

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

### **1.2 CODES AND REFERENCES**

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).
    - .1 ANSI/ASHRAE/IESNA 90.1-01, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.
  - .2 American Society for Testing and Materials International (ASTM).
    - .1 ASTM B209M-02, Specification for Aluminum and Aluminum Alloy Sheet and Plate (Metric).
    - .2 ASTM C335-95, Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
    - .3 ASTM C411-97, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
    - .4 ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
    - .5 ASTM C547-00, Specification for Mineral Fiber Pipe Insulation.
    - .6 ASTM C553-00, Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
    - .7 ASTM C612-00a, Specification for Mineral Fiber Block and Board Thermal Insulation.
    - .8 ASTM C795-92, Specification for Thermal Insulation for Use with Austenitic Stainless Steel.
    - .9 ASTM C921-92(1998)e1, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  - .3 Canadian General Standards Board (CGSB).
    - .1 CGSB 51-GP-52Ma-89, Vapor Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
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- .4 Thermal Insulation Association of Canada (TIAC), National Insulation Standards (C1999).
- .5 Underwriters Laboratories of Canada.
  - .1 CAN/ULC-S102-M88 (C2000), Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC-S701-01, Thermal Insulation Polyotrene, Boards and Pipe Covering.

### **1.3 DEFINITIONS**

- .1 For the present section the following definitions apply:
  - .1 Concealed elements: Insulated piping, ductwork and mechanical equipment located above suspended ceilings or in inaccessible construction spaces.
  - .2 Visible elements: Elements that are not concealed (as per the definition above).
  - .3 Insulation: Includes the insulating material, accessories for fixing and jackets.
  - .4 Ductwork: Overall duct network including the ducts, the joints and all related accessories.
- .2 Insulation thickness is the thickness needed to cover every component of the insulated element, including reinforcements, angles, T-joints, flanges, etc.

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit documents and samples required.
  - .2 Product Data.
    - .1 Provide manufacturer's printed product literature and datasheets for duct insulation, and include product characteristics, performance criteria, physical size, finish and limitations.
  - .3 Samples.
    - .1 Submit for approval: Complete assembly of each type of insulation system, insulation, coating, and adhesive proposed.
    - .2 Mount sample on 12 mm (1/2 in.) plywood board.
    - .3 Affix typewritten label beneath sample indicating service.
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.4 Manufacturers' Instructions.

.1 Provide manufacture's written duct insulation jointing recommendations and special handling criteria, installation sequence, and cleaning procedures.

## **1.5 QUALIFICATIONS**

.1 Installation: A specialist in performing work specified in this section, having at least 3 years of experience with this type and size of project and member of TIAC.

.2 Work must be completed by skilled insulation workers.

## **1.6 QUALITY ASSURANCE**

.1 The mechanical quality insulation standards manual of the Thermal Insulation Association of Canada (TIAC), as well as its authorized amendments, must be used as the standard reference and is part of the specifications of this project.

.2 The Contractor responsible for the thermal insulation installation must keep a copy of this quality standard manual as a reference on the jobsite.

## **1.7 WASTES MANAGEMENT**

.1 Sort out and recycle wastes in accordant with Architectural Specifications.

## **PART 2 - PRODUCTS**

### **2.1 FIRE AND SMOKE RATING**

.1 To CAN/ULC-S102 Standard.

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

### **2.2 INSULATION**

.1 Thermal conductivity coefficient (coefficient "K") must not exceed the prescribed value at mean temperatures of 24°C (75°F), in accordance with ASTM C335 Standard.

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- .2 **Type D-1 insulation:** Rigid panels made of mineral fibres in accordance with ASTM C612 Standard, with a factory installed vapour barrier envelop in accordance with CGSB 51-GP-52Ma Standard.
    - .1 Thermal conductivity coefficient "K" no greater than 0,035 W/m•°C (0.234 BTU-in/h•ft<sup>2</sup>•°F) at mean temperatures of 24 °C (75 °F).
    - .2 Temperature limit: 120 °C (250 °F).
    - .3 Acceptable product: Manson AK Board FSK.
  
  - .3 **Type D-2 insulation:** Bat made of mineral fibres in accordance with ASTM C553 Standard, with factory installed vapour barrier envelop in accordance with CGSB 51-GP-52Ma Standard.
    - .1 Mineral fibers: In accordance with ASTM-C553 Standard.
    - .2 Vapour barrier: In accordance with CGSB 51-GP-52Ma Standard.
    - .3 Thermal conductivity coefficient "K" no greater than 0,035 W/m•°C (0.234 BTU-in/h•ft<sup>2</sup>•°F) at mean temperature of 24 °C (75 °F).
    - .4 Temperature limit: 120 °C (250 °F).
    - .5 Density: (1.5 lb/ft<sup>3</sup>).
    - .6 Acceptable product: Manson Alley Wrap FSK.
  
  - .4 **Type D-3 insulation:** Rigid ducts made of mineral fibres, with factory installed vapour barrier envelop.
    - .1 Mineral fibers: In accordance with ASTM-C547 Standard.
    - .2 Vapour barrier: In accordance with CGSB 51-GP-52Ma Standard.
    - .3 Thermal conductivity coefficient "K" no greater than 0.037 W/m•°C (0.26 BTU-in/h•ft<sup>2</sup>•°F) at mean temperature of 38 °C (100 °F).
    - .4 Density: 40 kg/m<sup>3</sup> (2.5 lb/ft<sup>3</sup>).
    - .5 Temperature limit: 454 °C (850 °F).
    - .6 Acceptable products: Knauf KwikFlex Pipe & Tank with FSK liner.
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## **2.3 JACKETS**

- .1 Canvas.
  - .1 To utilize to the exposed elements 220 gm/m<sup>2</sup> cotton ULC approved, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921 Standard.
  - .2 Acceptable products: S. Fatall Thermocanvas.
  - .3 Lagging adhesive: Compatible with insulation.

## **2.4 GLUES, TAPES AND ATTACHMENTS**

- .1 Tapes: Self-adhesive aluminum, of 100 mm in width, approved by the ULC for the following characteristics: Flame spread index inferior to 25 and a fumigant property index of at most 50.
- .2 Quick set contact glue.
- .3 Sealing Glue for Overlaps: Quick set glue used to seal the joints and the overlaps of the vapour barriers.
- .4 Glues for jackets in canvas web.
  - .1 Washable glue used to stick the jacketing on the insulating material.
- .5 Pegs.
  - .1 Pegs to weld to the duct once the insulation is set, of a 4 mm (0.157 in.) diameter, with a 35 mm (1.378 in.) head diameter, of an appropriate length to the thickness of the insulator.
  - .2 Pegs to weld on the duct before the insulation is set, of a 2 mm (0.079 in.) diameter, of an appropriate length to the thickness of the insulator, equipped with a nylon square holding small plate of 32 mm (1.259 in.) side.

## **PART 3 - EXECUTION**

### **3.1 PRE-INSTALLATION REQUIREMENTS**

- .1 Pressure test ductwork systems completed, witnessed, and certified.
  - .2 Ensure surfaces are clean, dry, and free from foreign material.
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### 3.2 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers' instructions and as indicated.
- .3 Use two layers with staggered joints when required nominal thickness exceeds 75 mm (3 in.).
- .4 If there are elevated joints, cover them by overlapping sections or with a flexible insulating material with an integrated vapour barrier.
- .5 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
  - .1 Ensure hangers, and supports are outside vapour retarder jacket.
- .6 Hangers and supports in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
  - .1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.
- .7 Fasteners: Install at 300 mm (12 in.) on centre in horizontal and vertical directions, minimum two rows each side.

### 3.3 DUCTWORK INSULATION SCHEDULE

- .1 Insulation types and thicknesses: Conform to following table:

NETWORKS AND EQUIPMENTS	THICKNESS OF INSULATION mm (in.)	TYPE OF INSULATION
.1 The networks of rectangular exposed supply conditioning air ducts	25 (1)	D-1
.2 The networks of hidden rectangular supply conditioning air ducts whose greatest dimension does not exceed 1,000 mm (39 in.)	25 (1)	D-1
.3 The networks of hidden rectangular supply conditioning air ducts whose greatest dimension does exceed 1,000 mm (39 in.)	25 (1)	D-1

<b>NETWORKS AND EQUIPMENTS</b>	<b>THICKNESS OF INSULATION mm (in.)</b>	<b>TYPE OF INSULATION</b>
.4 The networks of round and oval exposed supply and return conditioning air ducts	25 (1)	D-2
.5 The networks of round and oval hidden supply and return conditioning air ducts	25 (1)	D-2
.6 The hidden and exposed air exhaust ducts on a 5 m (16 ft.) length starting from the roof or from exterior wall, to the main pipe and the branch lines	50 (2)	D-1
.7 The fresh air ducts on a 5 m (16 ft.) length, starting from the louvers to the heating coils	75 (3)	D-1

### **3.4 FINISHING**

- .1 Visible ducts located inside de building: Canvas jacket.

**END OF SECTION**