

## **1 General**

### **1.1 RELATED SECTIONS**

- .1 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
- .2 Section 23 05 53 - Identification for HVAC Piping and Equipment.

### **1.2 REFERENCES**

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  - .1 ANSI/ASHRAE/IESNA 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings.
- .2 American Society for Testing and Materials (ASTM International)
  - .1 ASTM B209M, Specification for Aluminum and Aluminum Alloy Sheet and Plate.
  - .2 ASTM C335, Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  - .3 ASTM C411, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  - .4 ASTM C449/C449M, Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  - .5 ASTM C533, Specification for Calcium Silicate Block and Pipe Thermal Insulation.
  - .6 ASTM C547, Specification for Mineral Fiber Pipe Insulation.
  - .7 ASTM C553, Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
  - .8 ASTM C612, Specification for Mineral Fiber Block and Board Thermal Insulation.
  - .9 ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  - .10 ASTM C921, Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 51-GP-52Ma, Vapor Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
  - .2 CGSB 51-GP-53M, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts.
- .4 Thermal Insulation Association of Canada (TIAC)
  - .1 National Insulation Standards.
- .5 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
- .6 National Energy Code of Canada for Buildings (NECB).

### **1.3 PRODUCT DATA**

- .1 Submit Product Data in accordance with Section 01 33 00 - Submittal Procedures.

### **1.4 SAMPLES**

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix typewritten label beneath sample indicating service.

### **1.5 MANUFACTURER'S INSTRUCTIONS**

- .1 Submit manufacturer's installation instructions in accordance with 01 33 00 - Submittal Procedures.
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- .2 Installation instructions to include procedures to be used, installation standards to be achieved.

## **1.6 QUALIFICATIONS**

- .1 Installer to be specialist in performing work of this section, and have at least 3 years successful experience in this size and type of project, qualified to standards of TIAC.

## **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.
- .2 Protect from weather and construction traffic.
- .3 Protect against damage from any source.
- .4 Store at temperatures and conditions recommended by manufacturer.

## **1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 00 - Cleaning.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.
- .5 Divert unused adhesive materials from landfill to official hazardous material collections site approved by Departmental Representative.
- .6 Do not dispose of unused adhesive materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

## **2 Products**

### **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: includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code A-1: Rigid moulded mineral fibre without factory applied vapour retarder jacket.
  - .1 Mineral fibre: ASTM C547.
  - .2 Maximum "k" factor: ASTM C547.
- .4 TIAC Code A-3: Rigid moulded mineral fibre with factory applied vapour retarder jacket.
  - .1 Mineral fibre: ASTM C547.
  - .2 Jacket: to CGSB 1-GP-52Ma.
  - .3 Maximum "k" factor: ASTM C547.
- .5 TIAC Code C-1: Rigid mineral fibre board, unfaced.
  - .1 Mineral fibre: ASTM C612.
  - .2 Maximum "k" factor: ASTM C612.
- .6 TIAC Code C-4: Rigid mineral fibre board faced with factory applied vapour retarder jacket.
  - .1 Mineral fibre: ASTM C612.
  - .2 Jacket: to CGSB51-GP-52Ma.

- .3 Maximum "k" factor: ASTM C612.
- .7 TIAC Code C-2: Mineral fibre blanket unfaced or faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).
  - .1 Mineral fibre: ASTM C553.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor: ASTM C553.
- .8 TIAC Code A.6: Flexible unicellular tubular elastomer.
  - .1 Insulation: with vapour retarder jacket.
  - .2 Jacket: to CGSB 51-GP-52Ma.
  - .3 Maximum "k" factor.
  - .4 Certified by manufacturer free of potential stress corrosion cracking corrodants.
- .9 TIAC Code A-2: Rigid moulded calcium silicate in sections and blocks, and with special shapes to suit project requirements.
  - .1 Insulation: ASTM C533.
  - .2 Maximum "k" factor: ASTM C533.
  - .3 Design to permit periodic removal and re-installation.

## **2.3 CEMENT**

- .1 Thermal insulating and finish
  - .1 To: ASTM C449/C449M.
  - .2 Hydraulic setting on mineral wool, to ASTM C449.

## **2.4 JACKETS**

- .1 Polyvinyl Chloride (PVC):
  - .1 One-piece moulded type and sheet to CGSB 51-GP-53M with pre-formed shapes as required.
  - .2 Colours: to match adjacent finish paint.
  - .3 Minimum service temperatures: -20°C.
  - .4 Maximum service temperature: 65°C.
  - .5 Moisture vapour transmission: 0.02 perm.
  - .6 Thickness: 0.56 mm.
  - .7 Fastenings:
    - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
    - .2 Tacks.
    - .3 Pressure sensitive vinyl tape of matching colour.
  - .8 Special requirements:
    - .1 Indoor: Flame spread rating 25, smoke developed 50.
    - .2 Outdoor: UV rated material at least 0.5 mm thick.
  - .9 Covering adhesive: Compatible with insulation.
- .2 Canvas:
  - .1 220 gm/m<sup>2</sup> cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
  - .2 Lagging adhesive: Compatible with insulation.

## **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.

### **3 Execution**

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

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

#### **3.2 INSTALLATION**

- .1 Install in accordance with TIAC National Standards
  - .1 Hot equipment: To TIAC code 1503-H.
  - .2 Cold equipment: to TIAC code 1503-C or 1503-CA.
- .2 Elastomeric Insulation: to remain dry. Overlaps to manufacturer's instructions. Joints tight and sealed properly.
- .3 Provide vapour retarder as recommended by manufacturer.
- .4 Apply materials in accordance with insulation and equipment manufacturer's instructions and this specification.
- .5 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
- .6 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
  - .1 Hangers, supports outside vapour retarder jacket.
- .7 Supports, Hangers:
  - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

#### **3.3 EQUIPMENT INSULATION SCHEDULES**

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 Hot Equipment:
  - .1 TIAC code A-1 or C-1 mechanical fastenings or wire or bands and 13 cement reinforced with one layer of reinforcing mesh.
  - .2 TIAC code A-2 with 25 mm air gap, mechanical fastenings or wire or bands and 13 mm cement reinforced with one layer of reinforcing mesh.
  - .3 TIAC code C-2 unfaced with wire and 13 mm cement precede by one layer of reinforcing mesh.
- .3 Breechings, :
  - .1 TIAC code A-2 with 25 mm air gap, mechanical fastenings and 13 mm cement reinforced with one layer of reinforcing mesh.
- .4 Finishes:
  - .1 Equipment in mechanical rooms: TIAC code CEF/1 with aluminum jacket.
  - .2 Equipment elsewhere: TIAC code CEF/2 with 13 mm cement jacket.

#### **3.4 REMOVABLE INSULATION COVERS**

- .1 Installation to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.
- .2 Removable insulation covers shall be provided for the following:
  - .1 Domestic hot water service pump assemblies.
  - .2 Hydronic heating flex connections, expansion joints.
  - .3 Hydronic heating and chilled water system expansion tanks.
  - .4 Heating system pump assemblies.
  - .5 Hydronic water treatment pot feeder.

**END OF SECTION**

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