

Insultherm™

PRE-INSULATED PIPE SYSTEMS



TECHNICAL SUBMISSION

DYNATHERM PP-RCT

TUNDISH IN GARAGE BY PLUMBER (PVC)
TO CONNECT INTO DRAINAGE SYSTEM.

Applications & Benefits

In a large number of projects, major benefits can be achieved by using the Insultherm pre-insulated pipe system. The insulation, with its low density and high closed cell rate has relatively low thermal conductivity, along with this, it also has good self extinguishing properties therefore providing you an option with which you can rest assured.

INSULTHERM CAN BE USED FOR TRANSPORTING EITHER ABOVEGROUND OR UNDERGROUND

- Drinking water
- Waste water
- Cooling water
- Hot water
- Condensate
- Chemicals
- Gases
- Air heating/cooling

YOUR CHOICE OF INTERNAL PIPE

- Dynatherm PP-RCT
- Stream PE100
- Primed Steel
- Copper

ENERGY SAVING

- Half the thickness of mineral wool
- More energy efficient.

NO MAINTENANCE COSTS

- Maintenance free
- 100% watertight
- 100% corrosion protected.

QUALITY ASSURED

- Manufactured under carefully monitored factory conditions
- Consistent procedures and controlled conditions throughout manufacture
- No reduction in quality due to site conditions or remoteness.

REDUCED SITE COSTS

- Quick, problem-free installation
- Less disruption of operations
- Doesn't rely on highly skilled installers.

UV RESISTANT

- The outer pipe is black high density polyethylene, which is 100% UV resistant.

INCREASED SURFACE STRENGTH

- High strength casing
- Self supports on casing.

FITTINGS AVAILABLE

Elbows, Tees, Reducing Tees, Flanges, Off-sets. Custom fittings can be supplied, e.g. flanged tees.

UPG SERVICE & TRAINING

Our technicians offer full service in all phases of a project from initial planning to commissioning. After sales service, including training of fitters is an integral part of UPG's services. Our training courses can be arranged onsite - NZ wide.

TALK TO OUR HELPFUL TEAM TODAY ABOUT YOUR INSULATED PIPE REQUIREMENTS.



INSULATION TECHNICAL DATA

- Thermal conductivity: 0.023 W/mK
- Compressive strength: 150 kPa
- Density: 32-35 kg/m³
- Closed cells: 90-95%
- System temperature range: -10°C to 90°C
- Standard pipe lengths: 4mt, 6mt or 8mt
- Dimensional Stability
 - 24 hrs @ 100°C - 1 to 5%
 - 24 hrs @ -40°C - 0%
 - 24 hrs @ 70°C/100% RH - 0 to 5%
- Water Absorption: (23°C/kg/m²) 0.49
- Water Vapour Permeability: 1.8 (Perm-in ASTM C-355 @ 23°C)

Thickness of insulation is specified at design stage

PROPERTIES AND SUSTAINABILITY OF POLYURETHANE FOAM

Polyurethane rigid foams have a closed cell structure and high cross-linking density give them the characteristics of good heat stability, high compressive strength and excellent insulation properties.

PU insulation has a very low thermal conductivity, starting from as low as 0.017W/m.K, making it one of the most effective insulants available today for a wide range of applications.

All types of insulation can also play a role in improving the energy efficiency of buildings and reducing CO2 emissions.

The environmental impact Polyurethane offers is as follows:

- Excellent thermal efficiency – leading to optimum energy savings and reduced CO2 emissions.
- Relatively low environmental impact at the building level – the product saves more than 100 times the energy than is used in its manufacture.
- Durability – leading to long term performance and reducing the need for replacement, therefore saving energy.

The economic impact from polyurethane is:

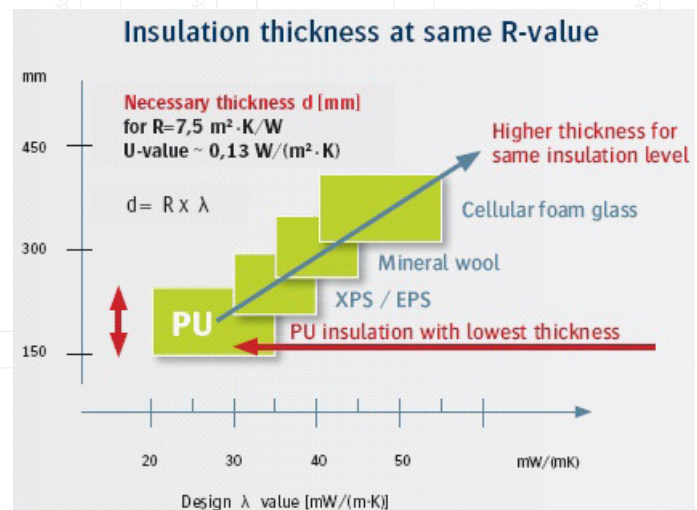
- Increased energy efficiency – leading to immediate savings for the end user.

TYPICAL VALUES OF INSULATING MATERIALS ARE:

MATERIAL	DENSITY (KG/M ³)	K-FACTOR (W/MK)
Polyurethane foam closed cell	32	0.023
Polyurethane foam open cell	10-12	0.035
Polystyrene foam	16	0.035
Rockwool	100	0.037
Glasswool	65-160	0.041
Timber – white pine	350-500	0.112

Insulation with the above k-factor of 0.023 would give an estimated R-value of 2.17 m² K/W @50mm thickness.

The following graph shows the thickness of insulation materials needed to get an R-value of 7.5 m² K/W with standard PU foam. As seen, PU offers the best insulation at lowest thickness.



Inner Pipe Details



TECHNICAL SPECIFICATION FOR DYNATHERM PP-RCT

MATERIAL PROPERTY	UNIT	COMMENTS
Standards	DIN 8077 / 8078	
Density	0.905 g/cm ²	
Hoop Stress @ 70°C with 50 year life	5.0 Mpa	Over 50% higher design strength than PP-R material.
Modulus of Elasticity	900 Mpa	
Thermal Expansion Rate	0.035mm/ Meter/10°C	
Thermal Conductivity	0.24 W/Mtr k	
Pipe Friction Factor	0.007	
Pressure Class	16 Bar	see table below

PP-RCT FASER COMPOSITE SDR11 SERIES DIMENSIONS

PIPE NB (MM)	PIPE OD (MM)	PIPE ID (MM)	SDR	HDPE OUTER JACKET	INSULATION THICKNESS
15	20	14.4	7.4	75	24.5
15	20	14.4	7.4	90	31.5
20	25	18.0	7.4	75	22.0
20	25	18.0	7.4	90	29.0
25	32	24.8	9	90	25.5
25	32	24.8	9	110	34.7
32	40	32.6	11	90	21.5
32	40	32.6	11	110	30.7
40	50	40.8	11	110	25.7
40	50	40.8	11	125	32.6
50	63	51.4	11	125	26.1
50	63	51.4	11	160	42.3
65	75	61.4	11	125	20.1
65	75	61.4	11	160	36.3
80	90	73.6	11	160	28.8
80	90	73.6	11	200	48.8
100	125	102.2	11	200	31.3
100	125	102.2	11	250	54.7
125	160	130.8	11	250	37.2
150	160	141.0	17	250	37.2

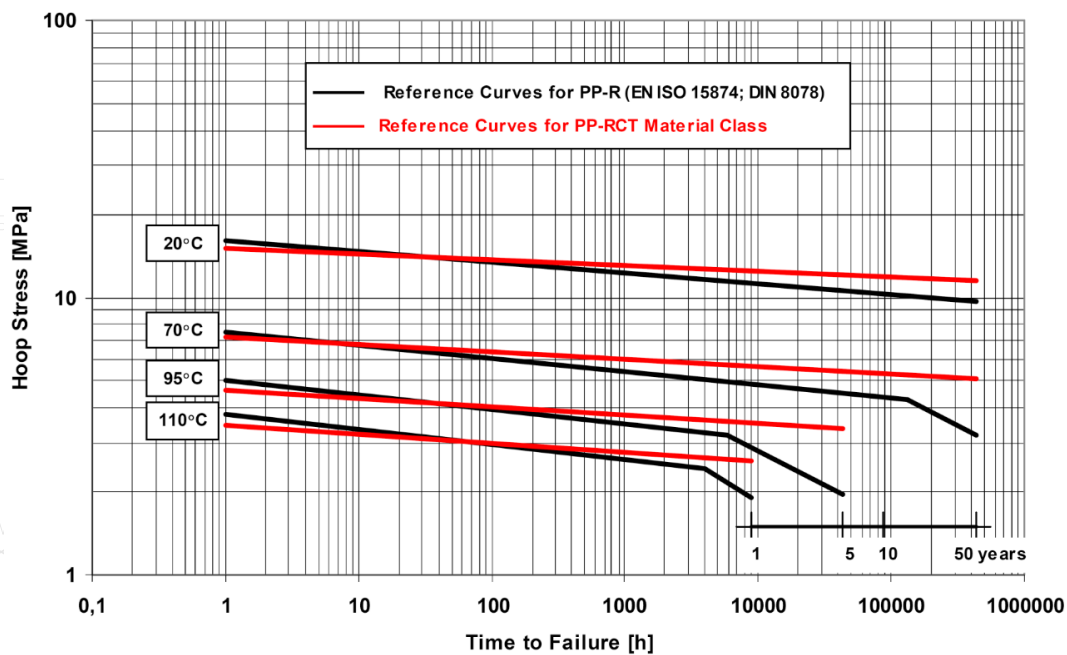
Inner Pipe Details

PERMISSIBLE OPERATING PRESSURE RATINGS OF DYNATHERM PP-RCT (REF: DIN 8077:2008-9)

TEMPERATURE (°C)	YEARS OF SERVICE	CLIMATEC SDR11 (BAR)
20	10	19.0
	20	18.6
	50	18.4
30	10	16.4
	20	16.1
	50	15.8
40	10	14.1
	20	13.8
	50	13.6
50	10	12.0
	20	11.7
	50	11.5
60	10	10.1
	20	9.9
	50	9.7
70	10	8.5
	20	8.3
	50	8.1
80	10	7.0
	20	6.9
	50	5.5

PP-RCT HAS A MUCH HIGHER TEMPERATURE RESISTANCE COMPARED TO PP-R MATERIAL

Comparison of the reference curves of PP-R and PP-RCT. The curves define the required hydrostatic pressure performance of the materials. Brittle failure is shown by a sharp decline of the reference curve. Note the PP-R80 brittle failure, even at 70°C



Trench Detail and Installation Guide

The bed of the trench where the pipe is to be laid must be completely flat and should be free from stones >20mm or sharp objects.

The pipe bedding material needs to be a minimum of 10cm of sand to provide a continuous support along the whole length of the pipe. The first 15-20cm of cover over the pipe should be of the same material. The cover must be compressed to prevent pipe movement. Sand compacting should be carried out immediately after the pipe has been covered.

If two or more pipes are to be laid in the same trench, they should not come into contact. A distance of 10 to 15 cm should be left between the two pipes to ensure the required compaction and support of the side support material is achieved.

This space should be filled with sand and compacted on both sides at the same time.

For calculation the following indications in Figures 1 to 3, the official guidelines, standards and regulations should be observed.

Standard cover including sand and backfill should be minimal 450mm (Figure 1).

In trafficable areas, this should be increased to 800mm (Figure 1).

In trafficable areas where the total cover is less than 800mm but more than 450mm it is recommended to cover the layer of sand with light concrete casting in order to evenly distribute the ground pressure (Figure 2).

In trafficable areas where the total cover is less than 450mm, encase the pipe in concrete (Figure 3). Here the behaviour of the pipeline will be rigid and will not undergo deformations; whereas Figures 1 and 2 represent flexible installations.

Figure 1 Light Traffic

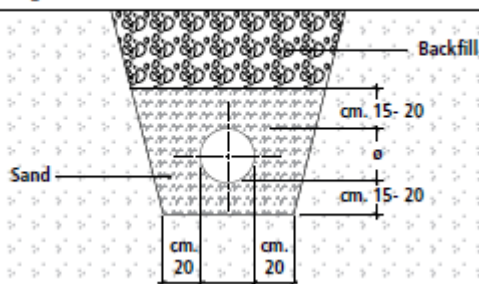


Figure 2 Heavy Traffic

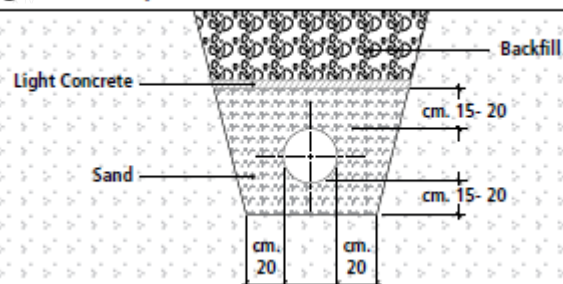
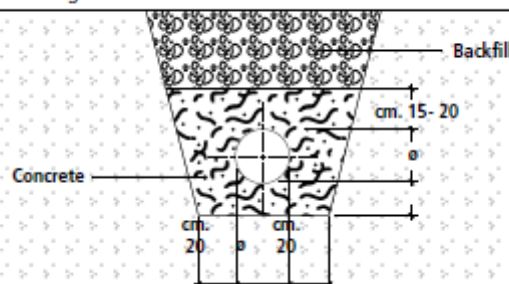


Figure 3 Rigid Installation

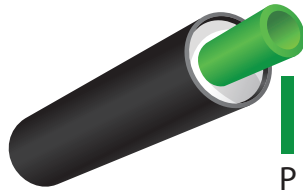


EXPANSION CONTROL

Where the air temperature is hotter or colder than the ground temperature, pipe lengths will contract or expand in length on adjustment to ground temperature. Keep the pipes covered from sunlight to help reduce contraction. The rate of expansion / contraction is about 0.1 mm / Mtr / °C.

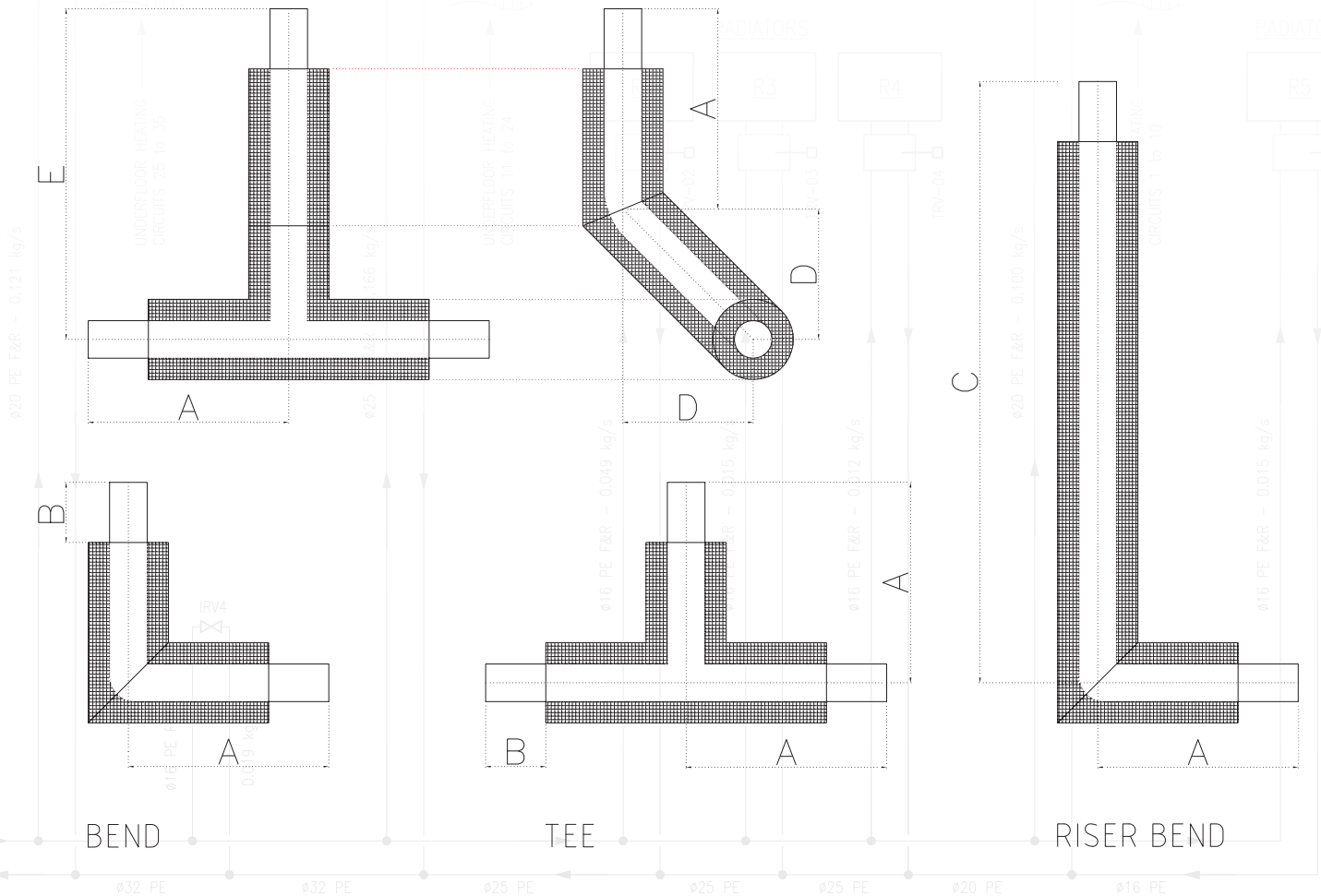
Once the pipework is stabilised, the compacted ground restricts any pipe movement. The pipework is further stabilised by the insulation and HDPE jacket and any expansion/contraction through temperature changes of the fluid is taken up through the wall of the pipe expanding/contracting inwards rather than linear.

Standard Fittings Dimensions



InsulthermTM
PRE-INSULATED PIPE SYSTEMS

CROSSOVER TEE



DIMENSIONS

A	2x Jacket OD + B
B	120mm
C	1200mm
D	Jacket OD + 100mm
E	A + D

*Measurements are customisable.



OUTSIDE
TEMPERATURE
SENSOR
OTS

HEAT PUMP CONTROLLER
HPC-01

CHEMICAL DOSING POT
(1 LITRE)

Ø15 SAFETY VALVE
DRAIN TO TUNDISH

HEAT
PUMP
HP-01

BT-01
300 LITRE

BUFFER TANK

HEAT IN
GROUND SOURCE HEAT COLLECTOR
(BY HP SUPPLIER)



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