

## **PART 1        GENERAL**

### **1.1            REFERENCE STANDARDS**

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).
  - .1 ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
- .2 American Society for Testing and Materials International (ASTM).
  - .1 ASTM B209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
  - .2 ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  - .3 ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  - .4 ASTM C449/C449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  - .5 ASTM C533, Calcium Silicate Block and Pipe Thermal Insulation.
  - .6 ASTM C547, Mineral Fiber Pipe Insulation.
  - .7 ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  - .8 ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB).
  - .1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
  - .2 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts.
- .4 Department of Justice Canada (Jus).
  - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
  - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
  - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Material Safety Data Sheets (MSDS).
- .6 Manufacturer's Trade Associations.
  - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

- .7 Underwriters' Laboratories of Canada (ULC).
  - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .3 CAN/ULC-S702, Thermal Insulation, Mineral Fibre, for Buildings
  - .4 CAN/ULC-S702.2, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

## **1.2 DEFINITIONS**

- .1 For purposes of this section:
  - .1 “CONCEALED”: insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
  - .2 “EXPOSED”: will mean “not concealed” as specified.
- .2 TIAC Codes:
  - .1 CRF: Code Rectangular Finish.
  - .2 CPF: Code Piping Finish.

## **1.3 QUALITY ASSURANCE**

- .1 Installer: must be a specialist in performing work of this field, have at least 3 years of successful experience in this size and type of project, and be a member of TIAC.

## **PART 2 PRODUCT**

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

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

### **2.2 INSULATION**

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity (“k” factor) must not exceed specified mean temperature values of 24°C, when tested in accordance with ASTM C335.
- .3 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.
  - .1 Mineral fibre: conform to CAN/ULC-S702 and ASTM C547.
  - .2 Jacket: conform to CGSB 51-GP-52Ma.
  - .3 Maximum “k” factor: conform to CAN/ULC-S702 and ASTM C547.
- .4 TIAC Code C-2: mineral fibre blanket faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).
  - .1 Mineral fibre: conform to CAN/ULC-S702 and ASTM C547.

- .2 Jacket: conform to CGSB 51-GP-52Ma.
- .3 Maximum "k" factor: conform to ASTM C547 and CAN/ULC-S702.

### **2.3 INSULATION SECUREMENT**

- .1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.
- .2 Contact adhesive: quick setting.
- .3 Canvas adhesive: washable.
- .4 Tie wire: 1.5 mm diameter stainless steel.
- .5 Bands: stainless steel, 19 mm wide, 0.5 mm thick.

### **2.4 CEMENT**

- .1 Thermal insulating and finishing cement:
  - .1 Air drying or hydraulic setting on mineral wool, conform to ASTM C449/C449M.

### **2.5 VAPOUR RETARDER LAP ADHESIVE**

- .1 Water-based, fire-retardant type, compatible with insulation.

### **2.6 INDOOR VAPOUR RETARDER FINISH**

- .1 Vinyl emulsion type acrylic, compatible with insulation.

### **2.7 OUTDOOR VAPOUR RETARDER FINISH**

- .1 Vinyl emulsion type acrylic, compatible with insulation.
- .2 Reinforcing fabric: fiber-glass, untreated 305 g/m<sup>2</sup>.

### **2.8 JACKETS**

- .1 Polyvinyl Chloride (PVC):
  - .1 One-piece moulded type and sheet conform to CAN/CGSB-51.53 with pre-formed shapes as required.
  - .2 Minimum service temperatures: -20°C.
  - .3 Maximum service temperature: 65°C.
  - .4 Moisture vapour transmission: 0.02 perm.
  - .5 Fastenings:
    - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
    - .2 Tacks.
    - .3 Pressure sensitive vinyl tape of matching colour.
- .2 Canvas:
  - .1 220 gm/m<sup>2</sup> cotton, plain weave, treated with dilute fire retardant lagging adhesive conform to ASTM C921.

- .2 Lagging adhesive: compatible with insulation.

### **PART 3 EXECUTION**

#### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

#### **3.2 PRE-INSTALLATION REQUIREMENT**

- .1 Pressure testing of piping systems and adjacent equipment must be completed, witnessed and certified.
- .2 Surfaces must be clean, dry, and free from foreign material.

#### **3.3 INSTALLATION**

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturer's instructions and this specification.
- .3 Use two layers with staggered joints when required nominal wall thickness exceeds 50 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
  - .1 Install hangers, supports outside vapour retarder jacket.
- .5 Supports, Hangers:
  - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

#### **3.4 REMOVABLE AND PRE-FABRICATED INSULATION AND ENCLOSURES**

- .1 Application: at expansion joints, valves, flanges and unions at equipment and primary flow measuring elements.
- .2 Design to permit movement of expansion joint, permit periodic removal and replacement, without damage to adjacent insulation.

#### **3.5 PIPING INSULATION SCHEDULES**

- .1 Includes valves, valve bonnets, strainers, flanges, and fittings, unless otherwise specified.
- .2 TIAC Code: A-3.
  - .1 Securements: SS bands at 300 mm on centre.
  - .2 Seals: VR lap seal adhesive, VR lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C.
- .3 TIAC Code: C-2.
  - .1 Seals: lap seal adhesive, lagging adhesive.

- .2 Installation: TIAC Code: 1501-C.
- .4 Thickness of insulation as listed in following table.
  - .1 Run-outs to individual units and equipment not exceeding 4000 mm long.
  - .2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp. °C	TIAC Code	Insulation thickness (mm)
Domestic CWS and HWS	---	A3	25
Vent	---	A-3 or C-2	25

- .5 Finishes:
  - .1 Exposed indoors: canvas or PVC jacket.
  - .2 Exposed in mechanical rooms: canvas or PVC jacket.
  - .3 Installation: conform to appropriate TIAC code CRF/1 through CPF/5.

**END OF SECTION**