



(TN6) Laying pipes at shallow depths



Installation: Pipe laying

Laying pipes at shallow depths (TN6)

Most specifications for drainage or sewerage pipelines contain similar general recommendations on minimum depths of cover, together with warnings that shallower pipelines require special protective measures to be taken.

Protection of shallow pipelines

Shallow pipelines may need to be protected by more than normal bedding and backfill materials, especially when laid at an early stage of a contract where the cover is less than that specified.

Two clear examples of this are:

1. When a sewer or drain is laid in a road which has only been brought up to formation level, where the pipe bedding has been designed assuming full depth of cover to finished road level.
2. Where building works are taking place close to a drain run previously laid to a specification suitable for 'fields and gardens' and the pipeline is subjected to unexpected loading due to delivery lorries, dumpers, fork lift trucks, etc.

Wherever possible, pipe laying should be the last construction activity, so as to be within the design conditions, otherwise the pipelines must either be isolated from site traffic by directing this away from pipe runs or temporarily bridging the trenches, or the pipes must be protected by stronger bedding constructions.

Taking into account the warnings given in various design tables for bedding construction, including those published by the CPDA, pipes can be safely laid using granular bedding without the need for a concrete bed or surround, provided that the effective depth of cover is at least 0.6m, the required bedding factors are achieved and there are no additional imposed loads.

The CPDA's Simplified Table for pipe beddings provides information on cover depths down to 0.4m for DN100 pipes, with an appropriate warning on their use.

Where the depth of cover is less than 0.6m, it is recommended that the pipeline is completely surrounded with structural quality concrete, minimum C20/25.

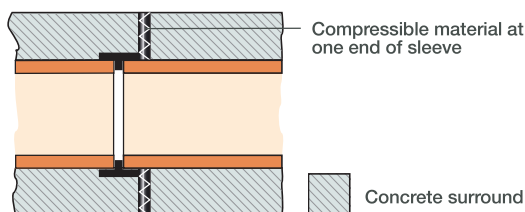
The flexibility of a pipeline bedded on, or surrounded with, concrete should normally be maintained by the provision of flexible construction joints through the concrete at pipe joints. These should be made from bitumen impregnated insulating board complying with **BS EN 622-4**, or other equally compressible filler material such as expanded polystyrene. The board should be cut to fit the pipes, and placed at the face of the pipe sockets or at one end of sleeve joints. The joint material should be at least 18mm thick.

This procedure allows for flexible movement of the pipe joints, while retaining the strength given by the concrete surround and should normally be carried out at every joint as shown in Fig. 12, particularly in building drainage applications.

Where more uniform support of the pipeline is found, the construction joints may be less frequent. However, it is recommended that they are no more than 5m apart. Further details of concrete surrounds are given in Technical Note No. 4.

An alternative method of protection is to use concrete slabs of sufficient strength to span the trench, as shown in Fig. 13.

Fig. 12 – Protection of a shallow pipeline



Sleeve jointed pipes in a concrete surround

The intention of this method of protection is to isolate the pipeline from imposed loading, particularly traffic loading, which is critical at shallow depths. In order to do this, the slab must be structurally capable of carrying the imposed load. In roads with a reinforced concrete slab construction, this may be easily accomplished by continuing the slab over the trench. Separate slabs may also need to be reinforced, except for example in gardens, when no wheel load is anticipated.

It is important that in all cases the slab spans the trench completely, bearing on the original ground on both sides, and does not simply rest within the trench. The width of bearing required will vary with the pipe diameter, trench width and ground conditions, but should not be less than 300mm.

It is advisable to make sure that any movement or deflection of the slabs does not load the pipeline by introducing a layer of compressible material, such as expanded polystyrene, immediately below the slab. The pipe should be bedded and surrounded in appropriate granular material in the normal way as shown in Fig. 13.

In all cases, backfilling should be carefully carried out as recommended in **BS EN 1610**. Where concrete backfill to trenches is demanded for early permanent reinstatement, either using lean mix or foamed concrete, care should be taken that this is not allowed to generate a high concentrated load on the pipes. It is therefore necessary to ensure that the concrete backfill is well supported by the trench sides. This can be achieved by the use of a stepped or battered trench. Concrete should not be placed between trench sheets which are subsequently removed since this would eliminate the friction between the concrete and the trench walls.

Fig. 13 – Protection of a shallow pipeline using a reinforced concrete slab

