



## Field Handling & Installation Recommendations for Cement Mortar Lined & Coated Steel Pipe

Note: All recommendations are minimum requirements and are to be considered general guidelines only. Contractor's equipment and installation methods as well as seasonal temperatures and other site conditions may require variations from these guidelines. All American Water Works & project specifications and Manuals should be consulted and followed throughout the course of the work.

As many factors affect the quality of the finished product, all procedures should be field tested for acceptable results and adjusted as necessary to suit field conditions. WCP accepts no responsibility for field impacts (time, cost, damage, etc.) resulting from the use of these guidelines.

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### **1 Pipe Unloading and Stringing or Laying**

- 1.1 UNLOADING – A proper number of pick-points is to be determined for each job. Generally, a center-pick is acceptable, though a 2-point pick may be preferred for reasons of safety, maneuverability, or if a center-pick results in lining or coating cracks. 2-point picks should be

spread between 13 & 20 feet apart (on a 40' joint) centered across the middle of the pipe. 2-point slings can be double-choked and looped around a single hook, or be spaced using a properly rated spreader-beam. Use caution during handling, as any sharp impacts between pipe and/or equipment may damage linings, coatings, or joint ends.

- 1.1.1 In streets it may be possible to unload using a forklift. However, each piece must be choked prior to lifting to prevent sections from rolling against the mast or each other which can damage linings, coatings and ends.
- 1.1.2 Belt slings should be 6" minimum width, load rated to accommodate the weight of pipe or fittings provided. DO NOT USE unpadded chains or cables for lifting, coating damage may result.
- 1.1.3 DO NOT USE flange bolt holes or attachments (outlets, etc.) for unloading or handling.
- 1.1.4 DO NOT bump pipe joint ends against other pipe sections or the ground, this may damage joints ends which will affect laying or gasket sealing ability.
- 1.2 **STORAGE** – Timber dunnage, if used, must be supplied by contractor; shipping dunnage which arrives on trucks is the property of the carrier and will not be left at the jobsite.
  - 1.2.1 Pipe sections may be placed on timber dunnage or sand/sandbag berms after unloading. Two bearing points should be used against the body of the pipe. Bearing material should be a minimum of 6" in width (to prevent the possibility of excessive point loading) and be spaced no closer than the 3<sup>rd</sup> points of the pipe length (i.e. 13' in 40') .
  - 1.2.2 If using timber, secure spools from rolling using wooden wedges on both sides of each bearing point. Sand berms need to be wide enough (perpendicular to the pipe body) to allow the pipe to "settle-into" the berm or sandbag which will prevent rolling.
  - 1.2.3 Dunnage/berms must be of sufficient height to prevent flanges, outlets or pipe ends from contacting the ground or other supports. Do not use these extremities for support or lifting operations. Handling pipe with and end flange can warp the flange or gouge the gasket face.
  - 1.2.4 DO NOT support pipe closer than one-foot from each end. Avoid any handling or storage methods that concentrate loads on pipe ends. This could result in an out-of-round or flat-spot condition which will cause difficulty in pipe laying, and possibly affect water-tightness in o-ring joints.
- 1.3 **MAINTENANCE DURING EXTENDED STORAGE**
  - 1.3.1 Mortar lined pipe will be shipped with polyethylene caps covering all openings. Interiors will have been moistened with water prior to shipment. Caps must remain in place and intact to prevent excessive drying and cracking of the mortar linings prior to installation.
  - 1.3.2 Periodically, visually inspect pipe interiors for sufficient moisture, re-spray as necessary – use only potable water on pipe interiors. Note: a good indicator of acceptable moisture levels is when condensation droplets are readily visible on the inside surface of the plastic covers. The absence of condensation does not necessarily mean that pipe is too dry.
  - 1.3.3 If caps are torn, or must be cut to replace moisture loss, repair with a strip of heavy tape, i.e. duct tape. If caps are excessively worn or damaged, replace.
  - 1.3.4 If pipe is left stored for extended periods in hot or dry weather, a daily water spray may be necessary to prevent exterior cracks from developing.

## **2 Nuts, Studs/bolts, Washers (if provided by WCP)**

- 2.1 All mounting hardware will arrive packaged in sets. Sets will be marked for their intended application.
- 2.2 Do not break open containers or wrappings until time of installation to prevent loss or damage.
- 2.3 If stored out of doors for extended periods, cover pallets with opaque plastic or burlap to insure permanence of markings and to protect packaging and contents from the elements. Otherwise, store indoors to protect from theft.

## **3 Gaskets & Lubricant (if provided by WCP)**

- 3.1 Gaskets will be marked for their intended use. They must be stored indoors.
- 3.2 Composition-type flange gaskets which are shipped 'flat' may be stacked together, vertically or horizontally. Smaller flange gaskets may be shipped 'bundled.' Do not stack nor otherwise crimp

gaskets at the folds as they are easily broken. Do not hang from pegs, as deformation may cause them to be unusable.

- 3.3 Rubber gaskets should be stored indoors, protected from sunlight and excessive heat and cold, in their original containers. Do not hang from pegs, as unwanted stretching may result.
- 3.4 Joint Gasket lubricant (flaxoap) should also be stored indoors and remain sealed in its shipping containers. If heavily contaminated by sand or dirt during or after use, discard, as gaskets may be damaged by sharp sand, etc. during joint assembly.

#### **4 Joint Diapers (Typar Cloth) or Grout Bands (Foam-lined Typar)**

- 4.1 Diapers should be stored indoors. Extended exposure to sunlight may weaken the Typar cloth or degrade the foam lining.
- 4.2 See Diaper dimensional data and assembly diagram (attached) for field use instructions.

#### **5 Mechanical Couplings (if provided by WCP)**

- 5.1 Follow manufacturers handling and installation procedures included with shipment.
- 5.2 Couplings should remain in their original packaging until ready for use. If stored for extended periods, they should be protected with opaque covers to prevent UV aging of their shop-applied coatings.
- 5.3 Coupling gaskets and lubricants should be stored as in par.3 above.

#### **6 Joint Assembly**

- 6.1 Pipe section placement handling operations should follow par. 1.1 above. Both joint types described below may require the use of a bottle jack or other sizing tool to ensure end roundness prior to laying. Shipping, stacking, and handling may cause joint ends to become out-of-round slightly. A crowbar-type tool may ease the assembly of lap-welded joints, but should not be used on O-Ring joints. A proper assortment of jacks and tools will aid in a trouble-free installation. These tools are not provided by WCP.
- 6.2 Lap Welded joints need only have the caps/bands removed, then be aligned and stabbed to the proper overlap/depth, then tacked, fit and welded. Depending on size, lap-welded joints may be laid either straight-in, or by using the tack-and-hinge method. Lining and coating finishing operations are as described in par.7.
- 6.3 O-Ring Joints.
  - 6.3.1 Prepare the joint by removing the caps/bands, then wiping the interior surfaces clean of sand, dirt, etc.
  - 6.3.2 Lubricate the gasket liberally before placing in spigot groove. An improperly lubed gasket may be cut, or rolled out of place, causing a leak. In addition, a light wipe of lubrication on the inside of the bell will also aid in joint assembly. Excessive lubrication is not recommended, as the lube may be forced through the joint gap during laying, and may require excessive cleanup before placement of the interior joint mortar. Trial & error experience will teach the proper method/amount of lube for each pipe job.
  - 6.3.3 Place the lubed gasket over the spigot groove. Large diameter gaskets may require 2 or more persons to perform this operation. Eye protection is recommended, as the operation requires considerable stretching of the lubricated rubber and they may snap back at the worker(s) from time to time.
  - 6.3.4 Equalize the gasket around the groove by sliding a screwdriver or other similar blunt-edged tool underneath/between the gasket and across the spigot groove 'humps,' then running the tool around the joint circumference once or twice. A gasket that is stretched on one side and loose on the other may "fish-mouth" during assembly and not seal properly.
  - 6.3.5 Assemble the joint by aligning the spigot with the previously laid bell, bring together until the gasket contacts the bell ID all around, then smoothly pull the joint home to the proper stab depth. See shop drawings for minimum stab depth required. If an angular deflection is required, only pull the joint after stabbing straight in to full depth, then open the joint the desired amount. Stabbing at an angle may cause a fish-mouthed or rolled gasket.
  - 6.3.6 Check gasket location with a feeler gauge all around the joint to ensure proper placement in the groove. Use only a blunt-edged feeler, DO NOT USE broken steel

strapping or knife edge, these can cut the gasket. A prepared piece of box strapping may be used if the end has been filed or ground to a round face with no sharp edges. If the gasket is not felt at an "even depth" around the circumference (excluding pull), the joint should be pulled apart and remade. If the pulled gasket is crimped, torn, or otherwise damaged, discard and replace with a new gasket (beginning at 6.3.1 above).

- 6.3.7 All un-welded pipe joints require continuity bonding after assembly, using Bonding Clips provided by WCP. See shop drawings for quantity and welding details. 2 or more clips per joint should be approximately evenly spaced around the top half of the joint, i.e.: 2 each would be placed at opposing springlines, 3 each would be placed one each at springline and 1 each at field top, 4 each at 45° intervals from one side to the other, etc.

## 7 **Joint Finishing**

### 7.1 Field Welding

- 7.1.1 Lap-welded joints may be welded from inside or outside (or both, dependant upon size and the Owner's requirements). If welded from inside, the outside joint must be thoroughly tacked in place to prevent movement of the joints during backfill operations. See also 7.1.3 below.
- 7.1.2 O-Ring joints may be restrained by placement of a sized/rolled round filler bar tucked into the bell flare. If the filler is to be stitch welded only, exercise caution to prevent burning the rubber gasket. If gasket is damaged during welding, the joint must then be fully welded to ensure water-tightness. Interior welding can be performed on O-Ring joints, but the proximity of the gasket to the spigot end mandates that the joint be fully welded to be watertight. Interior welding must comply with appropriate safety requirements, especially when burning of the joint gasket is likely.
- 7.1.3 Insitu-Welding: Exterior coating at field joints can be completed prior to interior welding. In this case, the Contractor's welding procedure, filler size, weld placement, speed, etc. should be checked on the first few joints to ensure that the exterior coating is not damaged by excessive localized heat during welding. Several light passes or 'skip-welding' has proven to be a useful procedure in heavier steel thicknesses. A simple check can be made by leaving the joints exposed (un-backfilled) until completion of the welding operation, then visually examining the joint. If the field procedure proves satisfactory, subsequent joints may be backfilled prior to welding if the same welding procedures are followed for the remaining joints.

- 7.2 Exterior field joint coating may be applied using the grout forms (diapers) provided by WCP. Reference AWWA C-205, Sec.4.6.3 for materials and methods.

- 7.2.1 Diapers should be located longitudinally across the center of the exposed portion of the joint, with the band opening at field top, and strapped securely past the shoulders of the shop applied coating using the provided bands and crimping clips (crimping tool not provided by WCP).
- 7.2.2 After moistening the joint with water, the 2:1 (sand:cement) grout mixture should be poured into the form until it is properly filled (ref.C-205: 4.6.3.2).

Note: Unless specified otherwise, pipe to be completely encased in concrete need not be diapered and grouted.

- 7.2.3 Joint diapers may be left in place or removed after joint grout is fully cured at the contractor's option. Most commonly the entire finished joint is left intact and buried.

- 7.3 Interior Field Joints over 22" diameter should not be finished until after the pipe has been backfilled and compacted through the pipe zone (1 foot above top of pipe). At least 2 or more joints should be in place ahead of the joint to be finished. These precautions ensure that the freshly finished mortar is not damaged by joint movement due to pipe laying or compacting operations.

- 7.3.1 Materials and methods are as described in AWWA C-205; 4.6.2

- 7.3.2 Excess gasket lube on lining shoulders should be cleaned from joint prior to pointing.