

INSTALLATION

EARTHWORKS & PIPE SUPPORT

Excavation

Excavation prior to installation of POLIplex® may be carried out using a wide range of equipment including mole ploughs, continuous chain diggers, tractor mounted backhoes, excavators, and directional drilling machines. In the case of mole ploughing and directional boring, the excavated hole diameter only needs to be just sufficient to give clearance for pulling in the pipe string allowing for any premature tendency of the soil to close onto the pipe. Trench widths can be kept to a minimum consistent with ensuring that the embedment is properly placed in the haunch and side support zones with adequate compaction - see Figure 1.0. Where the degree of compaction can be guaranteed or there is negligible loading, it may be permissible to reduce the width below that given in the below table & Figure 2.0. This could occur for example where trenches are in rock.

The trench spoil material should be placed where it will not interfere with stringing and jointing of the pipes.

Figure 2.0 shows a typical trench cross section together with standard terminology. All excavation methods must comply with the appropriate regulations for safe working practices.

Deep trenches in soil (≥ 1.5 metres) will require trench shields for support and protection of personnel. Where permissible it may be advantageous to keep these shields just clear of the pipe embedment zone to allow the embedment material to be compacted against the native soil of the trench walls. If the shields are used for the full trench depth, special attention must be given to ensure that the void formed on withdrawal is filled with compacted embedment material.

TYPICAL TRENCH DIMENSIONS (MM)

NOMINAL DIAMETER DN	TRENCH WIDTH "B"	BEDDING "B"	CLEARANCE "C"	OVERLAY "E"
16 - 25	130	50	50	50
32 - 63	160	50	50	50
75 - 110	270	80	80	80
125 - 180	380	100	100	100
200 - 280	580	100	150	100
315 - 400	800	100	200	100
450 - 560	1060	150	250	150
630 - 800	1100	150	300	150

Symbols refer to Fig 2.0

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FIGURE 1.0
Haunch Support

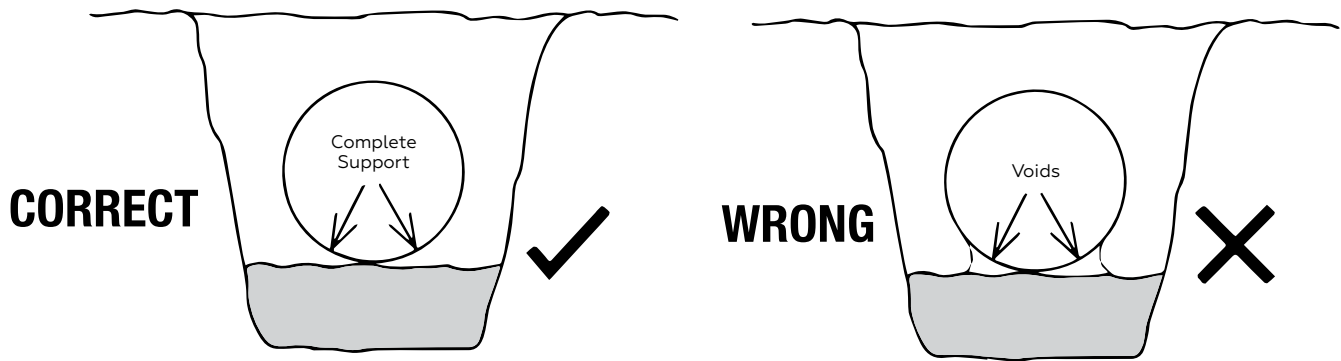
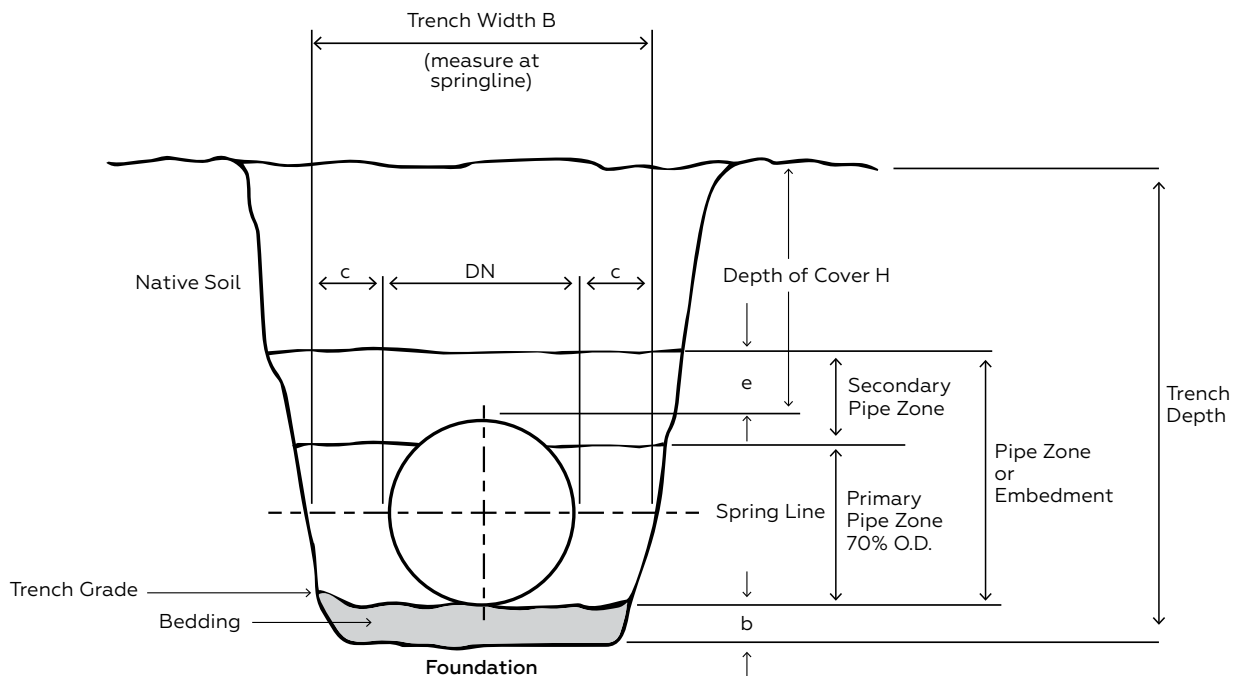


FIGURE 2.0
Trench Cross Section Showing Terminology



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EMBEDMENT

PE pipes should not be buried in contact with soil particle sizes larger than the lesser of 5% of DN or 20mm. Soil clods must be excluded from the pipe embedment zone and under no circumstances should temporary supports such as bricks or timber be left under or in contact with pipes. If the excavated material is not granular or friable, or does not comply with the project specification, then suitable embedment material must be imported. In the absence of any specification and if the pipe SDR is 17 or higher, it is important that only non cohesive or granular embedment be used with a compaction density index of at least 55.

The trench bottom should be as smooth as possible and to grade. Embedment material should as a general rule be non cohesive granular material. Where there is a possibility of migration of fine soil particles between the pipe embedment and the natural material surrounding the embedment zone, filter fabric must be used. Alternatively it may be possible to change the proposed embedment material to one with the required filtering characteristics. When used as bedding under the pipe it should be spread evenly and compacted over the full width of the trench to a uniform clear depth of 50-150 mm thickness depending on the pipe diameter and degree of irregularity of the trench bottom. If socketed fittings (eg compression or electrofusion couplings) are being used joint holes should be excavated in the bedding to ensure the load is evenly distributed along the pipe barrel.

The flexibility of polyethylene allows welded joints to be made above ground with the pipes then being snaked or rolled into the trench. Care must be taken to allow welds to cool completely before moving the pipeline. Refer to Table 1.0 for the recommended cooling times.

POLIplex® pipes are flexible by which it is meant that the pipe/soil interaction is of prime structural importance particularly for SDRs of 21 or thinner. Careful attention to the placement of embedment material to the specified density with a complete absence of voids is important (see Figs 1.0 & 3.0). The installer must be aware that the quality of the embedment material, its compaction together with the nature of the undisturbed material of the trench wall, all affect the ultimate performance of the installed pipeline. The designer/specifier will have based the choice of pipe stiffness (ie governed by SOR) on certain assumptions relating to soil types and compaction densities. Changes in the soil conditions from those assumptions should be brought to the attention of the appropriate person before continuing with the installation.

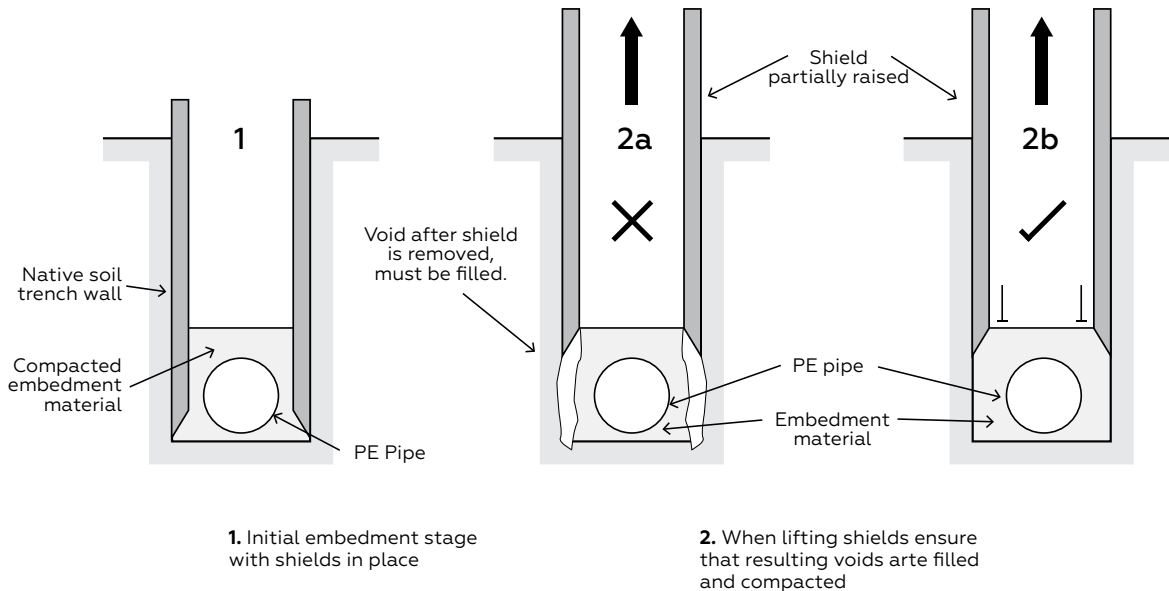
After pipes are laid and centred in the trench the embedment material should be compacted in 80-100mm layers to the specified density. The embedment should continue above the pipe to provide protection from the backfill. A clear height above the pipe of 50-150mm may therefore be required.

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FIGURE 3.0 EMBEDMENT COMPACTION WHEN USING SHIELDS



CONCRETE ENCASEMENT & THRUST (OR ANCHOR) BLOCKS

Polyethylene pipes may be encased in concrete although adhesion to the pipe will not be possible without some provision for a mechanical key such as a welded thrust flange. Due regard should be given to the thermal movement which will occur with changes in ambient temperature before placing concrete especially where associated with fitting locations and thrust blocks. Compressible material at least 3mm thick and at approximately 150mm from the face into the concrete should be used around pipes at the entry and exit points to eliminate any potential sharp edges from rubbing against the pipe wall. The pipeline should not be filled with water until the concrete has developed sufficient strength.

BACKFILLING

It may be desirable to delay the final backfilling operation after compacting the embedment around the pipe until a cooler period in the day to permit the pipeline to contract in length. Mechanical joints, especially flanged joints, should be left exposed if possible until the line is tested. Pipes should not be left uncovered where there is a possibility of the trench filling with water due to a rain, etc. as flotation of the empty pipeline will occur unless it is backfilled to a height of at least several diameters.

The method of placing the remainder of the trench backfill will depend on whether the pipeline is located in an untrafficked area or under a roadway. In a roadway it is good practice to continue backfilling and compacting with the good quality embedment material up to pavement level. Heavy compaction of backfill should not commence without at least 300mm of protective material covering the pipeline.

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