

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

- .1 Conform to the requirements of Section 21 05 01, "Common Work Results for Mechanical".
- .2 Under no circumstances may any insulation product containing asbestos fibre be used on this project.
- .3 All products used must have a flame spread rating less than 25 and smoke developed classification not more than 50 when tested in accordance with CAN/ULC S102 m88.
- .4 Submittals: Provide shop drawings which included product description, list of materials and thickness for each service and manufacturers' installation instructions.
- .5 Environmental Requirements: Maintain ambient temperature and conditions required by manufacturers of adhesives, mastics and insulation cements.
- .6 Quality Assurance: Insulation materials must be manufactured by a member of the Master Insulators Association(M.I.A.).
- .7 Storage of Materials: Protect materials from dirt, water, chemical and mechanical damage before, during and after installation. Provide and install waterproof sheeting to protect insulation in unfinished areas as required. Remove any damaged materials from the site immediately. Remove and replace at no additional cost any installed materials which are damaged.
- .8 Delivery: Deliver insulation, coverings, cements, adhesives coatings, etc., to the site in Manufacturer's original containers with the manufacturer's stamp or label affixed showing flame and smoke ratings on the products, name of manufacturer and brand.

1.2 DEFINITIONS

- .1 In this Specification, "exposed to view" means all services within Equipment Rooms, Service Corridors, plus all other areas of the building where the services are not enclosed within ceilings, shafts, furred spaces, trenches or chases.
- .2 In this Specification, "exposed to weather" means all services located outdoors.

PART 2 – PRODUCTS

2.1 MATERIALS

- .1 Use materials specified herein or approved equal as defined in Section 21 05 01, "Common Work Results for Mechanical", Clause "Material and Equipment".

2.2 PIPING INSULATION INSERTS

.1 Insulation inserts are to be Belform Pipe Support as per table below

2.3 SPECIFICATIONS FOR THE BELFORM INSULATED PIPE SUPPORT INSERTS (TABLE)

NOMINAL PIPE SIZE NPS (inch)	SUPPORT CENTRES (ft)	MINIMUM SAFETY FACTOR	MIMIMUM SUPPORT LENGTH IN INCHES BY DENSITY		METAL SADDLE GUAGE	METAL SADDLE LENGHT
			3.75 lb/ft2	5 lb/ft2		
1/2	10	5	6		22	4
3/4	10	5	6		22	4
1	10	5	6		22	4
1-1/4	10	5	6		22	4
1-1/2	10	5	6		20	4
2	10	5	6		20	4
2-1/2	10	5	6		20	4
3	10	5	6		20	4
3-1/2	10	5	6		20	4
4	10	5	6		16	4
5	10	5	6		16	4
6	10	5	9		14	7
8	10	5	9		14	7
10	10	5	9		14	7
12	10	5		9	14	7
14	10	5		9	14	7
16	10	5		9	14	7
18	10	5		12	14	10
20	10	5		12	14	10
24	10	5		12	14	10

2.4 PIPE INSULATION

.1 Piping

- .1 Use Belform Insul –Phen insulation with factory applied AP T Plus jacket. Jacket to consist of aluminum foil vapour barrier reinforced with fiberglass scrim and laminated to a fire resistant kraft facing.
- .2 In areas exposed to view, finish with Belform PVC (15mil) thickness “Cut and Curled” jacketing. With self seal adhesive tape. Tacking of jackets will not be accepted.

.2 Valves and Fittings

- .1 Insulate valves and fittings in exposed areas with Belform 2 piece Insul-Phen fittings. Finish with Belform PVC insulated fitting and jacketing (15 mil) thickness.

.3 Pipe Thickness Schedule

**SECTION 22 07 00
MECHANICAL INSULATION**

Minimum insulation thickness shall confirm to AHRAE 90.1

Pipe Insulation Schedule – Imperial

Fluid Design	Insulation Conductivity	Nominal Diameter (in)					
		Mean Rating Temperature	Less than 1	1 and 1-1/4	1-1/2 to 3	4 to 6	8& up
Operating Temperature Range (F)	Conductivity Range Btu in (hr.ft2 F)						
Domestic and Service Hot Water Systems							
105 & greater	0.22 .028	100	3/4"	3/4"	3/4"	1"	1"
Domestic Cold Water (Sanitary, Storm and Condensate Drains)							
40 75	0.23 0.27	75	3/4"	3/4"	3/4"	3/4"	3/4"

2.5 HEAT EXCHANGERS, STORAGE TANKS AND STORAGE HEATERS

- .1 For shell and coil heat exchangers, storage tanks and storage heaters, use 50 mm(2") thickness 48 kg/m3 (3 lb/ft3) density Johns Manville or equivalent pipe and tank semi-rigid fibreglass board bonded to a flexible type AP or FSK jacket .
- .2 For plate heat exchangers, insulated with 50 mmm (2") thickness 48 kg/m3 (3lb/ft3) density Johns Manville or equivalent pipe and tank semi-rigid fibreglass board bonded to a flexible type AP or FSK jacket.

2.6 FINISHING

- .1 Finish with PVC Jacket or Canvas Jacket

2.7 ALUMINUM COVERING

- .1 Use 0.045 mm (0.016") aluminum jacket with integral moisture barrier for all piping exposed to the weather.

PART 3 – EXECUTION

3.1 GENERAL

- .1 Install all insulation in strict accordance with manufacturer's published recommendations.
- .2 Install all insulation continuous through walls and sleeves.
- .3 Verify that piping and equipment have been tested according to the specifications and as required by agencies having jurisdiction and approved before applying insulation materials. Work can proceed with written permission by mechanical consultant/contractor with the understanding that any necessary insulation removal and repairs are corrected at the contractor's expense.
- .4 Apply removable cover to allow regular servicing of equipment in certain locations. Where insulation ends, finish with vapour resistant mastic or aluminum tape.
- .5 Insulate ALL components of insulated systems unless specifically excluded.
- .6 Extend all surface finishes to protect all surfaces, ends and raw edges of insulation.

3.2 PIPING SYSTEM

- .1 Storm Drainage System: Insulate all horizontal sections of rainwater leaders. Where horizontal sections connect to roof or patio drains, also insulate underside of drains and drain bodies, including any vertical piping between underside of drain and drain body. Insulate discharge piping from sump pumps to points of connection with building drainage systems. Insulate around heat traced sections. Size insulation to suit. Coordinate this work with Division 23 and 27.

**SECTION 22 07 00
MECHANICAL INSULATION**

- .2 Other Systems: Insulate the following piping systems in their entirety:
 - .1 domestic cold water (potable and non potable)
 - .2 domestic hot water (potable and non potable)
 - .3 domestic hot water recirculating (potable and non potable)
 - .4 condensate drains from refrigeration units
 - .5 drainage
- .3 Insulation Application
 - .1 Hanger Points: Provide a Belform Pipe Support at each hanger point on all systems. On cold lines, vapour seal butt joints on each side of insert.
 - .2 Pipe: Apply insulation over clean dry pipe. Butt all joints firmly together. Seal all jackets neatly in place. Wrap butt joints with a minimum 75 mm (3") wide strip of the jacketing material. Use vapour barrier adhesive on all "cold" lines and dual temperature systems.
 - .3 Fittings and Valves
 - .1 For piping in exposed areas use the 2 pieces Belform fitting, finished with the Belform PVC fitting to a thickness matching adjoining insulation. In areas where insulation is not exposed to view, insulation ends may be mitred at elbows and sealed with aluminum tape.
 - .2 Cold system: Vapour seal the end of cut out insulation with 3" aluminum tape. This applies TO:
 - .1 domestic cold water
 - .2 condensate drains
 - .3 On components which require regular services, fabricate easily removable and reusable covers for circulating pumps and pump casings test ports and strainers.
 - .4 Pipe Insulation Covering: In all locations where the insulation will be exposed to view, finish Belform .015 PVC or canvas. Follow strictly manufacture's installation procedures for cold and hot systems.
 - .5 Aluminum Covering: On all piping exposed to weather, apply aluminum jacket over insulation with 15 mm x 0.38 mm (1/2" x 0.015") stainless steel banding at 300 mm (12") o/c Overlap all joints at least 80 mm (3") with longitudinal joint lapped to the weather.

3.4 LAVATORY INSULATION

- .1 Insulate drain and supply pipes on all barrier free lavatories. Use moulded offset drain and water supplies covers.

3.5 HEAT EXCHANGERS, STORAGE TANKS AND STORAGE HEATERS

- .1 General: Insulation all uninsulated heat exchangers and storage tanks.
- .2 Application: Apply insulation over clean dry surfaces. Butt all joints firmly together. Secure with 12 mm x 0.4 mm (1/2" x 0.015") stainless steel bands on 300 mm (12") maximum centres.
- .3 Finish: PVC jacket or canvas jacket.