DETAILED SPECIFICATION

Hi-Temp System to 149°C *(300°F)* with polyethylene jacket for below grade

1. GENERAL

It is critical that all field installed components of a Hi-Temp foam piping system be installed with special care and attention, ensuring that the system is not only insulated properly, but completely waterproof as well. Should moisture be trapped in the system by any means after commissioning, the moisture could flash off as steam, permanently damaging the insulation and jacketing.

The pipe shall be insulated using the unique U.I.P.® factory insulation process, as supplied by GF Urecon. The insulation of associated joints, fittings and accessories shall be as per GF Urecon's recommendations. All exposed ends of insulation shall be bagged with plastic or sealed with waterproof sealant prior to leaving the factory to prevent moisture ingress during shipping and storage. The product shall be manufactured in accordance to ISO 9001 standards, or approved equal.

2. PIPE PREPARATION

Pipe shall be cleaned of surface dust or dirt to ensure adhesion of the foam to the pipe.

3. INSULATION

a) Material: Rigid polyurethane foam, factory applied.
b) Thickness: 50.8 mm *(2 in)* or as required.
c) Density: (ASTM D1622) 38 to 56 kg/m³ *(2.4 to 3.5 lbs/ft³).*
d) Closed cell content: (ASTM D6226) 90%, minimum.
e) Water absorption: (ASTM D2842) 4.0% by volume.
f) Thermal conductivity: (ASTM C518) 0.020 to 0.026 W/m°C *(0.14 to 0.17 Btu • in/ft² • hr • °F).*
g) Temperature range: - 45°C to 149°C *(-49°F to 300 °F).*

4. SYSTEM PROPERTIES

a) System compressive strength: (modified ASTM D1621 with PE extruded jacket) approximately 690 to 1379 kPa *(100-200 lbs/in²),* varies with pipe diameter.
b) Service temperature range: The overall factory insulated system limitations are dependent on the core pipe type, insulation and application.
c) Temperature limitations: minimum ambient installation temperature -34 °C *(-29 °F)*

5. OUTER JACKET ON PIPE INSULATION

The outer protective jacket shall consist of either:

i.) Extruded system*:* (available from Calmar, AB only)
   a) Jacket material: Extruded black high density polyethylene copolymer, UV inhibited and factory applied.
   b) Minimum cell classification 435560A for PE as per ASTM D3350.
   c) Minimum 2% carbon black, well dispersed.
   d) Density 0.953 g/cm3 (59.5 lbs/ft3) ASTM D4883.

ii.) PE cased system*:* (available from both manufacturing facilities)
   a) Jacket material: Casing extruded from polyethylene resin with cell class requirements 334360C as defined in ASTM D3350-12.
   b) Polyethylene compound shall be of color and UV stabilizer Code C (black) as specified in ASTM D3350, with a target range of 2 to 2.5% well dispersed carbon black (max. 2.8%);
   c) Jacket thickness shall be 3.81 mm (*150 mils*) to 7.62 mm (*300 mils*) depending on pipe diameter and PE casing availability from supplier.

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Recommended PE Jacket thicknesses* for below grade applications-

Jacket OD ≤ 300 mm (*12 in*)	@ 3.17 mm (*125 mils)*
Jacket OD > 300 mm (*12 in*) to 600 mm (*24 in*)	@ 3.81 mm (*150 mils*)
Jacket OD > 600 mm (*24 in*)	@ 4.44 mm (*175 mils*)

*other jacket thicknesses are available upon request

6. INSULATED PIPE JOINTS

Insulated pipe joints shall consist of field foamed in place Hi-Temp polyurethane foam supplied complete with Canusa Superseal® WTD heat shrink wrap with closure seal, as supplied by GF Urecon. The heat-shrink sleeves shall overlap the insulation jacket by a minimum of 76.2 mm *(3 in)* on either side of the joint.

For more demanding applications, GF Urecon Mec-Seal® joint kit should be considered.

7. INSULATION FOR FITTINGS

7.1 Field applied insulation

a) Insulation for fittings shall consist of polyurethane 'foamed in place' insulation with the following characteristics:

i. Density (ASTM D1622) 27 to 32 kg/m 3 *(1.7 to 2.0 lbs/ft^3).*
ii. Compressive strength (ASTM D1621) 131 to 158 kPa *(19 to 23 lbs/in^2)*.
iii. Closed cell content (ASTM D6226) 90%, minimum.
iv. Water absorption: (ASTM C272) 4.0% by volume.
v. Thermal conductivity: (ASTM C518) 0,027 W/m°C, *(0.19 Btu • in/ft^2 • hr • °F).*
vi. Thickness, to match pipe insulation thickness.

b) Jacket for fittings: The insulation shall be waterproofed with 101.6 mm *(4 in)* wide Canusa heat shrinkable tape Wrapid Tape® HCA spiraled around the entire fitting allowing a 50% overlap onto itself and shall extend onto the adjacent insulated pipe jacketing a minimum of 76.2 mm *(3 in);* Canusa Superseal® WTD heat shrink wrap with closure seal may be used for below grade on the straight sections.

7.2 Factory insulated fittings

GF Urecon recommends that fittings be factory insulated and fitted with extension legs. Outer jacket shall be as per section 5 above and be mitered / fused around the fitting to form a robust waterproof assembly. The annular space shall then be filled with polyurethane insulation as per Section 3 above.

Expansion/contraction pads shall be installed as per specifications; consult GF Urecon for design assistance if required.

7.3 End seals

Canusa PLX-65 heat shrinkable end seals shall be field installed at all pipe insulation exposed ends at thrust blocks, building entries, etc.

7.4 Anchor points assembly

Shall be supplied by GF Urecon and shall be 'foamed in place' as described above, then double sealed against moisture ingress using Canusa K-60-B heat shrink wrap for the inner layer, then Canusa high ratio heat shrink wrap for the outer seal; concrete shall then be poured as per project requirements. Refer to the anchor point assembly schematic detail for more information.

Note: *Physical characteristics are nominal and may vary depending on pipe type and diameter.*

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