

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  - .1 ASHRAE Standard 90.1-Latest Edition, 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 C 335-Latest Edition, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  - .2 ASTM C 411-Latest Edition, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  - .3 ASTM C 449/C 449M-Latest Edition, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  - .4 ASTM C 533-Latest Edition, Calcium Silicate Block and Pipe Thermal Insulation.
  - .5 ASTM C 547-Latest Edition, Mineral Fiber Pipe Insulation.
  - .6 ASTM C 795-Latest Edition, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  - .7 ASTM C 921-Latest Edition, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 51-GP-52Ma-Latest Edition, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
  - .2 CAN/CGSB-51.53-Latest Edition, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts
- .4 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Assessment Act (CEAA).
  - .2 Canadian Environmental Protection Act (CEPA).

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| <u>1.1 REFERENCES</u><br>(Cont'd)              | .5 | Health Canada/Workplace Hazardous Materials Information System (WHMIS)<br>.1 Material Safety Data Sheets (MSDS).   |
|  | .6 | Manufacturer's Trade Associations<br>.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Latest Edition ).  |
|  | .7 | Underwriters' Laboratories of Canada (ULC)<br>.1 CAN/ULC-S102-Latest Edition, Surface Burning Characteristics of Building Materials and Assemblies.<br>.2 CAN/ULC-S701-Latest Edition, Thermal Insulation, Polystyrene, Boards and Pipe Covering.<br>.3 CAN/ULC-S702-Latest Edition, Thermal Insulation, Mineral Fibre, for Buildings<br>.4 CAN/ULC-S702.2-Latest Edition, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines. |
| <u>1.2 DEFINITIONS</u>                         | .1 | For purposes of this section:<br>.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.<br>.2 "EXPOSED" - will mean "not concealed" as specified.  |
|  | .2 | TIAC ss:<br>.1 CRF: Code Rectangular Finish.<br>.2 CPF: Code Piping Finish.  |
| <u>1.3 ACTION AND INFORMATIONAL SUBMITTALS</u> | .1 | Submittals: in accordance with Section 01 33 00 - Submittal Procedures.  |
|  | .2 | Product Data:<br>.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.<br>.1 Submit one copy of Workplace Hazardous Materials Information System   |
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1.3 ACTION AND  
INFORMATIONAL  
SUBMITTALS  
(Cont'd)

- .2 Product Data: (Cont'd)
  - .1 (Cont'd)
    - .1 (Cont'd)  
(WHMIS) Material Safety Data Sheets  
(MSDS) in accordance with Section  
01 33 00 - Submittal Procedures.
- .3 Shop Drawings:
  - .1 Submit shop drawings in accordance with  
Section 01 33 00 - Submittal Procedures.
    - .1 Shop drawings: submit drawings  
stamped and signed by professional  
engineer registered or licensed in  
Province of Newfoundland and Labrador,  
Canada.
- .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 label beneath  
sample indicating service.
- .5 Quality assurance submittals: submit  
following in accordance with Section 01 33 00  
- Submittal Procedures.
  - .1 Certificates: submit certificates signed  
by manufacturer certifying that materials  
comply with specified performance  
characteristics and physical properties.
  - .2 Instructions: submit manufacturer's  
installation instructions.
    - .1 Departmental Representative will  
make available 1 copy of systems  
supplier's installation instructions.

1.4 QUALITY  
ASSURANCE

- .1 Qualifications:
- .2 Installer: 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 or member of  
TIAC.

1.4 QUALITY ASSURANCE (Cont'd)	.3 Health and Safety: .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
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1.5 DELIVERY, STORAGE AND HANDLING	.1 Packing, shipping, handling and unloading: .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements. .2 Deliver, store and handle materials in accordance with manufacturer's written instructions. .3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.  .2 Storage and Protection: .1 Protect from weather, construction traffic. .2 Protect against damage. .3 Store at temperatures and conditions required by manufacturer.  .3 Waste Management and Disposal: .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling. .2 Place excess or unused insulation and insulation accessory materials in designated containers. .3 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.
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## PART 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 specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C 335.
- .3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.  
.1 Mineral fibre: to CAN/ULC-S702 and ASTM C 547.  
.2 Maximum "k" factor: to CAN/ULC-S702.
- .4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.  
.1 Mineral fibre: to CAN/ULC-S702 and ASTM C 547.  
.2 Jacket: to CGSB 51-GP-52Ma.  
.3 Maximum "k" factor: to CAN/ULC-S702 and ASTM C 547.
- .5 TIAC Code C-2: mineral fibre blanket faced [with] [without] factory applied vapour retarder jacket (as scheduled in PART 3 of this section).  
.1 Mineral fibre: to CAN/ULC-S702 and ASTM C 547.  
.2 Jacket: to CGSB 51-GP-52Ma.  
.3 Maximum "k" factor: to CAN/ULC-S702 and ASTM C 547.
- .6 TIAC Code A-6: flexible unicellular tubular elastomer.  
.1 Jacket: to CGSB 51-GP-52Ma.  
.2 Maximum "k" factor: CAN/ULC.
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| 2.2 INSULATION<br>(Cont'd)            | .6 | TIAC Code A-6: (Cont'd)<br>.3 Certified by manufacturer: free of potential stress corrosion cracking corrodants.      |
| 2.3 INSULATION<br>SECUREMENT          | .1 | Tape: self-adhesive, aluminum, [plain] [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:<br>.1 Hydraulic setting or Air drying on mineral wool, to ASTM C 449/C 449M. |
| 2.5 VAPOUR RETARDER<br>LAP ADHESIVE   | .1 | Water based, fire retardant type, compatible with insulation.   |
| 2.6 INDOOR VAPOUR<br>RETARDER FINISH  | .1 | Vinyl emulsion type acrylic, compatible with insulation.  |
| 2.7 OUTDOOR VAPOUR<br>RETARDER FINISH | .1 | Vinyl emulsion type acrylic, compatible with insulation.  |
|                                       | .2 | Reinforcing fabric: fibrous glass, untreated 305 g/m <sup>2</sup> .   |
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## 2.8 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: to match adjacent finish paint by Departmental Representative.
    - .3 Minimum service temperatures: -20 degrees C.
    - .4 Maximum service temperature: 65 degrees 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 ABS Plastic:
    - .1 One-piece moulded type and sheet with pre-formed shapes as required.
    - .2 Colours: to match adjacent finish paint.
    - .3 Minimum service temperatures: -40 degrees C.
    - .4 Maximum service temperature: 82 degrees C.
    - .5 Moisture vapour transmission: 0.012 perm.
    - .6 Thickness: 0.75 mm.
    - .7 Fastenings:
      - .1 Solvent weld adhesive compatible with insulation to seal laps and joints.
      - .2 Tacks.
      - .3 Pressure sensitive vinyl tape of matching colour.
    - .8 Locations:
      - .1 For outdoor use ONLY.
  - .3 Canvas:
    - .1 220 and 120 gm/m<sup>2</sup> cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.
    - .2 Lagging adhesive: compatible with insulation.
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| 2.8 JACKETS<br>(Cont'd) | .4 | Aluminum:<br>.1 To ASTM B 209.<br>.2 Thickness: 0.50 mm sheet.<br>.3 Finish: smooth.<br>.4 Joining: longitudinal and circumferential slip joints with 50 mm laps.<br>.5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.<br>.6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing. |
|                         | .5 | Stainless steel:<br>.1 Type: 304.<br>.2 Thickness: 0.25 mm.<br>.3 Finish: smooth.<br>.4 Joining: longitudinal and circumferential slip joints with 50 mm laps.<br>.5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.<br>.6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.    |

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| 2.9 WEATHERPROOF<br>CAULKING FOR<br>JACKETS INSTALLED<br>OUTDOORS | .1 | Caulking to: Section 07 92 00 - Joint Sealants. |
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### PART 3 - EXECUTION

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| 3.1 MANUFACTURER'S<br>INSTRUCTIONS     | .1 | Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet. |
| 3.2<br>PRE-INSTALLATION<br>REQUIREMENT | .1 | Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.   |
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3.1 MANUFACTURER'S INSTRUCTIONS  
(Cont'd)

.1 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers instructions and this specification.

.3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 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 INSTALLATION OF ELASTOMERIC INSULATION

.1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.

.2 Provide vapour retarder as recommended by manufacturer.

3.5 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 TIAC Code: A-1.  
.1 Securements: [SS [wire] [bands]] [Tape] at 300 mm on centre.

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3.5 PIPING  
INSULATION  
SCHEDULES  
(Cont'd)

- .2 TIAC Code: (Cont'd)
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code 1501-H.
- .3 TIAC Code: A-3.
  - .1 Securements: [SS [wire] [bands]] [Tape] at 300 mm on centre.
  - .2 Seals: VR lap seal adhesive, VR lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C.
- .4 TIAC Code: A-6.
  - .1 Insulation securements: SS wire bands at 300 mm on centre.
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C (Cold) and H (Hot).
- .5 TIAC Code: C-2 [with] [without] vapour retarder jacket.
  - .1 Insulation securements: [\_\_\_\_\_].
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code: 1501-C.
- .6 TIAC Code: A-2.
  - .1 Insulation securements: [\_\_\_\_\_].
  - .2 Seals: lap seal adhesive, lagging adhesive.
  - .3 Installation: TIAC Code: 1501-H.
- .7 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.

Applic ation	Temp degrees	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

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3.5 PIPING  
INSULATION  
SCHEDULES  
(Cont'd)

.7 (Cont'd)  
.2 (Cont'd)

Refrig- erant hot gas liquid suction	4-13	A-6	25	25	25	25	25
Refrig- erant hot gas liquid suction	below 4	A-6	25	25	38	38	38

- .8 Finishes:
- .1 Exposed indoors: PVC jacket.
  - .2 Exposed in mechanical rooms: aluminum PVC jacket.
  - .3 Concealed, indoors: canvas on valves, fittings. No further finish.
  - .4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
  - .5 Outdoors: water-proof ABS jacket.
  - .6 Finish attachments: SS bands, at 150 mm on centre. Seals: closed.
  - .7 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.