

1. GENERAL

1.1 Scope

- .1 Piping System Heat tracing & insulation.

1.2 References

- .1 Except as specified herein, the latest edition of the standards listed below form a part of this Specification to the extent referenced in this Section. Where earlier editions of standards are adopted as referenced in applicable codes, those shall govern. The publications are referred to within the text by the basic designation only.
- .2 In each of the standards referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears.
- .3 American Society for Testing Materials (ASTM):
 - 1.A167: Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
 - 2.A240: Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels for General Applications
 - 3.C195: Mineral Fiber Thermal Insulating Cement
 - 4.C450 Standard Practice for Prefabrication and Field Fabrication of Thermal Insulating Fittings, Covers for NPS Piping, Vessel Lagging and Dished Head Segments
 - 5.C533: Calcium Silicate Block and Pipe Thermal Insulation
 - 6.C534: Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
 - 7.C547: Mineral Fiber Pipe Insulation
 - 8.C552: Cellular Glass Thermal Insulation
 - 9.C553: Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

10. C591: Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
11. C592: Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type)
12. C612: Mineral Fiber Block and Board Thermal Insulation
13. C916: Adhesives for Duct Thermal Insulation
14. C1126: Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation
15. C1136: Flexible, Low Permeance Vapor Retarders for Thermal Insulation
16. E 84: Surface Burning Characteristics of Building Materials
- .4 National Fire Protection Association (NFPA):
 1. 255: Method of Test of Surface Burning Characteristics of Building Materials
- .5 Underwriters Laboratories (UL):
 1. 723: Test for Surface Burning Characteristics of Building Materials

1.3 Quality Assurance

- .1 Insulation shall be installed by skilled workmen regularly engaged in this type of work.
- .2 Materials shall meet or exceed fire and smoke hazard ratings as stated in this section and defined in applicable building codes.
- .3 Vapor Barrier Coating: Provide in accordance with insulation manufacturers' recommendations.
- .4 Insulation and Vapor Barrier Adhesive: ASTM C916, Type I adhesive for securing insulation to metal surfaces and for vapor barrier lap only in building interior

1.4 Submittals

- .1 Submit shop drawings which indicate complete material data, "K" value temperature rating, density, finish, recovery jacket of materials proposed for this project and indicate thickness of material for individual services.
- .2 For heat tracing supply shop drawings for all electric heating cable and accessories including calculations and design for the specific requirements of the project.

1.5 Job Conditions

- .1 Deliver material to job site in original non-broken factory packaging, labelled with manufacturer's density and thickness.
- .2 Perform work at ambient and equipment temperatures as recommended by the adhesive manufacturer. Make good separation of joints or cracking of insulation due to thermal movement or poor workmanship.

1.6 Alternatives

- .1 Alternative insulations are subject to approval. Alternatives shall provide the same thermal resistance within 5%, at normal conditions as material specified.

2. PRODUCTS

2.1 General

- .1 Insulation Materials, Recovery Jackets, Vapour Barrier Facings, Tapes and Adhesives: Composite fire and smoke hazard ratings shall not exceed 25 for flame spread and 50 for smoke developed.
- .2 All insulation materials shall meet Building Code Standards, and packages or containers of such materials shall be appropriately labelled.
- .3 Insulate fittings and valve bodies with preformed insulated fittings.
- .4 All heat tracing and accessories should be installed and tested as per manufacturer's recommendations/procedures, and industry accepted standard practices.
- .5 Since the thermal resistance of plastic is significant (125 times that of steel), the heat tracing density for plastic pipes must be considered carefully. Particular care must be taken when calculating the heating cable capacity for thick walled, large diameter plastic pipe. In some cases, it may be necessary to install two conduits or more, and cables with reduced watt output. This will ensure more even heat distribution and penetration, while not permitting to exceed the maximum permissible temperature of the pipe wall.

2.2 Materials

- .1 All Domestic and Fire Water piping systems will be formed fine fibrous glass or formed mineral fibre pipe insulation, with factory applied vapour barrier jacket, factory moulded to conform with piping, "K" value at 24°C maximum 0.035 W/m·°C. Service temperature - 14°C to 100°C. Minimum thickness to be 50.8mm.
- .2 Recovery Jackets:

- .1 0.9 mm embossed aluminum sheet for exposed to atmosphere, floating docks and gangway areas.
- .2 2.54 mm PVC jacket for gallery and kiosks areas.
- .3 Heating tracing cable, required to provide consistent and reliable heat outputs regardless of circuit length, approved for use in ordinary (nonclassified) areas, hazardous areas and Zone 2 classified areas. Available in several watt densities and voltages.
- .4 Electronic thermostat with ground fault detection circuitry, 3-pole circuit breaker and contactor in a Nema 4X Stainless Steel enclosure.
- .5 Control sensor and additional high limit sensors required for plastic pipe protections
- .6 Heat trace cable's watt density to be 26W/m at 208Vac nominal. Minimum heat trace's installation temperature to be -60oC.
- .7 Ground fault interrupt device to be RCM420-D-2 or approved equal with manufacturer's recommended CT. The interrupt device's feed shall be 120Vac single phase.
- .8 Teck cable to be used as feed for both panel and heat trace's feed. Cable shall be used with manufacturer's approved connectors.
- .9 Temperature sensors for temperature controller & limits controller shall be RTD.
- .10 All components, sensors and equipment used shall be CSA approved.

3. EXECUTION

3.1 Preparation

- .1 Do not install covering before piping and equipment has been tested and approved.
- .2 Ensure surface is clean and dry prior to installation. Ensure insulation is dry before and during application. Finish with systems at operating conditions.

3.2 Installation

- .1 Ensure insulation is continuous through inside walls. Pack around pipes with fire proof self-supporting insulation material, properly sealed.
- .2 Insulate piping, fittings and valves. Do not insulate unions, flanges (except on flanged valves), "victaulic" couplings, stainers, (except on chilled water lines), flexible connections and expansion joints. Terminate insulation neatly with plastic material trowelled on a bevel.

- .3 Finish insulation neatly on hangers, supports and other protrusions.
- .4 Locate insulation or cover seams in least visible locations. Locate seams on piping in ceiling spaces on the underside of the pipe.
- .5 Provide recovering jackets on exposed insulation throughout, including equipment rooms. Insulation located in crawl spaces, pipe shafts and suspended ceiling spaces is not considered exposed. Make smooth uneven insulated surfaces before recovering.
- .6 Cover insulation exposed to outdoors with aluminum jacket secured with aluminum bands on 200 mm centres or screws on 150 mm centres. Lap joints 75 mm minimum and seal with compatible waterproof lap cement.
- .7 Cold Piping: Seal lap joints with 100% coverage of vapour barrier adhesive. Seal butt joints with 50 mm wide strips of vapour barrier sealed with vapour barrier adhesive. For fittings and valves, apply hydraulic insulating cement; or apply factory fabricated insulation half shells, seal all laps and joints.
- .8 Flare out staples may be used to secure jacket laps on hot systems. Staples are to be applied on 100 mm centres.

END OF SECTION