

Part 1 General

1.1 REFERENCES

.1 Definitions:

- .1 For the purposes of this section, the following definitions apply:
  - .1 In this section, the term "insulation" and "thermal insulation" will be considered synonymous.
  - .2 The acronym "CGSB" stands for the Canadian General Standards Board.
  - .3 "Concealed" elements: insulated mechanical services and equipment located above suspended ceilings or in inaccessible chases and furred-in spaces.
  - .4 "Exposed" elements: elements that are not concealed (as previously defined).
  - .5 Insulation system: systems consisting in particular of the insulation itself, the fasteners, jackets and other accessories.

.2 TIAC acronyms:

- .1 CRD: Code Round Ductwork.
- .2 CRF: Code Rectangular Finish.

.3 References:

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE):
  - .1 ANSI/ASHRAE 90.1-2013-SI Edition – Energy Standard for Buildings Except Low-Rise Residential Buildings.
- .2 ASTM International Inc.:
  - .1 ASTM B209M-14 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
  - .2 ASTM C335/C335M-10e1, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.
  - .3 ASTM C411-11, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  - .4 ASTM C449/C449M-07(R2013), Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  - .5 ASTM C547-15, Standard Specification for Mineral Fiber Pipe Insulation.
  - .6 ASTM C553-13, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
  - .7 ASTM C612-14, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
  - .8 ASTM C795-08(R2013) – Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

- .9 ASTM C921-10(2015), Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
  - .3 Canadian General Standards Board (CGSB):
    - .1 Preformed mineral fiber insulation: ONGC 51-GP-9M-76, Thermal Insulation, Mineral Fibre, Sleeving for Piping and Round Ducting.
    - .2 Thermal Insulation, Flexible, Elastomeric, Unicellular, Sheet and Pipe Covering: ONGC 51-GP-40-95, Flexible, Elastomeric, Unicellular Thermal Insulation, Sheet and Pipe Covering.
    - .3 Mineral fiber flexible blanket: ONGC 51-GP-11M-76, Thermal Insulation, Mineral Fibre, Blanket for Piping, Ducting, Machinery and Boilers.
    - .4 Mineral fiber rigid and semi-rigid boards: ONGC 51-GP-10M.
    - .5 Hydrated calcium silicate insulation: ONGC 51.2-M88 or 51-GP-2M.
    - .6 Vapor barrier covering: ONGC 51-GP-52Ma.
    - .7 PVC jacketing: ONGC 51.53-95.
  - .4 "k" thermal conductivity factors:
    - .1 ASTM C-335 for precast or rigid insulation.
    - .2 ASTM C-177 or C-518 for the other types.
  - .5 Green Seal Environmental Standards (GSES):
    - .1 Standard GS-36-13 – Standard for Adhesives for Commercial Use.
  - .6 South Coast Air Quality Management District (SCAQMD), California State:
    - .1 SCAQMD Rule 1168-A2005 – Adhesive and Sealant Applications.
  - .7 Thermal Insulation Association of Canada (TIAC), National Insulation Standards (2005).
  - .8 Underwriters' Laboratories of Canada (ULC):
    - .1 CAN/ULC-S102-11 – Method of test for surface burning characteristics of building materials and assemblies.
    - .2 CAN/ULC-S701-11 – Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- 1.2 MANUFACTURER'S INSTRUCTIONS
  - .1 Submit the manufacturers' instructions for the installation of the insulating materials.
  - .2 The instructions must specify the methods to be used, as well as the required execution quality, particularly in regards to the joints and the overlaps.
- 1.3 QUALIFICATIONS
  - .1 The installer must be an expert in the field, with at least three years of proven and successful experience in the installation of work in this size, type and scope of work, and possess the qualifications required by the TIAC.

#### 1.4 SCOPE OF THE WORK

- .1 The work generally includes, but is not limited to: labor, supply and installation of all materials and equipment necessary for the insulation work shown on the drawings and in the specification related to ductwork.
- .2 Insulation to be installed between fresh air openings and Air Handling Units.
- .3 Consult the drawings and the specification of all mechanical work.

#### Part 2 Product

##### 2.1 FIRE AND SMOKE RATING

- .1 To CAN/ULC-S102.
  - .1 Maximum flame spread rating : 25
  - .2 Maximum smoke developed rating : 50

##### 2.2 TYPE D INSULATION

- .1 Rigid mineral fiber board bonded by a thermosetting resin with integrated FSK vapor barrier, with a density of 36 kg/m<sup>3</sup>, maximum service temperature of 232°C.
- .2 Maximum thermal conductivity "k": 0.035 W/m.°C at 24°C.

##### 2.3 ADHESIVES

- .1 Compliant with the standards ASTM-E-84-76 and CAN/ULC-S102.
- .2 Use to secure the canvas, the tabs and all-service jackets, seal the joints, and secure the insulation to the metal surfaces.

##### 2.4 CEMENT INSULATION

- .1 Compliant with the standard ASTM C449/C449M.
- .2 Use for fittings, flanges, valves, and accessories.

##### 2.5 JACKETS

- .1 Aluminum jackets:
  - .1 Aluminum jacketing compliant with the standards ASTM B209 and CSA HA.4-1980, to be used on exposed elements located outdoors and in mechanical rooms, when specified.
  - .2 Corrugated or embossed aluminum alloy jacketing, 0.4 mm thick, with longitudinal S joints with 50 mm wide overlapping ends, factory installed internal protective covering, and also featuring an aluminum alloy joint cover with mechanical fasteners. Vapor barrier membrane.
  - .3 Jackets for connecting to matrix elements made of 0.4 mm thick aluminum alloy with factory installed internal protective covering.

## 2.6 MANUFACTURER LIST

- .1 Type D thermal insulation:
  - .1 Johns Manville: Spin-Glas 814, type II with a FSK vapor barrier.
  - .2 Knauf: panel for air ducts with FSK.
  - .3 Owens-Corning Fiberglas: AF530 with FRK.
- .2 Insulating cement:
  - .1 IIG Calcoat No. 127 applied in successive 8 mm (0.3") layers.
- .3 Mechanical Fasteners:
  - .1 Welding pins, pin fasteners, Duro-Dyne.
- .4 Aluminum jackets:
  - .1 Thermoclad Plus jacketing with anti-corrosion protection, Polysurlin type, Stucco finish.
- .5 Thermal insulation protection support:
  - .1 Insulgard (Master Group)
  - .2 Steel support (Dispro Inc.)
- .6 Exterior Duct Membrane:
  - .1 Rubberized asphalt membrane with aluminum coating Flexclad MFM (Dispro Inc.).
  - .2 Self-adhering aluminized coating, five ply, Venture Clad No. 1577CW from Venture Tape.
  - .3 Rubberized asphalt membrane with aluminum coating, Polyguard from Alumaguard.

## Part 3 Execution

### 3.1 PREPARATORY WORK

- .1 Only install the insulation once the system has been tested and the results have been certified by the responsible authority who has witnessed the test.
- .2 Ensure surfaces to be covered with insulation or with a finish coating are clean, dry, and free of foreign matter.

### 3.2 INSTALLATION METHOD

- .1 The insulation work is considered as:
  - .1 Concealed: pipes and ducts are installed in suspended ceilings, walls, shafts, and floors.
  - .2 Exposed: exposed pipes and ducts must be insulated on all sides, even on non-visible sides against walls or ceilings.
  - .3 Ducts and pipes in mechanical rooms, tunnels, and service spaces are considered exposed.

- .2 Install insulation once all tests are complete and accepted, and air inside the building is dry enough and in conditions conforming to the manufacturers standards. Install insulation continuously, without interruption.
- .3 All equipment, piping, and ducts must be clean and dry before installing the insulation.
- .4 Consult the other mechanical sections to determine the type of ducts, piping, fittings, valves, and other accessories installed by other contractors. The insulation contractor must consider that contractors from Division 23 will use the Victaulic type fittings where allowed, and will tender accordingly.
- .5 This section is responsible for the proper installation of insulation, where specified.
- .6 When insulation is likely to be damaged by impact or crushing near the access doors, doors, access panels, corridors, etc., protect with a 1.3 mm galvanized steel sleeve (18 gauge).
- .7 Notify applicable sections and properly adjust the supports and saddles to ensure that saddles remain in place.

### 3.3 APPLICATION

- .1 See section "DUCTWORK INSULATION SCHEDULE" for thicknesses.
- .2 Hot ducts and plenums (20-65°C):
  - .1 Rigid insulation:
    - .1 Preparation:
      - .1 Secure mechanical fasteners to horizontal and vertical surfaces at approximately 300 mm centre to centre in each direction.
    - .2 Application:
      - .1 Cut insulation without integral vapor barrier to the right size and apply to exterior of duct and/or plenum with overlapping ends of horizontal and vertical surfaces and edges tightened together. Secure insulation to mechanical fasteners. Install retaining washers.
- .3 Finishes:
  - .1 Indoors:
    - .1 Rectangular ductwork with rigid insulation:
      - .1 Use rigid insulation with an integral vapour retarder. Apply continuous metal corner bead to all corners. Adhere vapour retarder tape over all joints and breaks in vapour retarder, and at all corners.
      - .2 Where ductwork is exposed, apply treated fabric jacket over insulation using fabric adhesive and finish with one (1) coat of fabric coating.

- .3 Use rigid insulation with an integral vapour retarder.  
Apply continuous metal corner bead to all corners.  
Adhere vapour retarder tape over all joints and breaks in  
vapour retarder, and at all corners.

### 3.4 DUCTWORK INSULATION SCHEDULE

#### .1 General:

- .1 No insulation is required for:
  - .1 Ducts fitted with acoustic insulation serving as thermal insulation, unless otherwise indicated.
- .2 In mechanical rooms, fresh air intakes, supply air ductwork:
  - .1 Insulation type D
  - .2 Thickness : 25 mm

END OF SECTION