Excavation, preparation of the trench and handling of pipes

General
The trench should be excavated to the specified line and levels and the contractor should take all precautions required by statutory regulations, or dictated by actual circumstances, to ensure the safety of the public and the pipe layers. He should also avoid interrupting or damaging public or private utilities encountered during the course of the work.

The trench
Trenches should be kept to the specified width since any increase in trench width will increase the load on the pipe, the quantity of excavation, and will also require more bedding material.

A trench narrower than that specified may impede the proper placing and consolidation of the bedding material and restrict working conditions in the trench during pipe laying.

A trench adjacent to a manhole may need to be wider and care must be taken to ensure that both the width and the widened length are kept to a minimum.

Recommended maximum trench widths for different pipe diameters are given in the depth of cover charts. Trench widths should be maintained for at least 300mm above the crown of the pipe.

The formation
Uniform support along the pipeline is essential. All hard spots and also soft zones which can cause differential settlement should be dug out and replaced with well tamped selected backfill. Rock occurring in the foundation should be generously overcut and replaced by a layer of granular material. Peat or boggy material at formation level should be removed and replaced by approved filling materials.

Ground water should be kept below the bottom of the trench wherever possible during pipe laying operations by the use of temporary drains, sumps, or other suitable means. The water level should not be allowed to rise before backfilling is completed.

Disturbance of the trench bottom by trampling must be avoided.

When the trench bottom is unstable, for example in marshy ground or running sands etc., special measures are necessary to ensure proper bedding.

If the trench is excavated in clay it is important to try to maintain the water content of the clay constant during construction. The addition of water will cause swelling while excessive drying can cause shrinkage. Either swelling or shrinkage can cause an uneven trench bottom.

Handling
1. Avoid damage when handling, especially to ends of concrete pipes, and never drag or roll pipes over rough ground.
2. Use correct craneage for offloading, utilising canvas/fabric slings with central lift and correct lifting bolts for manhole components. If ordered, large diameter pipes incorporate lift pins for which the propriety head chain link is required.
3. Joint rings must be stored away from sunlight, heat or possible contact with any oils.
4. Stack pipes on even ground on timbers to protect sockets and spigots, making sure the bottom row is severely chocked.
5. Never exceed recommended heights for stacking pipes on site.
JOINTING INSTRUCTIONS – ‘G’ RING JOINTS
DIAMETER RANGE DN225 – 1350

Position of typical rolling joint ring (no lubrication)

Starting position

Final Position

1. Correctly position and bed the first pipe. Prepare the bedding for the second pipe and hollow out for the incoming spigot to prevent bedding material entering the joint.

2. Ensure the joint ring is of the correct size and the spigot and socket are clean and undamaged.

3. Ensure the joint ring is not twisted and correctly located on the spigot and is the right way round.

4. Lubricants MUST NOT be used where rolling joint rings are supplied.

5. Unless Flexi lift jointing chains are being employed, using an adequate strap, suspend the pipe at the balance point and guide the spigot into the socket taking care not to disturb the ring. The spigot should be centred carefully in the socket before jointing is completed. The pipe can now be allowed to rest on the bedding material.

6. If pipe jointing equipment is being used refer to suppliers literature. However use of the excavator bucket or pulling the pipe home with a strap are now the most common method to complete the joint.

7. If using the excavator bucket to push the pipe home, place a timber between the back of the bucket and pipe socket. Apply a steady even pressure until the pipe is in its final jointed position with the joint gap being within the recommended limits.

8. The line and level at the socket end of the pipe can be checked and adjusted if necessary. Adjustment for level should not be achieved by using Mechanical plant to press the pipe down but by adjusting the bedding. A final check on the joint gap should be made after any adjustment.
JOINTING INSTRUCTIONS – LAMELL TYPE SLIDING SEAL
DIAMETER RANGE DN1500 – 1800 MELS WORKS

1. Correctly position and bed the first pipe. Prepare the bedding for the second pipe and hollow out for incoming spigot to prevent bedding material entering the joint.

2. Check the spigot profile for cleanliness and that the seal is the correct size. Place the seal on the spigot (as Fig 1) with the small step on the underside.

3. It is important that the seal is placed squarely back against the shoulder on the spigot and that the stretch is even around the gasket. This is achieved by lifting and releasing the gasket at opposite quarter points on the circumference.
Correctly positioned seal

4. Ensure that the socket of the previous pipe is wiped free of dirt and grit and reasonably dry. Under no circumstances should the joint be lubricated. Enter the spigot checking that the pipes are correctly aligned.

FIGURE 2 – POSITION OF SEAL AFTER JOINTING

5. The joint may now be closed (Fig 2) whilst the pipe is still supported by the crane. Check and pack, if necessary, the bedding material beneath the pipe barrel. An internal joint gap of between 10-25mm should be obtained upon completion of jointing.
JOINTING INSTRUCTIONS ‘EZ’ JOINT (Integral Seal)

DIAMETER RANGE DN 300 – 1200MM

1. Ensure the pipes are in a good condition.

2. Remove the protective strip prior to jointing.
   Grip the tab of red tape & pull towards the centre
   (On DN300 – it is vital to ensure any remains of Polystyrene are cleared out at the back of the seal).
   Should back edge of seal lift during polystyrene removal – gentle pressure will re set it into its seating.

3. Apply lubricant to the Spigot end. (CPM grease is advised).
   It is important to lubricate the radius area, as shown and the full sliding length of the spigot.
   Additional lubrication to the receiving seal face can also assist jointing.

4. Enter the Spigot checking that the pipes are correctly aligned.
   The joint may now be closed whilst the pipe is still supported by the crane. Check and pack, if necessary, the bedding material beneath the pipe barrel. An internal joint gap of between 10-25mm should be obtained upon completion of jointing.
INSTALLATION AND JOINTING INSTRUCTIONS

OVOID PIPES WN X HN 600x400

The 400 x 600 ovoid pipe can be easily handled and jointed utilising a specially designed ‘C’ hook.

The pipe will rotate into the correct vertical position when on the ‘C’ hook.

The pipe can then be correctly aligned prior to jointing as a standard rolling ring joint.
INSTALLATION AND JOINTING INSTRUCTIONS

OVOID PIPES (WN x HN) 600 x 900 and 800 x 1200

The following is a recommended method for installing ovoid pipes. Care and attention should be given to all aspects of this procedure.

1. These instructions should be read in conjunction with the section which illustrates the use of the Flexilift chain system incorporated into Ovoid pipes.

2. Short length pipes (Spigot/Socket Butts) can be laid prior to commencing the line ensuring they are secured in position and set correctly for line, level and vertical alignment. If they are set in concrete the socket lifting pin should be left exposed.

   Short length pipes can also be laid upon completion of the line using the Flexilift system.

3. The bedding must be accurately placed and the use of a spirit level for screeding purposes is essential. A 5mm cross fall on bedding can produce a 12mm error in vertical alignment.

   The bedding should also be accurately placed to the correct gradient.

4. The Ovoid pipe should be mated with the previously laid pipe socket lining up the jointing lines (Figure 1) cast in the crown of the pipes. The spigot should enter the socket with an even gap around the pipe.

Positioning of internally lubricated seal

1. Ensure the spigot and socket of the Ovoid pipe are clean and undamaged.

2. Fit the internally lubricated seal on the spigot, prior to jointing.

3. Avoid uneven strain or twists on seal.

4. Ensure correct location of the seal against the spigot shoulder around the circumference of the pipe.

   Initial position of seal for 600mm x 900mm an 800mm x 1200mm ovoid pipe.

   Final position of seal for 600mm x 900mm an 800mm x 1200mm ovoid pipe.
5. Place the chains for jointing as detailed on the Flexilift Handling and Jointing section. The excavator arm should be slowly raised vertically angled slightly towards the previously laid pipe, to ensure satisfactory jointing.

6. Line and level should be checked after jointing each pipe. Adjustments can be made using a single chain connected to the pipe at the socket end. However if the adjustment disturbs the bedding or the joint it may be necessary to perform the jointing procedure again to obtain a satisfactory gap.

7. Joint gaps will vary between 10-30mm. If 30mm is exceeded it may be necessary to remove the pipe in order to check the bedding and perform the jointing procedure again.

8. Each pipe when laid should be checked for vertical alignment by plumbing between the points on the socket face. Should the vertical offset exceed 25mm, the following action should be taken to remedy the offset.

9. The next pipe joint can be made with the chains leaning in the direction i.e. off vertical to which the correction is required.

or

A single chain in the front lift pin can be used to ease the top of the pipe over to correct the vertical offset.

It may be necessary to make the correction over several joints.
Components

BRC Lifting Heads

The BRC Lifting Head is a specially designed component that hooks under the head of the lifting anchor. Lifting heads are tested to twice the safe working load and test certificates are supplied. The lifting heads are designed to prevent mismatch of components from different load bands and fit the cavity created by the recess former exactly. This prevents the possibility of lifting equipment failure. The ball head is located exactly in the centre of the cavity, somewhat recessed, so that the cavity can be filled and levelled easily with grout after assembly. The lifting heads are available to hire by the week.

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Flexilift – Handling and Jointing System

Use of the Chains

**Chain Slings**

Designed for lifting in conjunction with BRC Lifting Heads, these can be supplied in all the tonnage ratios that the lifting heads are available in. All chain slings come with a valid UK test certificate. Lifting Heads supplied separately.

The CPM Flexilift System enables pipes to be transported, laid and jointed using the same set of chains.

1. Use the equal length chains A and C for lifting and placing each pipe in the trench
2. Connect the longer length chain, D to the pipe already laid and release the shorter length chain A and hang on the hook provided.

3. The pipe can then be joined without moving the jib of the crane by raising the hook vertically.
Site testing and inspection of pipelines

Almost all pipelines, especially those for foul sewers are tested before and after backfilling. Normally sewers up to and including DN 750 are subjected to an air or water test whereas a visual inspection is often considered adequate for the larger man entry sewers.

Close circuit television (CCTV) is used by many authorities for pipeline inspections. BS EN 1610 'Construction and testing of drains and sewers' gives advice on testing requirements.

Air test

This test is not covered by BS EN 1916:2002/BS 5911-1:2002, but a pipe which complies with the Standard will usually comply with the air test provided it is laid correctly and the test equipment is in good condition. Failure to pass the air test will not preclude the acceptance of the pipeline if a successful water test can be achieved.

Air testing, whilst being convenient for the contractor, is subject to many vagaries and special care must be taken to ensure that any indicated failure is not due to the test equipment as opposed to the pipeline.

The following practice on the use of test equipment should be considered.

- PTFE tape should be used on the thread of all bung outlets such as on the brass blanks
- Soft soap should be generously applied to stopper faces and around the inside of the concrete pipe

It is always more satisfactory to test a string of pipes correctly jointed rather than single pipes, because this will minimise the effect of any shortcomings in the equipment.

A typical specification states that air should be pumped into the pipeline by a suitable means until a stable pressure of 100mm head of water is indicated on the U-tube and if, after allowing a suitable period for the pressure to stabilise, the air pressure has not fallen below 75mm during a period of 5 minutes, without further pumping, the pipeline should be accepted.

A stable 100mm head on the manometer is best achieved by

- Pressurising initially to 100mm head on the manometer, then allowing the reading to settle for at least 2 minutes
- If any change in reading is noted after allowing the reading to settle, readjust to 100mm and then commence the test period.

1. Ensure the test equipment is in good condition. Inflatable stoppers are recommended for ease of use.
2. The test should be carried out after every 3 or 4 correctly laid and jointed pipes prior to commencement of backfill.
3. A successful test is achieved if the equipment shows a fall in pressure of no more than 25mm after 5 minutes, having allowed a suitable period for stabilisation.
4. If the pressure falls sharply and the pipes appear to have failed, the following checks must be made before contacting CPM for assistance:
   
   (a) Check the test equipment is in good condition.
   (b) Check if the stoppers are leaking — use industrial soap around the edge of the stopper to provide an effective seal, if necessary.
   (c) Check the joint rings are correctly located.

Dramatic temperature changes both in and out of the pipe could affect the air test. Reference should be made to BS 8005 : Part 1 1987.

If after following the guidance on this advice sheet you still have problems with our product, please contact the supplying works in the first instance, on the following telephone numbers or the technical department advice line on 01384 221369.
Water test

BS EN 1916:2002/BS 5911-1:2002 specify that each batch of pipes is sampled and tested hydrostatically to 0.5 bar (5 metre head) for 15 minutes. This provides a rapid indication of the impermeability of the pipes and how they will perform when laid on site. It is normal for a site test to be of much longer duration and at a lower pressure. The following test is typically specified: The pipe shall be filled with water and provided with a stand pipe so that the head is not less than 1.2m above the crown of the pipe at the highest point and not more than 6.0m at the lowest point. It may be necessary to test pipelines laid at a steep gradient in sections to remain within these limits.

It is normal to allow the filled pipeline to stand full of water for a period of not less than 2 hours to allow for absorption prior to commencement of the test.

If the loss of water over a 30 minute period, when topped up every 10 minutes, is less than 0.5 litres per metre diameter per linear metre of pipe run the test is considered acceptable.

Close circuit television (CCTV)

The use of CCTV is now quite widely used for the inspection of mature sewers to access their serviceability, and also for newly laid sewers to identify any major defects at the end of the maintenance period prior to adoption by the appropriate authority.

This is a visual check only and requires personnel who are not only experienced in the operation of the equipment but also in interpreting the results.

General

The air and water tests summarised above are consistent with those specified in the following publications:
This is to certify

Name ........................................

Has been instructed in the laying and jointing of Concrete Pipes manufactured to BS EN 1916:2002/BS 5911-1:2002, incorporating the following elements:

- Jointing with rolling ring
- Jointing with integral seal
- Jointing with Lamell type seal
- Use of ‘Flexilift’ handling and jointing chains
- Air testing

Training Instructor ........................................

Date ............................................................

Technical Manager ........................................
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