**DETAILED SPECIFICATION**
**Standard U.I.P.® System**

## 1) General

The pipe shall be insulated using the U.I.P.® factory insulation process, as supplied by Urecon Ltd., complete with integral conduit for electric heat trace cable *(if required)* and 1,27 mm *(50 mils) to* 2.54mm *(100mils)* black polyethylene jacket with UV inhibitor. The jacket thickness is dependant on the diameter and intended function. The insulation of associated joints, fittings and accessories shall be as per Urecon's recommendations, depending on the size and type of pipe involved. The product shall be manufactured in accordance to ISO 9001-2000 Standards, or approved equal.

## 2) Pipe preparation

Pipe and casing shall be cleaned of surface dust or dirt, if necessary, to insure adhesion of the foam to the pipe and casing surface. The pipe may be treated by sand blasting or the application of a chemical foam-bonding compound to enhance adhesion, as deemed necessary by Urecon and project requirements.

## 3) Heat tracing conduit(s)

Heat tracing conduit(s) shall consist of an extruded molding and shall be applied to the pipe prior to application of the insulation. The conduit(s) will be securely fastened to the pipe to prevent the ingress of foam therein during the insulation process. All conduit(s) shall be checked after insulating to insure they are not plugged. The ends shall be sealed prior to shipping to prevent any foreign material from entering the conduit while in transit or during installation.

## 4) Insulation

a) Material: rigid polyurethane foam, factory applied.
b) Thickness: 50 mm *(2 in.)* or as required.
c) Density: (ASTM D 1622) 35 to 46 kg/$m^3$ *(2.2 to 3.0 lbs/$ft^3$ ).*
d) Closed cell content: (ASTM D 6226) 90%, minimum.
e) Water absorption: (ASTM D 2842) 4.0% by volume .
f) Thermal conductivity: (ASTM C518) 0,020 to 0,026 W/m $^0$C *(0.14 to 0.17 Btu • in/$ft^2$ •hr • $^0$F).*
*g)* Temperature limitations: Cryogenic to 93$^0$C *(200$^o$F)*

## 5) System Properties

a) System compressive strength: (modified ASTM D 1621 with 50 mil jacket) approximately 414 to 552 kPa *(60-80 lbs/$in^2$ ),* varies with pipe diameter.
b) Temperature limitations: -minimum ambient installation temperature @ -34$^0$ C (*-30$^0$*F)
-service temperature approximately -45$^0$C *(-49$^0$F)*

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## 6) Outer Jacket on Pipe Insulation *with enhanced cold climate handling properties*

The outer protective jacket shall consist of either –

**i.)** ***Tape wrap system***- (available from both manufacturing facilities)

a) Jacket material: Scapa #366 polyethylene, UV inhibited, specially formulated for superior cold environment properties.
b) Sealant: butyl rubber and resin, applied hot in 1.27mm (*25 mils*) multiple layers providing a shrink tightened waterproof bond throughout its entire length.
c) Minimum elongation: (ASTM D 1000) 300%, 6 month test.
d) Tensile strength: (ASTM D-1000) 6,83 kg/cm wide *(38 lbs/in wide).*

***ii.) Extruded system****-(from Calmar, AB only)*

The outer protective jacket on the casing system shall consist of high density polyethylene copolymer black PE, UV inhibited, factory applied as per the following specifications:

a.) Minimum cell classification 435560A for PE as per ASTM D 3350
b.) Minimum 2% carbon black, well dispersed
c.) Density 0.953 gm/cc ASTM D 4883
d.) Tensile Strength at yield (50 mm(*2 in.*) /min) 26 MPa (*3,700 psi*) , ASTM D 638

**Recommended PE Jacket thicknesses for below grade applications-**

| | | | |
|---|---|---|---|
| Jacket OD | ≤ 400 mm | (*16 in*) | @ 1,27 mm (*50 mil)* |
| Jacket OD | >450mm (*18 in*) to 600 mm | (24 *in*) | @ 1, 90 mm (*75 mil*) |
| Jacket OD | ≥ 600 mm | (*24 in*) | @ 2.54 mm (*100 mil*) |

*other jacket thicknesses are available upon request

## 7) Insulated Pipe Joints

### a.) Butt-Fused and Welded joints

Insulated pipe joints shall be completed using pre-fabricated rigid polyisocyanurate or urethane half shells and sealed with the application of suitable wrap around adhesive lined heat shrink sleeves as supplied by Urecon. The heat shrink sleeves shall overlap the insulation jacket by a minimum of 75 mm *(3 in)* on either side of the joint.

### b) Bell x Spigot Joints

Insulated pipe joints shall be sealed with a 150 mm (*6 in.*) wide heat shrink sleeve or butyl mastic tape if the system is not electrically heat traced, 300 mm (*12 in.*) wide if traced.

**DETAILED SPECIFICATION**
**Standard U.I.P®. System**

## 8) Insulation kits for fittings.

Insulation kits for fittings shall consist of rigid polyisocyanurate or urethane foam insulation with a fully bonded polymer protective coating on all exterior and interior surfaces, including ends. Kits to be supplied complete with silicone caulking for seams, stainless steel attachment straps and clips, and heat shrink sleeves or butyl mastic tape to seal between pipe and insulation kit.

### *a) Rigid Polyisocyanurate or Urethane Foam Insulation*

.1 Density: (ASTM D1622) 27 to 32 kg/m$^3$ *(1.7 to 2.0 lbs/ft.$^3$).*
.2 Compressive strength: (ASTM D1621) 131 to 158 kPa *(19 to 23 lbs/in.$^2$)* .
.3 Closed cell content: 90%, minimum.
.4 Water absorption: (ASTM C272) 4.0% by volume.
.5 Thermal Conductivity: (ASTM C 518) 0,027 W/m $^0$C *(0.19 Btu • in/ft$^2$ • hr • $^0$F)*.
.6 Thickness: to match pipe insulation thickness.

### *b) Polymer Coating, Urecon BL-75-20EP*

.1 Two component high density polyurethane coating, black in color.
.2 Density: 1170 kg/m$^3$ *(73 lbs/ft$^3$).*
.3 Durometer D scale 60.
.4 Tensile strength: 11,100 kPa *(1610 lbs/in$^2$).*
.5 Tear strength: 26,5 N/mm *(151 lbs/in.).*
.6 Thickness: 1,9mm *(75 mils)* outside surfaces, 0,51mm *(20 mils)* inside surfaces.

## 9 ) Electric Tracing System

The electric tracing system and associated controls shall be as per the manufacturer's recommendations with particular attention being paid to the watt densities applied through conduits on plastic pipes. All tracing cables and related accessories to be CSA approved and comply with CSA heat tracing standard C22.2 No. 130.2-93. Standard of acceptance is Urecon's Thermocable or approved equal. Please contact your Urecon representative for further details and design assistance.

Note: -Physical characteristics are nominal and may vary depending on pipe type and diameter (Revised June 2011).