

DETAILED SPECIFICATION**PexFLEXTRA (with diffusion barrier)****1. GENERAL**

The PEX pipe(s) shall be produced and insulated by Logstor and supplied by GF Urecon Ltd. Insulation of associated joints; fittings and accessories shall be as per GF Urecon's recommendations. The product shall have a high compressive strength capable of H2O loading. The product shall be manufactured in accordance to ISO 9001-2000 Standards, or approved equal.

2. PIPE

The carrier pipe shall be made of cross-linked polyethylene (PEX) which conforms to DIN 16892/16893 with an organic oxygen diffusion retainer (EVOH). It is required that flexible polyurethane (PUR) is foamed between the carrier pipe and the jacket. The jacket shall be made of extruded corrugated high density polyethylene (HDPE) with incorporated EVOH diffusion barrier. The pipes shall be available in coils from 50 to 300 m (164 to 984 ft) depending on the core pipe dimension required. The maximum diameter of the coils shall be 2.3 m (7.54 ft) for all pipes. The PEX carrier pipe must be protected against daylight; consequently all pipes are delivered without stripped ends and with end caps.

Properties of PEX pipe:

- a) Density: 938 kg/m³ (58.6 lbs/ft³).
- b) Tensile strength:
 - i) @20 °C: 20 to 26 N/mm² (2 901 to 3 771 lb/in²).
 - ii) @100 °C: 9 to 13 N/mm² (1 305 to 1 885 lb/in²).
- c) Young's modulus:
 - i) @20 °C: 600 to 900 N/mm² (87 023 to 130 534 lb/in²).
 - ii) @80 °C: 300 to 400 N/mm² (43 511 to 58 015 lb/in²).
- d) Elongation at rupture:
 - i) @20 °C: 300-450 %.
 - ii) @100 °C: 500-700 %.
- e) Coefficient of expansion:
 - i) @20 °C: 1.4·10⁻⁴ K⁻¹ (0.78 °F⁻¹).
 - ii) @100 °C: 2.05·10⁻⁴ K⁻¹ (1.14 °F⁻¹).
- f) Specific heat: 0.55 kJ/kg°C (0.131 BTU/lb°F).
- g) Thermal conductivity: 0.38 W/m°C (2.63 Btu • in/ft² • hr • °F).

3. INSULATION

The supplied pre-insulated pipe shall contain Semi-Flexible polyurethane foam (PUR) made from polyol and isocyanate. The resulting Polyurethane-cyclopentane foam shall have a lambda-value of 0.0223 W/m°C (0.155 Btu • in/ft² • hr • °F) measured at 50 °C (122 °F).

Properties of PUR insulation:

- a) Core density: ≥ 50 kg/m³ (≥ 3.12 lb/ft³).

- b) Closed cells: > 88%.
- c) Water absorption: ≤ 10% (vol).
- d) Compressive strength, 10% deformation: ≥ 0.15 N/mm² (21.75 lb/in²).
- e) Thermal conductivity at 50 °C: < 0.022 W/m°C (< 0.155 Btu • in/ft² • hr • °F).

4. DIFFUSION BARRIER (patented)

A proprietary polymer barrier foil shall be an integrated layer in the HDPE jacket extrusion process. This barrier is incorporated to avoid the migration of cell gases through the jacket over the long term.

5. OUTER JACKET ON PIPE INSULATION

The jacket of the pipe system shall be High Density Polyethylene with a minimum 2% carbon black incorporated for UV protection.

Mechanical properties of HDPE:

- a) Density: > 955 kg/m³ (> 59.6 lb/ft³).
- b) Elongation at rupture: > 350%.
- c) Hardness, shore D: 50.
- d) Thermal conductivity: 0.48 W/m°C (3.328 Btu • in/ft² • hr • °F).

6. SYSTEM PROPERTIES

Velocity, temperature and pressure

In order to avoid noise and erosion of the couplings, the sustained velocity in PexFLEXTRA is not to exceed 2 m/s (6.6 ft/sec).

PexFLEXTRA can be used for temperatures up to 95 °C (203 °F); and up to a pressure of 6 bar (87 lb/in²).

With an operating pressure of 6 bar (87 lb/in²) the expected service life of the pipes is a minimum of 30 years under the following operating conditions:

- continuous operating temperature of 85 °C (185 °F)
- continuous operating temperature of 80°C (176 °F) with 90°C (194 °F) one month per year and 95 °C (203 °F) for 100 hours per year.

At 70 °C (158 °F) the allowable continuous operating pressure is 8.5 bar (123 lb/in²).

A 16 bar (232 lb/in²) pressure test can be applied to the pipe with 20 °C (68 °F) water. When pressure testing, the PEX pipe will expand thus gradually relieving the pressure.

PexFLEXTRA for district heating

Nominal pipe size (in)	Carrier pipe O.D. mm (in)	Carrier pipe wall thickness mm (in)	Jacket pipe O.D. mm (in)	Standard/Maximum coil length m (ft)	Weight kg/m (lb/ft)
¾	25 (0.98)	2.5 (0.098)	77 (3.0)	100/300 (328/984)	1.0 (0.7)
1	32 (1.26)	2.9 (0.114)	77 (3.0)	100/300 (328/984)	1.0 (0.7)
1 ¼	40 (1.57)	3.7 (0.145)	90 (3.5)	100/300 (328/984)	1.3 (0.9)
1 ½	50 (1.97)	4.6 (0.181)	110 (4.3)	100/200 (328/656)	1.9 (1.3)
2	63 (2.48)	5.8 (0.228)	125 (5.0)	100/200 (328/656)	2.4 (1.6)
2 ½	75 (2.95)	6.9 (0.272)	140 (5.5)	100 (328)	3.3 (2.2)
3	90 (3.54)	8.2 (0.323)	160 (6.3)	100 (328)	4.2 (2.8)
4	110 (4.33)	10.0 (0.393)	160 (6.3)	100 (328)	5.5 (3.7)

Note: All sizes are metric, neither IPS nor CTS sizes; imperial adapters are supplied as required.

PexFLEXTRA, Twin, for district heating

Nominal pipe size (in)	Carrier pipe O.D. mm (in)	Carrier pipe wall thickness mm (in)	Jacket pipe O.D. mm (in)	Minimum/Maximum coil length m (ft)	Weight kg/m (lb/ft)
2 x ¾	2 x 25 (2 x 0.98)	2.5 (0.098)	110 (4.3)	100/300 (328/984)	2.1 (1.4)
2 x 1	2 x 32 (2 x 1.26)	2.9 (0.114)	110 (4.3)	173/346 (567/1135)	2.2 (1.5)
2 x 1¼	2 x 40 (2 x 1.57)	3.7 (0.145)	125 (5.0)	100/200 (328/656)	2.7 (1.8)
2 x 1½	2 x 50 (2 x 1.97)	4.6 (0.181)	160 (6.3)	100 (328)	4.1 (2.8)
2 x 2	2 x 63 (2 x 2.48)	5.8 (0.228)	180 (7.0)	100 (328)	5.5 (3.7)

Note: All sizes are metric, neither IPS nor CTS sizes; imperial adapters are supplied as required.

7. BENDS

Wherever a change of direction is required PexFLEXTRA can be curved on site to reach a minimum radius depending on the dimension.

Jacket Pipe O.D. mm (in)	Minimum radius of curvature m (ft)
77 (3.0)	0.8 (2.6)
90 (3.5)	0.9 (3.0)
110 (4.3)	1.1 (3.6)
125 (4.9)	1.2 (3.9)
140 (5.5)	1.4 (4.6)
160 (6.3)	1.6 (5.2)

8. INSULATION KITS FOR JOINTS

Insulated pipe joints shall consist of the appropriate pex-to-pex compression or press fitting, rigid polyisocyanurate 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 and stainless steel attachment straps and clips. For more demanding or critical applications, a GF Urecon Mec-Seal® joint kit should be considered.

A) Compression Fittings:

Mechanical Brass fittings are available.

- Pex metric to NPT adapters: 25mm (¾ in) – 110mm (4 in)
- Pex to Pex Couplings: 20mm – 110 mm
- Straight and Reducing Tees: 25mm – 110mm
- 90° elbows: 25mm – 110mm

Note: Follow installation instructions for each type of Compression fitting when used for direct burial.

B) PRESS Fittings:

PRESSFIT brass fittings are available.

- PEX metric PRESS to NPT male adapters: 20mm (½ in) – 110mm (4in)
- PEX to PEX PRESS Coupling: 20mm – 110mm
- PEX to STEEL (welding): 20mm – 110mm
- Straight and Reducing Tees: 25mm – 63mm

Note: PRESS Tool and Hydraulic Pump required for assembly. PRESSFIT system is approved for direct burial.

1. Rigid polyisocyanurate foam insulation

- a) Density: (ASTM D1622) 32 kg/m³ (2.0 lbs/ft³).
- b) Compressive strength: (ASTM D1621) 124 to 186 kPa (18 to 27 lbs/in²).
- c) Closed cell content: (ASTM D2856) 90%, minimum.
- d) Water absorption: (ASTM C272) 2.0% by volume.
- e) K factor: (ASTM C518) 0.027 W/m°C (0.19 Btu • in/ft² • hr • °F).
- f) Thickness: to match pipe insulation thickness.

2. Polymer coating, GF Urecon BL-20-20EP
- a) Two component high density polyurethane coating, black in color.
 - b) Density: 1170 kg/m³ (73 lbs/ft³).
 - c) Durometer D scale 60.
 - d) Tensile strength: 11.10 MPa (1610 lbs/in²).
 - e) Tear strength: 26.5 N/mm (151 lbs/in).
 - f) Thickness: 0.51 mm (20 mils) outside surfaces, 0.51 mm (20 mils) inside surfaces.

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

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