System design

Guidelines for buried plastic piping

Plastic piping is suitable for installation below ground. Indeed its corrosion resistance makes it ideal for this application. Installed correctly it will give a long, trouble-free service life.

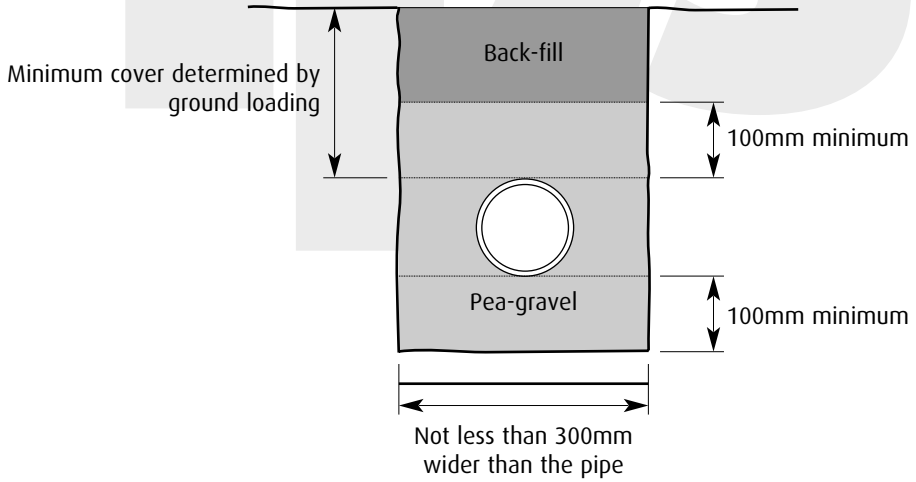
Trenches

Trenches should be dug to a width of not less than 300mm wider than the diameter of the pipe. A trench width of two to three times the pipe diameter is a good general guide. The trench bottom should be free of any sharp objects that may damage the pipe or cause a point loading. All rocks and large stones should be removed to permit a minimum bedding thickness of 100mm below the pipe.

The depth of the trench is determined by the ground loadings after back-filling. As a guide, the following is recommended:

- A minimum cover of 450mm or one pipe diameter (whichever is greater) where there is no overland traffic.
- A minimum cover of 1000mm where there is vehicle traffic expected.
- A minimum cover of 1500mm where there is heavy truck or rail traffic expected.

The trench bottom should have a minimum 100mm pea-gravel bedding. Pipe diameters up to 200mm can usually be installed in the trench, or it can snake or bend from the surface to the bed of the trench to allow for jointing. With larger diameter pipes, it may be preferable to join lengths of pipe on the surface before placing the joined length into the trench.The use of pipe rollers is strongly recommended for making up long pipe lengths. When lifting joined lengths, rope or band slings must be used to prevent damage to the pipe. Joined lengths of pipe must never be rolled into a trench, as twisting stresses can occur.



Pipe Bending Radii

Changes of direction may be made by laying thermoplastic pipes on a gradual curve.The flexibility of thermoplastic pipes means that minor deviations can be taken up by the pipe without the use of fittings.

The minimum radius of any such curvature on PVC-U, PVC-C, ABS, PVDF and Polypropylene pipes is 150 times the nominal diameter of the pipe.

Polyethylene pipes may be installed with smaller bending radii (depending upon the installation temperature conditions):

PE installation temperature +20°C: minimum bending radius 20 x outside diameter
PE installation temperature +10°C: minimum bending radius 35 x outside diameter
PE installation temperature +5°C: minimum bending radius 50 x outside diameter

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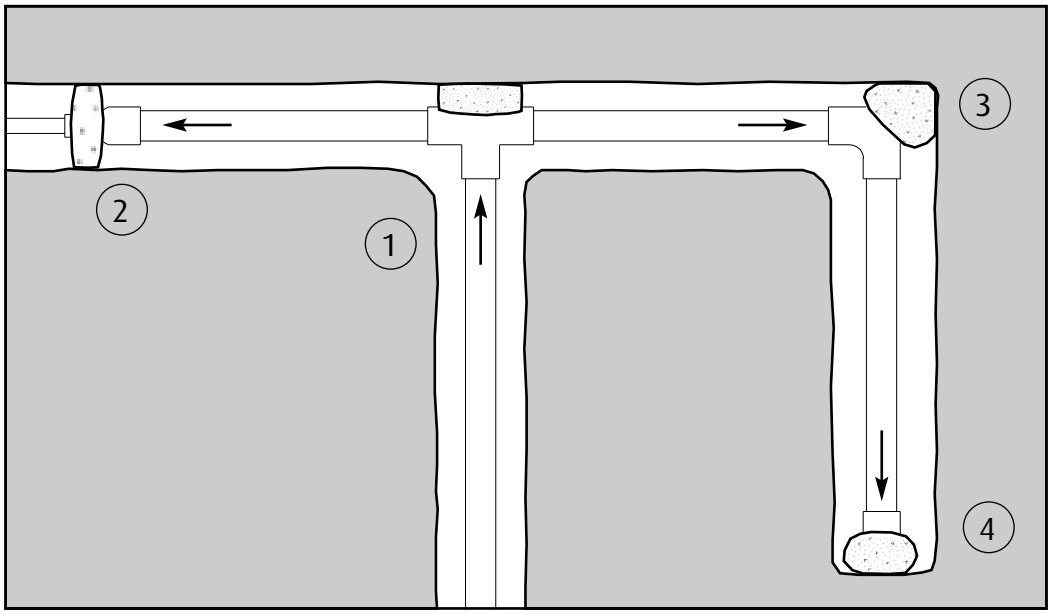
Thrust blocking

Thrust blocks are essential for buried plastic pipe systems that use push-fit gasket joints, and may also be useful in other systems as a means of controlling hydraulic shock.

Thrust forces are usually encountered:

1. At the back of a tee
2. At a reduction in pipe diameter
3. At a change of direction
4. At a blank end



The size and type of thrust block depends upon the pipe size, the type of fitting, soil properties and the water-hammer possibilities. The most common method is to pour concrete (to the size required) between the pipe fitting and the bearing wall of the trench. A thin membrane such as polyethylene film should be laid between the concrete and the plastic pipe. As a guide to assist with thrust block design, the following table shows the typical thrust forces in kN for a range of pipe sizes and fitting configurations:

DN	OD	Thrust forces in kN:				
mm	mm	Tee, Cap or Blank	90° Bend	45° Bend	22fi° Bend	11/° Bend
80	90	0.64	0.91	0.49	0.25	0.13
100	110	0.95	1.36	0.73	0.37	0.19
150	160	2.01	2.87	1.55	0.79	0.40
180	200	3.14	4.49	2.43	1.24	0.62
225	250	4.91	7.01	3.80	1.93	0.97
300	315	7.79	11.13	6.03	3.07	1.54
400	400	12.57	17.95	9.72	4.95	2.49