



Concrete Pipes Installation Manual

Marshalls Civils & Drainage: a name you can trust

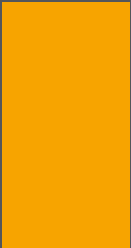
To assist our customers prepare for offloading a Marshalls product delivery, the following guide outlines how vehicle loads will typically arrive to site and guidance on the lifting equipment required.

Please note: This does not negate the need for a site specific risk assessment, including the safe offload of products.

The loaded diagrams represent the aerial views of the loaded trailers and the various products the customer may have ordered These drawings are not to scale but do give a true definition of how they may look.

Information is given on the type(s) of lifting equipment that may be required, along with the type(s) of handling equipment Marshalls use on each of their manufacturing sites.

All lifting processes must be assessed before the task begins. Site Specific Risk Assessments, Safe Working Practices, Method Statements along with the provision of training and competency is the responsibility of the customer.



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Excavation, preparation of the trench

1.1 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.

1.2 The trench

Trenches should be kept to the contract engineers specified dimensions since any change to the trench dimensions can increase the load on the pipe. Bedding material requirements may also change if trench design isn't followed.

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.

Trench widths should be maintained for at least 300mm above the crown of the pipe.

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 site engineer specified bedding material. Bedding material and depth should be suitably selected based on ground composition below by the site engineer. This can include rocky ground, marshes, clay etc

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.

Handling & lifting

2.1 General

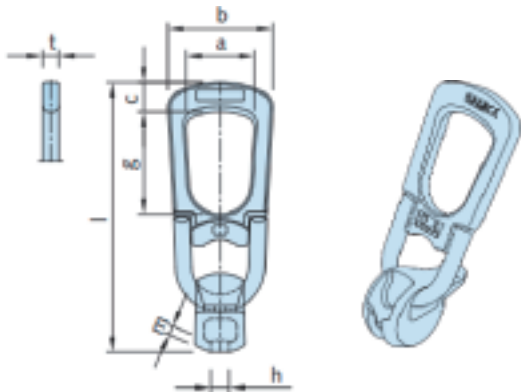
- ☑ Avoid damage when handling, especially to ends of concrete pipes, and never drag or roll pipes over rough ground
- ☑ Use correct craneage for offloading, utilising the correct lifting method outlined in this section
- ☑ Marshalls Civils and Drainage recommend use of a 'pipe lifter' for both handling and jointing full length concrete pipes
- ☑ Any loose pipe seals must be stored away from sunlight, heat or possible contact with any oils
- ☑ Stack pipes on even ground on timbers to protect sockets and spigots, making sure the bottom row is securely chocked
- ☑ Never exceed recommended heights for stacking pipes on site

Pipe diameter	Stacking height (no. of pipes)
DN300	7
DN375	7
DN450	6
DN525	5
DN600	4
DN675	4
DN750	4
DN825	4
DN900	4
DN1050	3
DN1200	3
DN1350	2
DN1500	2
DN1600	2
DN1800	2

2.2 Lifting anchors

System suitable for full 2.5m length DN1200 to DN1800 Circular Pipes.

Pipes in this size range supplied by Marshalls Civils & Drainage utilise the DEHA spherical head lifting anchor system for lifting and transporting.



Dimensions of universal head lifting link

Load class (t)	Weight (kg)	a (mm)	b (mm)	c (mm)	g (mm)	h (mm)	t (mm)	l (mm)	m (mm)
1.3	0.9	47	75	20	71	11	12	188	7.0
2.5	1.4	59	91	25	86	16	14	230	8.5
4.0 and 5.0	3.4	70	118	37	88	21	16	283	10.0
7.5 and 10.0	9.1	88	160	50	115	30	25	401	14.0
15.0 and 20.0	21.0	106	180	75	135	41	30	506	21.0
32.0	47.0	172	272	100	189	52	40	680	28.5
45.0	59.0	179	349	100	192	52	40	676	28.5

Lifting heads/chain sets supplied by Marshalls Civils & Drainage

5.0t set, consisting of xxxxx	DN1200 pipes
	DN1350 pipes
10.0t set, consisting of xxxx	DN1500 pipes
	DN1600 pipes
	DN1800 pipes

These relates to 2.5m full length pipes only.
For shorter length units, use of slings for lifting and jointing are recommended.

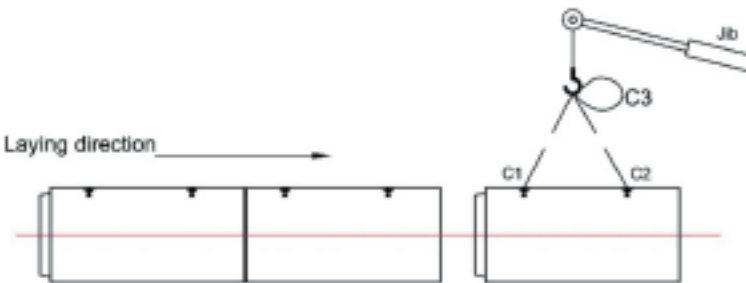
2.3 Chain slings

Designed for lifting in conjunction with 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.

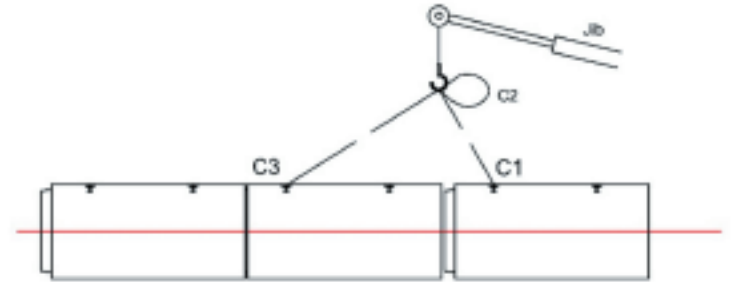
The system enables pipes to be offloaded, positioned and jointed using the same set of chains.



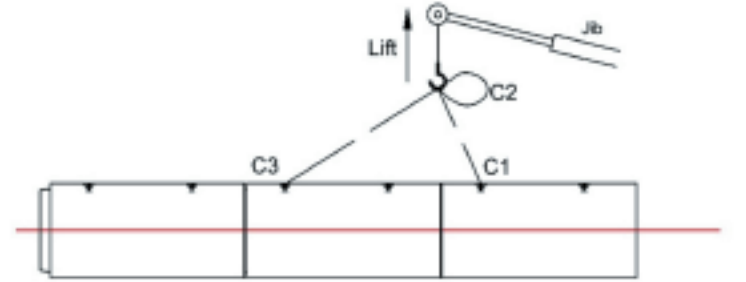
- 1. Use the equal length chains C1 and C2 for lifting and placing each pipe in the trench



- 2. Connect the longer length chain, C3 to the pipe already laid and release the shorter length chain C1 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



2.4 Health and safety

Marshalls Civils and Drainage recommends that ALL lifting operations should comply with the Lifting Operations and Lifting Equipment Regulations (LOLER) 1998, and the Provision and Use of Work Equipment Regulations 1998 (PUWER).

Marshalls Civils and Drainage is committed that its products are designed and manufactured to ensure the safety of users. Installation of products involves breaking ground and is thus considered as construction work under the Construction (Design and Management) Regulations 2015.

Marshalls Civils and Drainage puts a great deal of effort into ensuring that its designs are safe and all pipes sold are Kitemarked in line with BS5911-1.

Jointing instructions

3.1 Instructions

- 1. Correctly position and bed the first pipe. Prepare the bedding for the second pipe and hollow out in the area of the incoming pipe socket to ensure the pipe is supported by the bedding along its barrel length (generally the socket has a greater outside diameter than the main barrel).

Note - DN1500 & DN1800 pipe diameters do not have a flared socket end.

- 2. Ensure that all jointing surfaces are wiped free of dirt and grit and reasonably dry and that the respective spigot and socket profiles are undamaged.
 - Pipe sizes DN300 – DN1200 require pipe lubricant applying before jointing
 - Pipe sizes DN1350 – DN1800 do not require pipe lubricant before jointing.

See Section 3.2 with regards the application of pipe lubricant.

- 3. Using jointing chains, a pipe lifter system or canvas/fabric sling, carefully lift and guide the next pipe spigot into the previously laid pipe socket - taking care not to disturb the jointing ring or damage the jointing surfaces. The spigot should be offered up to and centred carefully into the receiving socket. The pipe can now be allowed to rest on the bedding material.



- 4. Using plant equipment or pulling the pipe home with a strap are common methods of completing the joint. If using the plant equipment to push the pipe home, always place a timber between the back of the equipment and the pipes socket (spigot if back-laying). Apply a steady, evenly distributed pressure until the pipe is in its final jointed position with the joint gap being within the recommended limits of between 10-25mm (joint gap measured internally).
- 5. The line and level at the 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 with pipe removed. A final check on the joint gap should be made after any adjustment is made.

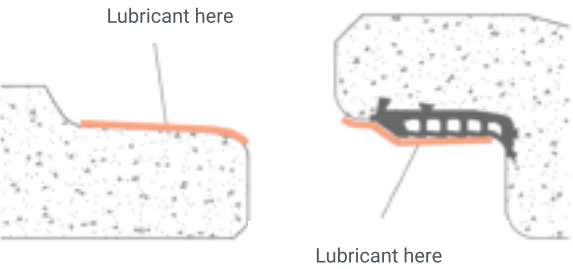
If back laying the pipeline (new pipes laid with the socket offered up to previously laid pipes spigot). Special attention should be made to ensuring the socket does not scoop up bedding material and hence contaminating the joint when laid using this method.

3.2 Pipe lubricant

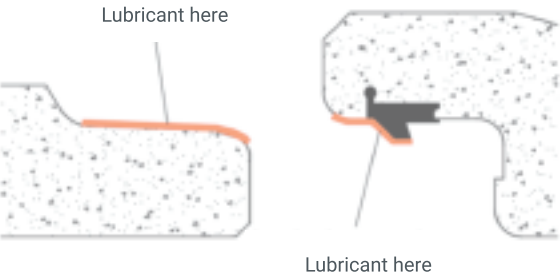
Pipe lubricant is required on pipe sizes DN300 to DN1200. This is essential in effecting a seal and also assists in the pipe spigot fitting into the spigot end.

- ☑ Ensure that the face of the seal and the spigot of the adjoining pipe a
- ☑ Apply lubricant to the spigot end of pipe using a rag or a cloth (Marshalls Civils and Drainage pipe lubricant 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

'Superseal' integral seal



'EZ' integral seal



Seals

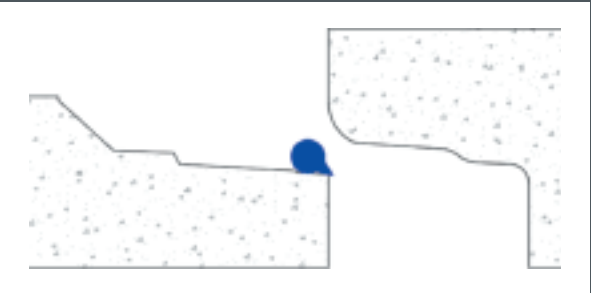
4.1 General

Pipes from DN1350 to DN1800 utilise a seal in the join between socket and spigot in place of pipe lubricant. There are two types of seal, 'Rolling Ring' and 'Lamell', both of which are detailed in this section.

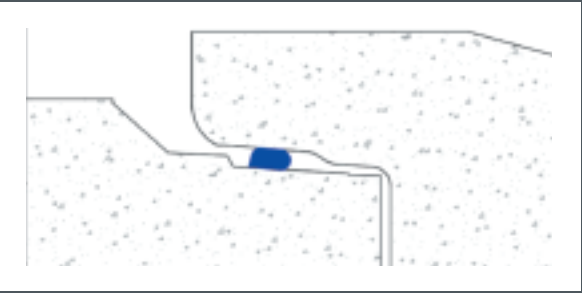
4.2 DN1350 Pipe Seal Details (Rolling Ring)

1. Ensure the pipe seal is not twisted.
2. Ensure seal is correctly located on the spigot.
3. Ensure seal is the right way round and that the stretch is even all round (this is achieved by lifting and releasing the seal at opposite quarter points on the circumference).
4. Lubricants MUST NOT be used where rolling ring pipe seals are supplied.

Before jointing



After jointing



4.3 Pipe Range DN300 – DN1200 Seal Details (Integral 'EZ'/Superseal)

1. Ensure the pipes are in a good condition, with no damage to the spigot end or socket end



2. For 'EZ' type only - remove the protective polystyrene strip prior to jointing. Grip the tab of red tape & pull towards the centre of pipe (and not outwards towards you).

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 slightly during polystyrene removal – gentle pressure will re-set it into its seating.

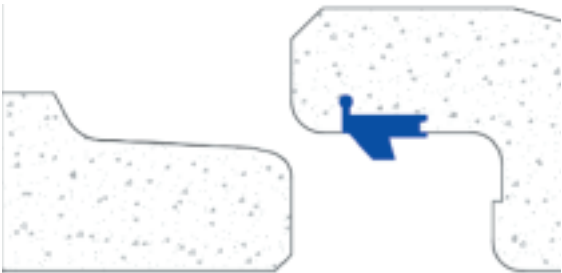


3. 'Superseal' pipes are similar to and compatible with the EZ type (see previous), except there is no polystyrene to be taken out on site (larger seal area).

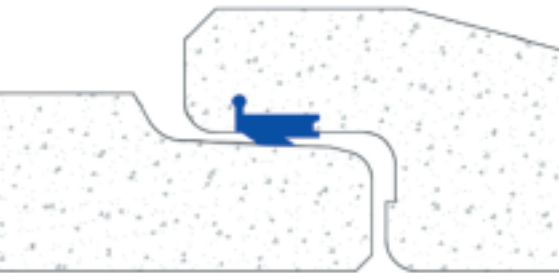


'EZ' integral seal

Before jointing



After jointing

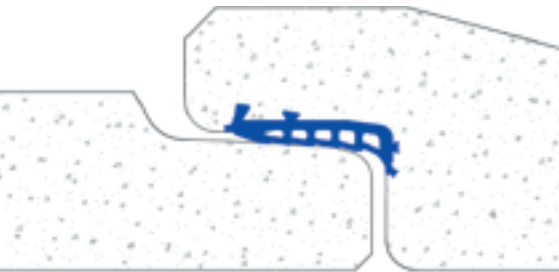


'Superseal' integral seal

Before jointing



After jointing

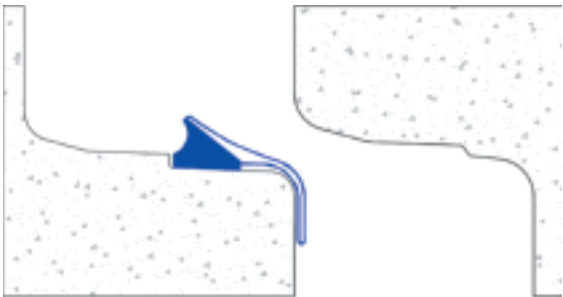


4.4 Pipe Range DN1500 – DN1800 Seal Details (Lamell Sliding Seal)

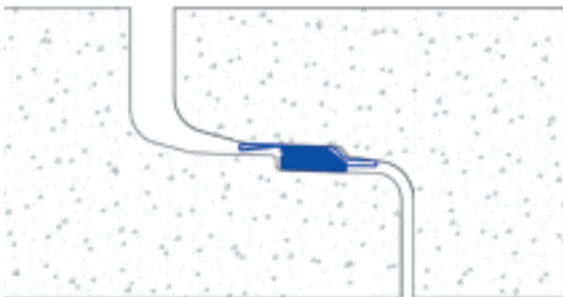
- 1. Ensure the seal is the correct size.
- 2. Place the seal on the spigot (as shown below). Care must be taken not to stretch the seal past the ridge on the spigot.
- 3. Lubricants MUST NOT be used where Lamell seals are supplied.
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Before jointing



After jointing



Site testing and inspection of pipelines

5.1 General

Marshalls Civils & Drainage supply and test all pipe products in accordance with BS EN 1916:2002. The factory hydrostatic test procedure invokes an internal pressure test of 0.5bar with no ingress test required.

BS EN 1610:2015 dictates that air or hydrostatic testing may be applied before any sidefill is placed. For final acceptance the line shall be tested after backfilling and removal of trench support system. The test shall be performed according to the method specified by the owner of the network or the designer.

5.2 Air testing

Marshalls Civils & Drainage recommends the use of inflatable pipe stoppers when air testing concrete pipes. All test equipment used must be calibrated and verified before use.

To achieve a successful air test we recommend using the following procedure which reflects the requirements of BS EN 1610:2015 'Construction and Testing of Drains and Sewers':

- Ensure any debris from the pipeline to be tested is removed
- Ensure an air tight seal is achieved between the stopper and the pipe bore. Using a small amount of pipe jointing lubricant applied to the bore surface will help form an air tight barrier.
- The test is monitored via a manometer filled with water up to the 0mm pressure level. Pressure shall be achieved by application via pump or compressor.
- To ensure the pipeline is stabilised, an initial pressure shall be applied of 10% above the required test pressure and held for 5 minutes
- Following the initial stabilisation test, the test pressure shall be applied to achieve 100mm head and held for 5 minutes. If the pressure drops <25mm, this constitutes a pass.
- After every 3rd correctly laid and jointed pipe, prior to commencement of backfill, the line should be air tested

In the event of a single or continued air test failure, BS EN 1610:2015 allows recourse to a water test and the result of the water test alone shall be decisive.

Various air testing equipment currently used on construction sites



5.3 Water testing

BS EN 1916:2002 specifies that each batch of pipes is sampled and tested hydrostatically to 0.5 bar (5 metre head of water) for 15 minutes. This provides a validation of the impermeability of the pipes and how they will perform when laid on site.

BS EN 1610:2015 dictates that the test duration is 30minutes +/- 1 minute at a pressure of between 10-50kPa.

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 is less than 0.5 litres per metre diameter per linear metre of pipe run, the test is considered acceptable.

5.4 Infiltration

Design and Construction Guidance provides acceptance criteria for infiltration once the pipeline has been installed and backfilled.

The permissible infiltration into the pipeline follows the same acceptance criteria as for the water test.

General

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

- 1. Civil Engineering Specification for the Water Industry published by the WRc plc
- 2. Design and Construction Guidance published by the WRc plc
- 3. Specification for Highway Works published by the Department of Transport

Further reading

References

- 1. BS EN 1916:2002
Concrete pipes and fittings, unreinforced, steel fibre and reinforced
- 2. BS EN 1610:2015
Construction and testing of drains and sewers
- 3. Sewerage Sector Guidance Appendix C
Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England ("the Code")



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