptable Manufacturers:~~
    - ~~.1 Rockwool ComfortBatt by Rockwool Inc.~~
    - ~~.2 Thermafiber UltraBatt by Owens Corning~~
    - ~~.3 Or accepted equal~~
- ~~.2 Mineral Wool: Exterior Insulation for exterior wall continuous insulation and Rainscreen cavity wall~~
  - ~~.1 Performance characteristic: Mineral fibre, semi-rigid or rigid board, manufactured from basalt rock and slag, Conforming to CAN/ULC 702 Type 1 or ASTM C612, Type IVB.~~
  - ~~.2 Thermal Resistance: RSI value 0.74/25 mm (R-value 4.3/inch) in accordance with ASTM C518.~~
  - ~~.3 Density: to ASTM C303~~
    - ~~.1 Thicknesses below 50 mm Density: 70 kg/m<sup>3</sup>.~~
    - ~~.2 Thicknesses 65 mm and above Density: Outer layer: 100 kg/m<sup>3</sup>; Inner layer: 60 kg/m<sup>3</sup>~~
  - ~~.4 Non-combustible in accordance with CAN/ULC S114.~~
  - ~~.5 Acoustic: 1.00/51 mm NRC in accordance with ASTM C423.~~
  - ~~.6 Thickness as indicated on Contract Drawings.~~
  - ~~.7 Acceptable Manufacturer:~~
    - ~~.1 Cavityrock by Rockwool Inc.~~
    - ~~.2 Thermafiber RainBarrier 45 by Owens Corning~~
    - ~~.3 Thermafiber RainBarrier HD by Owens Corning~~

~~.4 — Or accepted equal~~

~~.3 — Mineral Wool: For Continuous Insulation Systems~~

~~.1 — Performance characteristic: Conforming to ASTM C612, Type IVB and CAN/ULC S702, Type 1, Non-combustible, rigid, water repellent, mineral wool insulation board for exterior non-structural commercial and industrial high performance insulation sheathing applications and or "screws through insulation assembly" where the dense board is sandwiched with strapping, furring or hat track. It can also be used below slabs, on exterior insulated below grade walls, and in other continuous insulation board application.~~

~~.2 — Thickness: as indicated on Drawings~~

~~.3 — Acceptable Manufacturer:~~

~~.1 — Density: 8lb/ft<sup>3</sup>~~

~~.1 — Comfortboard 110 by Rockwool Inc.~~

~~.2 — or accepted equal~~

~~.2 — Density 11lb/ft<sup>3</sup>~~

~~.1 — Comfortboard 110 by Rockwool Inc.~~

~~.2 — or accepted equal~~

4.1 Mineral Wool: Multipurpose Board Insulation for Thermal and Acoustic Applications

.1 Performance characteristic: Semi-rigid or rigid board, manufactured from basalt rock and slag, and having the following properties:

.2 Density: Nominal 64, 96, 80 kg/m<sup>3</sup> in accordance with ASTM C303.

.3 Non-combustible in accordance with CAN/ULC S114.

.4 Thermal Resistance: RSI-value 0.71-0.74/25 mm (R-value 4.1-4.2/inch)

.5 Thickness as indicated on Drawings

.6 Acoustic: Coefficients at frequencies in accordance with ASTM C423.

.7 Acceptable Manufacturer:

.1 Density: 64 kg/m<sup>3</sup> = 1.00/51 mm NRC

.1 Acceptable Manufacturer:

.1 RockBoard 40 by Rockwool Inc.

.2 Thermafiber VersaBoard 40 by Owens Corning

.3 Or accepted equal

.2 Density: 96 kg/m<sup>3</sup> = 0.95/51 mm NRC

.1 Acceptable Manufacturer:

.1 RockBoard 60 by Rockwool Inc.

.2 Thermafiber VersaBoard 60 by Owens Corning

- .3 Or accepted equal
- .3 Density:  $128 \text{ kg/m}^3 = 0.80/51 \text{ mm NRC}$ .
- .1 Acceptable Manufacturer:
  - .1 RockBoard 80 By Rockwool Inc.
  - .2 Thermafiber VersaBoard 80 by Owens
  - .3 Or accepted equal

5.2 Mineral Wool: Firestopping Insulation for firestop applications at perimeter floor and wall penetrations

- .1 Performance Criteria: Mineral fibre, semi-rigid board, manufactured from basalt rock and slag, in accordance with ASTM C612 Types IA, IB, II, III, or IVA
- .2 Thermal Resistance: RSI-value 0.74/25 mm (R-value 4.2/inch) in accordance with ASTM C518.
- .3 Non-combustible in accordance with CAN/ULC S114.
- .4 Acceptable Manufacturer:
  - .1 Roxul Safe by Rockwool Inc.
  - .2 Thermafiber Safing by Owens Corning Canada LP.
  - .3 Or accepted equal

~~6 Mineral Wool: Exterior Fire Containment Insulation for aluminum spandrel curtain wall, steel stud framed gypsum sheathing curtain wall, glass spandrel curtain wall, or precast concrete spandrel panel applications~~

- ~~.1 Performance Criteria: Mineral fibre, rigid board, manufactured from basalt rock and slag, in accordance with CAN/ULC S702 Type 1, Type 3 (foil), or ASTM C612, Type IA, IB, III, or IVB.~~
- ~~.2 Facing options: Unfaced or foil faced.~~
- ~~.3 Thermal resistance: RSI-value: 0.74/25 mm (R-value 4.2/inch) in accordance with ASTM C518.~~
- ~~.4 Density: In accordance with ASTM C303.~~
- ~~.5 Non-combustible in accordance with CAN/ULC S114.~~
- ~~.6 Fire resistance rating of the system tested in accordance with ASTM E2307.~~
- ~~.7 Acceptable Manufacturers:~~
  - ~~.1 Density 64 kg/m<sup>3</sup>:~~
    - ~~.1 CurtainRock 40 by Rockwool Inc.~~
    - ~~.2 Thermafiber FireSpan 40 or Therma fiber FireSpan FF 40 by Owens Corning~~
    - ~~.3 Or accepted equal~~
  - ~~.2 Density 128 kg/m<sup>3</sup>:~~

~~.1 — CurtainRock 80 by Rockwool Inc.~~

~~.2 — Thermafiber FireSpan 90 or Thermafiber FireSpan FF 90 by Owens Corning~~

~~.3 — Or accepted equal~~

~~.7 — Rigid Insulation — XPS (Perimeter Foundation Insulation)~~

~~.1 — Extruded polystyrene (XPS), closed-cell foam, rigid insulation board, smooth skin, to CAN/ULC S701-01, Type 4 or ASTM C578, Type IV.~~

~~.2 — Thermal resistance: RSI value 0.88/25 mm (R-value 5.0/inch) in accordance with ASTM C518.~~

~~.3 — Compressive strength, ASTM D1621, 207 kPa~~

~~.4 — Combustible in accordance with CAN/ULC S114.~~

~~.5 — Thickness: as indicated on Drawings~~

~~.6 — Acceptable Manufacturers:~~

~~.1 — Styrofoam brand SM by DuPont~~

~~.2 — Foamular C-300 by Owens Corning~~

~~.3 — Or accepted equal~~

~~.8 — Rigid Insulation — XPS (under slab Insulation)~~

~~.1 — Extruded polystyrene (XPS), closed-cell foam rigid insulation board, to CAN/ULC S701-05, Type 4.~~

~~.2 — Compressive strength, ASTM D1621-04a, 275 kPa (40 psi) minimum (measured at 5% deformation or at yield, whichever occurs first).~~

~~.3 — Thickness: as indicated on Drawings~~

~~.4 — Acceptable Manufacturers:~~

~~.1 — Styrofoam brand Highload 40 by DuPont~~

~~.2 — Foamular 400 by Owens Corning~~

~~.3 — Or accepted equal~~

~~9.3~~ Loose insulation: Loose glass fibre by Owens Corning Canada, basalt wool by Fibrex Insulations Inc. or mineral wool by Roxul Inc.

~~10.4~~ Foamed-in-place air seals: One component polyurethane foam for installation within closures and fillers; "Enerfoam" by Abisko Manufacturing Inc. or "Foam Sealant" by Zerodraft Products Inc.

~~11.5~~ Adhesives

.1 Polystyrene foam insulation adhesive: Canadian Adhesive "Lepage PL Premium" or approved equivalent.

.2 Glass fibre or mineral wool insulation adhesive: Henry "200-02".

- .3 For installing insulation clips direct to masonry, concrete or metal: High strength, resilient adhesive having a drying time of zero to thirty minutes (rapid initial set), and twenty-four hours final set. Adhesive shall be compatible with insulation and air/vapour barrier and shall be non-corrosive to galvanized steel and membrane air/vapour barrier.
- .4 Mechanical fasteners to concrete: Galvanized "Gripcon" screws with plastic plates. For use with vinyl faced insulation, use white head screws and white plastic plates to match vinyl.
- .5 Insulation clips: Insul-Anchors, adhered to substrate with Tactoo adhesive and with self locking washers by Continental Stud Welding. Clip size and type to suit application and insulation thickness. Alternative adhesive at obstructions: Air-Bloc 21 by Henry.

### 3 Execution

#### 3.1 MECHANICAL FASTENERS

- .1 Install rigid insulation on masonry, concrete, metal, behind precast panels and where use of wedges is not possible using stick clips.
- .2 Use five stick clips per 600 mm x 1200 mm x up to 75 mm thick. Use six stick clips per 600 mm x 1200 mm x 100 mm thick or thicker.
- .3 Apply clips with mastic adhesive, allowing it to "ooze" out through the perforations and/or around the clip base.
- .4 Install clips to liquid membrane by softening membrane with torch and installing fasteners into softened areas. Supplement with a small power activated pin fastener applied through fastener base to structure.
- .5 Support adhesive-installed clips in place until adhesive has set.

#### 3.2 RIGID MINERAL FIBRE INSULATION

- .1 Clean surfaces to receive rigid insulation free of moisture, grease and oil. Ensure surfaces are reasonably smooth and free of mortar projections.
- .2 Knife cut and fit boards neatly around beams, pipes, ducts, openings and corners, reinforcing and bonding ties, and other obstructions.
- .3 Butt insulation boards together and stagger joints to ensure thermal tight construction. Apply firm hand pressure to level insulation boards.
- .4 Where cutting is necessary, use the largest module of insulation possible to reduce the number of joints. Patch holes and tears with the same material.
- .5 Do not install insulation in any part of the building where protection against inclement weather has not yet been provided, and where the insulation could thereby be exposed to damage.

~~.6 Insulation on liquid membrane air/vapour barrier: Apply board in 100% bond to 3.2 mm thick liquid air/vapour barrier.~~

~~.7 Insulation on sheet membrane air/vapour barrier: Apply board using daubs of adhesive at 300 mm o.c.~~

~~.8 Air/vapour barrier covered by insulation: Install "stick clips" to concrete or masonry substrate. After clip adhesive has cured, apply liquid air/vapour barrier to serve as~~

~~insulation adhesive over the entire area to receive insulation. Apply to a uniform thickness of 3 mm. Press insulation against adhesive and stick clips. Install washers in stick clips to lock insulation in place.~~

~~.9 — Insulation covered by air/vapour barrier (and no gypsum board is subsequently applied): Apply daubs of adhesive to substrate at 300 mm o.c. into which, press insulation board. To ensure positive adhesion of insulation, mechanically fasten insulation at the middle and at each end with galvanized fasteners with smooth plastic washer buttons, at the rate of 4 per 600 mm x 1200 mm board. Depress fastener heads slightly from surface of insulation. Double tape all fastener points with vapour barrier tape.~~

~~10.6~~ Where more than one layer of insulation is required, stagger successive layer joints with the joints of the preceding layer and bed in adhesive trowelled solidly over the preceding layer.

### ~~3.3~~ **HIGH DENSITY INSULATION**

~~.1 — Place high-density insulation under or within poured-in-place concrete in accordance with the Drawings.~~

~~.2 — Foamed-In-Place Insulation~~

~~.1 — Install foam insulation at jambs of all doors and windows in pool in accordance with manufacturer's recommendations.~~

~~2.1~~ Insulation will be inspected by the Consultant prior to the installation of the internal caulking seal.

### ~~3.43.3~~ **LOOSE INSULATION**

.1 Install in exterior hollow metal frames, wall voids formed by metal closures, and at locations where loose insulation packing is shown on Drawings.

### ~~3.53.4~~ **WALL VOID INSULATION**

.1 Fill exterior wall voids, such as within and around beams, under metal closures at sills of openings, and other miscellaneous locations as shown, using specified glass fibre material.

### ~~3.63.5~~ **BATT INSULATION**

.1 Install batt insulation between steel studs; at metal closures and where shown elsewhere. Extend nailing flanges over stud faces and secure with adhesive or sheet metal screws. Install batts with vapour barrier face on warm side. Tape at top and bottom of stud spaces and at junctions with other materials, provide a complete vapour seal.

### ~~3.73.6~~ **PATCHING**

- .1 Perform cutting and patching necessary to accommodate irregularities in the Work including piping, ductwork and electrical conduit projecting through the insulation.
- .2 Ensure the continuity of the insulation where such above items project through the insulation. Allow for expansion and contraction and linear movement of these items.
- .3 Where there is a possibility of heat loss through ductwork or conduit which passes through the insulation, extend insulation around the duct or conduit a distance of 300 mm minimum on both sides of the barrier.
- .4 After installation under other sections of heating equipment and other construction adjacent to the Work of this section, conduct an inspection and replace insulation as necessitated by unavoidable minor damage caused in the course of the Work of the other sections.

**3.83.7 FIELD QUALITY CONTROL**

- .1 Insulation installations will be inspected and approved by the Consultant prior to the installation of ceiling and wall finishing materials. Notify Consultant forty-eight hours in advance of inspection.

End of Section