

PART 1 GENERAL

1.1 GENERAL:

- .1 Materials and installation for pipe insulation.

1.2 REFERENCES

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
 - .1 ASHRAE Standard 90.1, Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings (Including Addenda B, C, D, E, F, G, I and M) (includes supplements).
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM B209, Specification for Aluminium and Aluminium 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, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .5 ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - .6 ASTM C921, 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 Manufacturer's Trade Associations
 - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 1999).
- .5 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

1.3 DEFINITIONS

- .1 For purposes of this section:
 - .1 The word "Exposed" means any work which is not concealed in walls, shafts, cavities, ceilings or crawlspace. Work behind doors, in closets or cupboards, or under counters is considered exposed. Work in Mechanical and Boiler Rooms is considered exposed.
 - .2 The word "Concealed" means any work in suspended ceilings and non-accessible chases and furred-in spaces.
 - .3 The term 'cold piping' refers to the following systems: Domestic Cold Water, Plumbing Vents, and Condensate Drip Drains.
 - .4 The term 'hot piping' refers to Domestic Hot Water Supply and Recirc piping, Tempered Water Supply and Recirc piping, and Heating Water Supply and Return piping.
 - .5 TIAC codes:
 - .1 CRF: Code Rectangular Finish.
 - .2 CPF: Code Piping Finish.

1.4 SUBMITTALS

- .1 Conform to the requirements of Section 013300 - Submittal Procedures.
- .2 Conform to the requirements of Section 017800 – Closeout Submittals.
- .3 Conform to the requirements of Section 230501 – Common Work Results - Mechanical.
- .4 Closeout Submittals:
 - .1 Provide maintenance data for incorporation into manual specified in Section 017800 - Closeout Submittals.

PART 2 PRODUCTS

2.1 GENERAL

- .1 Conform to the requirements of Section 230501 – Common Work Results – Mechanical.
- .2 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) not to exceed specified values at 24 °C mean temperature 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: to CAN/ULC-S702.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: to 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.

2.4 CEMENT

- .1 Thermal insulating and finishing cement:
 - .1 Hydraulic setting or Air drying on mineral wool, 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 JACKETS

- .1 Polyvinyl Chloride (PVC):
 - .1 One-piece moulded type and sheet to CAN/CGSB-51.53 with pre-formed shapes as required.
 - .2 Colours: white.
 - .3 Minimum service temperatures: -20°C.
 - .4 Maximum service temperature: 65°C.
 - .5 Moisture vapour transmission: 0.02 perm.
 - .6 Fastenings:
 - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
 - .2 Tacks.
 - .3 Pressure sensitive vinyl tape of matching colour.

- .7 Special requirements:
 - .1 Outdoor: UV rated material at least 0.5 mm thick.
- .2 Canvas:
 - .1 220 and 120 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
 - .2 Lagging adhesive: Compatible with insulation.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

- .1 Conform to the requirements of Section 230501 – Common Work Results – Mechanical
- .2 Conform to the requirements of Section 230505 – Installation of Pipework
- .3 Install using Manufacturers Recommended Instructions
- .4 Install in accordance with TIAC National Standards.
- .5 Pre- Installation Requirements
 - .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
 - .2 Surfaces to be clean, dry, free from foreign material.
- .6 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
- .7 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Hangers, supports to be outside vapour retarder jacket.

3.2 INSTALLATION - PIPING

- .1 Apply insulation at a temperature of approximately 18°C (65°F) over clean, dry surfaces. Butt adjoining sections of insulation firmly together with the longitudinal seam of the jacket located on the bottom half of the pipe.
- .2 For hot piping:
 - .1 Insulate valves, unions and flanges, and where concealed, insulate fittings.
 - .2 seal longitudinal lap joints with a suitable adhesive/cement capable of withstanding the service temperature. Cover butt joints with a strip of the same material as the jacket, and cement as required.
- .3 Concealed insulated items require no further finish than provided in factory applied jacket.
- .4 All adhesives and finishes: Fire retardant or fire resistant when dry, and acceptable to the Authorities Having Jurisdiction.

.5 Supports, Hangers:

- .1 For piping N.P.S. 1.5" and larger, provide a section of rigid insulation or non-compressible material under the vapour barrier, the same length as the saddle.

3.3 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

- .1 Application: At expansion compensators, valves, primary flow measuring elements, and flanges and unions at equipment.
- .2 Design: To permit movement of expansion compensator and to permit periodic removal and replacement without damage to adjacent insulation.
- .3 Insulation:
- .1 Insulation, fastenings and finishes: same as system.
- .2 Jacket: ~~Aluminum, SS~~, PVC, ~~ABS~~, or high temperature fabric, to match remainder of system.

3.4 PIPING INSULATION SCHEDULES

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 TIAC Code: A-3.
- .1 Securements: Tape.
- .2 Seals: VR lap seal adhesive, VR lagging adhesive.
- .3 Installation: TIAC Code: 1501-C.
- .3 Thickness of insulation to be as listed in following table:
- .1 Run-outs to individual units and equipment not exceeding 4000 mm long.
- .2 Insulate sections of pipes that are removed and reinstalled or replaced,
- .3 Insulate valves that are removed and reinstalled or replaced,

Application	Temp °C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
			Run out	to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over
Heating Water	up to 40		N/R	N/R	N/R	N/R	N/R	N/R
Heating Water	40-93	A-3	25	25	25	38	38	38

.4 Finishes:

- .1 Exposed indoors: PVC jacket.
- .2 Exposed in mechanical rooms: Canvas or PVC jacket.
- .3 Concealed, indoors: factory applied jacket.
- .4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.

.5 Installation: To appropriate TIAC code CRF/1 through CPF/5.

3.5 COMMISSIONING

- .1 Conform to the requirements of Section 230501 – Common Work Results - Mechanical
- .2 Conform to the requirements of Section 230801 – Performance Verification of Mechanical Piping Systems
- .3 In accordance with manufacturer's recommendations.

END OF SPECIFICATION SECTION 21 07 20