OPERATION MANUAL

安钢集团
AN GANG GROUP

ANGANG GROUP YONGTONG
DUCTILE CAST IRON PIPE CO., LTD.

IISCO
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INTERNATIONAL INTEGRATED SOLUTIONS Co

CONTENT

Packing

1. For ductile iron pipes

Small diameter pipes DN80-300mm are packed in bundles. The bundles are designed to protect the pipe and speed up the pipe handling.

Detailed quantity for each bundle

Item	Diamater (MM)	Quantity for each bundle
1	DN80	45
2	DN100	45
3	DN150	30
4	DN200	20
5	DN250	16
6	DN300	12

Pipes with diameter larger than DN300mm are in bulk.

2. For ductile iron fittings and accessories

Ductile iron fittings with diameter up to DN600mm are packed in wooden cases. Fittings with diameter larger than DN600mm are packed with hard wood and steel strap wooden tray. Accessories are packed in wooden cases.

Rubber gasket and rubber sealing rings are first packed in plastic bags.

Lifting

To protect coating and lining of ductile iron pipe and fittings adequately, the loading and unloading should under the supervisor of expert.

There are four kinds of tools used commonly for lifting ductile iron pipe and fittings, steel rope, hooks, nylon or plastic sling and forklift. Before lifting please check all the tools such as hooks, slings, wire ropes and confirm that they are in good condition.

1. **Lifting by steel rope.**

Steel rope is used for lifting single pipes. When lifting the pipe by steel rope, a number of elementary precautions need to be taken:

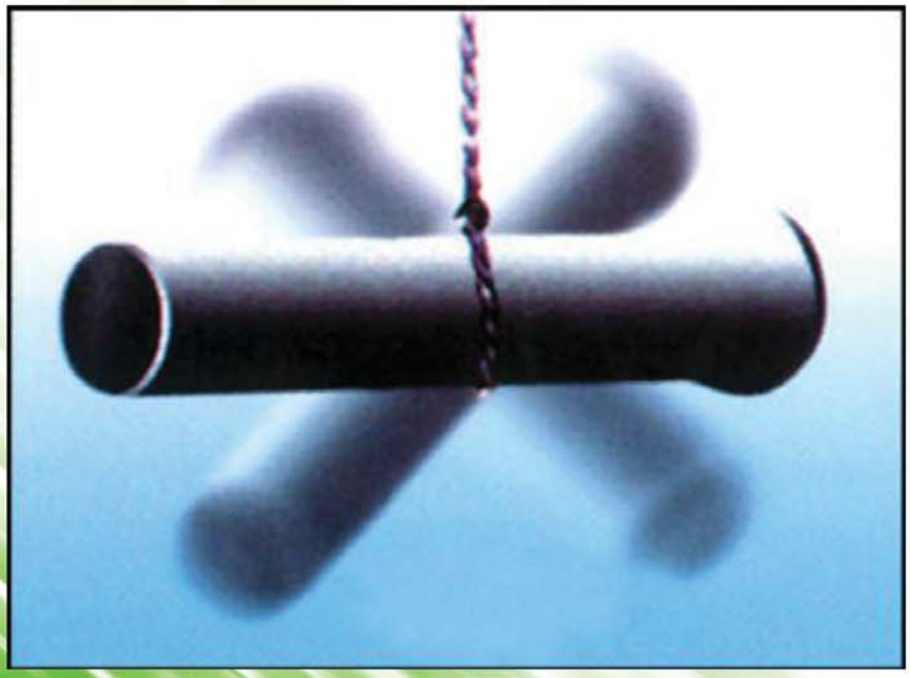
A: The distance of two steel rope should not less than half of the length of pipe.

B: The distance between socket/spigot to the steel rope should be nearly same.

C: Place cushion pads between wire ropes and pipe surface for protecting the coating.

D: Always use two ropes to lift pipe, it is prohibited to use only one steel ropes to lift the pipe.

E: Do not lift more than one pipe together with two steel ropes.



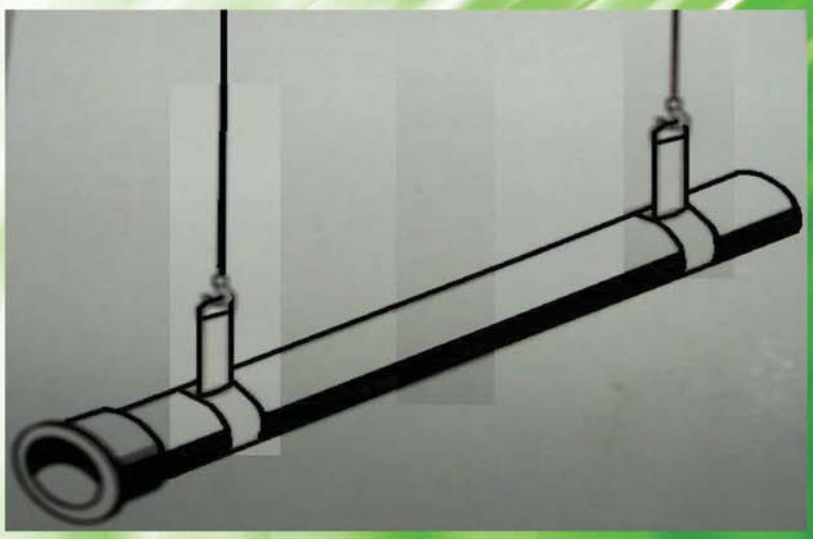
2. **Lifting by hooks**

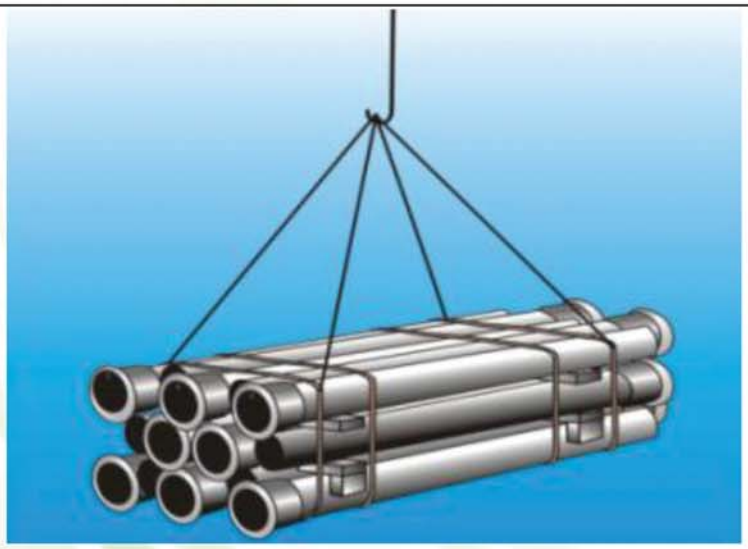
Hook is used usually only for pipes in bulk. It is not recommended to lift bundles by hook. Hooks used for lifting pipe or fittings should be covered by rubber to protect the internal lining. The end of the hook should be in flat. Hook with sharp point is not allowed to lift pipe and fittings with lining.

When more than one set of hooks is using together to lift more than one pipe, be sure pipes will not crash each other during lifting.

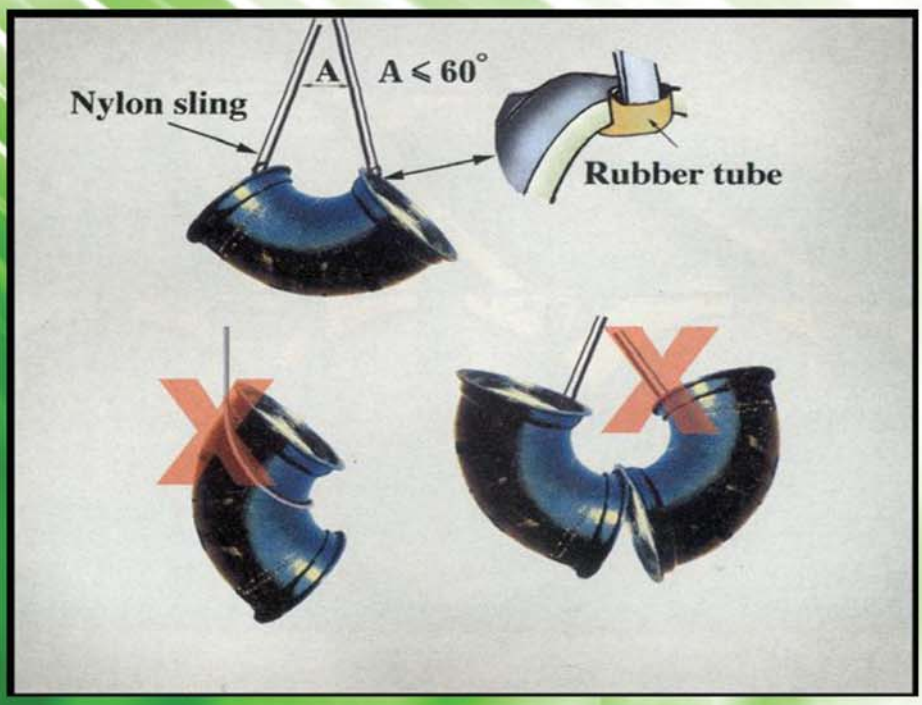
3. Lifting by nylon or plastic sling

Nylon or plastic sling is highly recommended for lifting ductile fitting in bulk and pipes in bundles. When lift pipes with bundle, it is not allowed to lift more than two bundles once. Always use slings with wide flat to prevent accidental slippage.





If single sling is used, lift the pipe at its centre of gravity with the sling gripping the pipe to prevent slippage. When sling is used for lifting single fitting, place rubber pieces to avoid direct abrasion of sling with the socket. Lift the fittings in slow speed when the fitting near the ground during unloading until the fitting place in the ground properly and can not move.



4. Lifting by forklift.

Forklift is used for lifting pipe in bundle. When forklift is used, be sure the bundle does not come out from the fork. It is recommended to put rubber on the fork.

Always lift pipe and fitting in low speed prevent slippage or hit with hard objects. Pipe lifting should be done slowly and horizontally. The winding of the rope, making pipe turning, is restricted. Lifting should be careful and not to urn into the hard materials. Suddenly lifting or stopping is should be prevented.

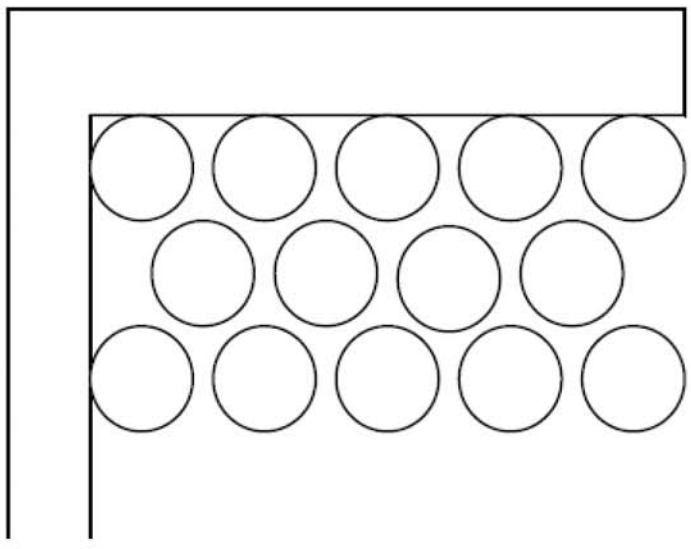
Transportation

1. Marine transportation

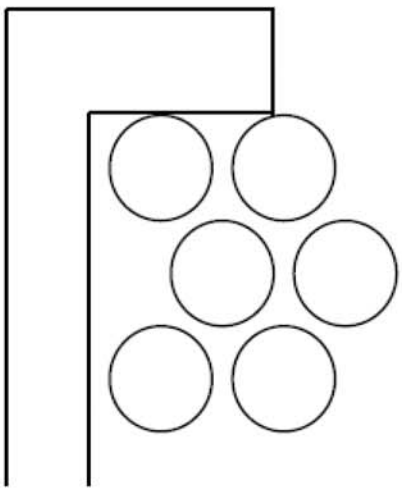
When rolling out pipes from the side of the hold, be careful not to give impact on pipes. Use some cushion on below pipes. When taking out pipes from the front or rear of the hold, first slide pipes very slowly and carefully and then pull them up. Put at least two timbers for the bottom tier. The first tier should be fixed with chocks and cramps.

Total height of the pipes tier should not more than 6 meters in the hold. In this case, double deck vessel is recommended to transport the pipe. The space maybe will be wasted if you use single deck vessel.

Choose the vessel has similar dimension of hatchway and bottom of the hold. For it is difficult to load and unload pipe from side of the hold.

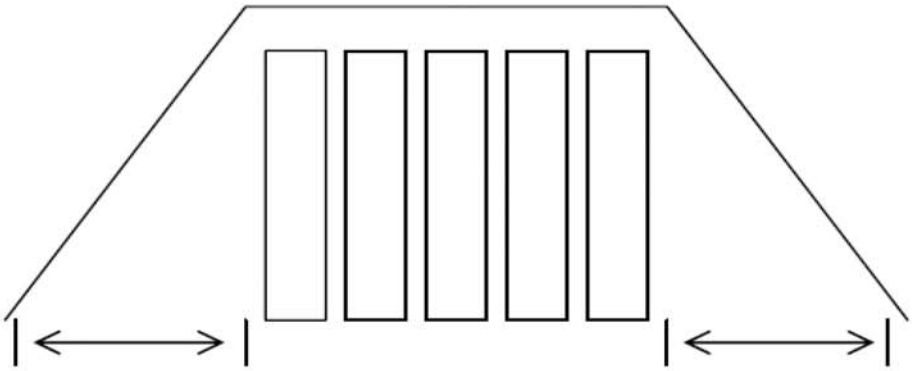


Not good



Good

When the first or last hold is used for transporting the pipe, the spare place should be filled and protected by wooden racks to avoid pipe moving cross wisely during transportation.



Put hard wood between pipes and the wall of hold. Never make the pipe contact the wall of hold directly.

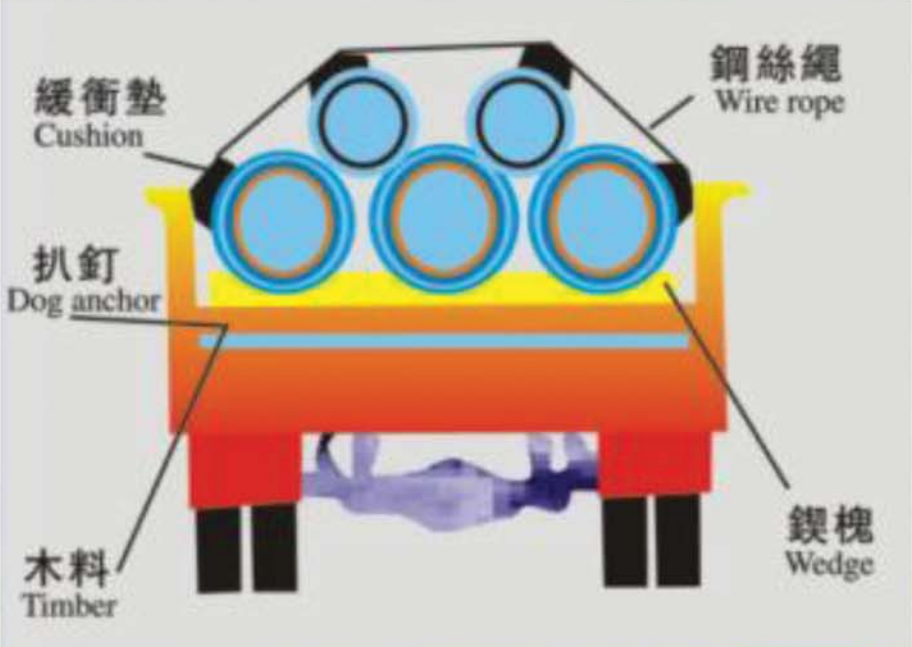
2. Transportation by truck or trailer

Use trucks or trailers equipped with side supports to stabilize the load (adequately sized stanchions on either side of the floor).

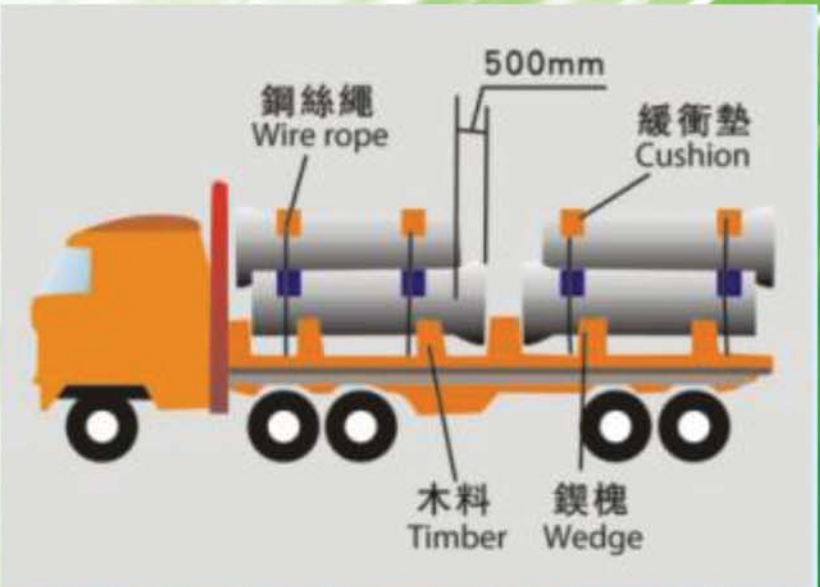
Place pipes on timbers, ensure that the pipes are secured with chocks. At least two or more timbers should be used on the platform of the truck or trailer. The timber should have enough thickness ensure the socket end of pipe or fitting will not touch the bottom of truck or trailers. Never let pipe contact with the bottom of truck or trailer directly.

Secure all pipes with wire ropes and or chains. Place cushion pads between wire ropes and pipe surface for protecting coating. If more than one pipe in the first tier, keep the direction of the socket to same direction. Each pipe should be fixed with chocks. All the

chocks should have same shape and size. If more than one tier of pipes is loaded in the truck or trailer, reverse the direction of pipes at each tier.



When loading pipes in trailer, load pipes on trailer so that socket of the lowest tier face each other. Insert timber blocks in the space to prevent longitudinal movement of pipes.



Before the truck or trailer departure, check all the timbers, blocks and wire ropes.

Confirm that the timber is stable, chocks and wire ropes are firmly secured.

Use the good quality wood for the timber and chock. Never use any decayed wood for timbers or chocks so that the pipe will fall off during transportation because of the bad quality of timbers or chocks.

When unload pipes from truck or trailer, start from the middle of top tier, then evenly from both sides. Do not unload pipe only from one side avoid truck or trailer become incline and pipe may drop down from the truck.

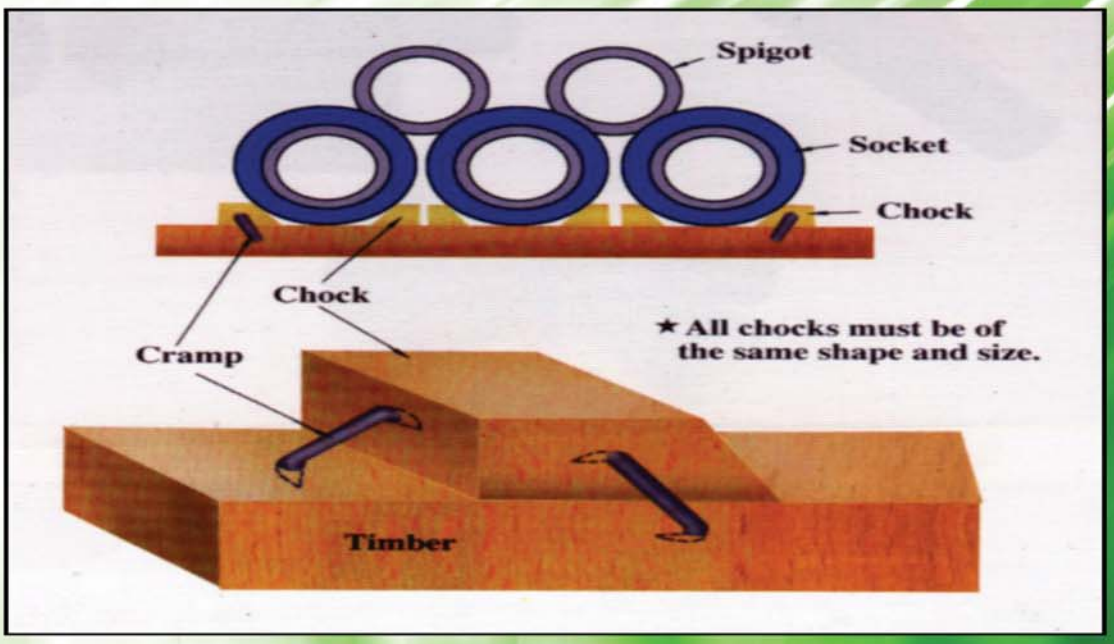
Stacking and storage

Pipe should be placed in stock yard with ground hard enough to bear the weight of pipe and will not cave after stacking the pipe. Marshy or soft ground is not suitable for storing pipe. The ground should be planar, if necessary, ground should be leveled by grader or roller.

Before laying the pipe, obstacles, stones or other hard objects may damage the pipe should be removed out from the storage area.

1. Pipe placing

Place at least two timbers for the first tier. The distance between the timber and socket or spigot end of the pipe is about 1 meter. Leave about equal distance between pipes and if possible, it is better to secure all pipes in bottom tier with chocks. The end chocks in the bottom tier must be secured firmly with cramps



Keep the direction of the socket to same direction in same tier, and reverse the direction of pipes at each tier. Always make the socket of pipe to be free from contacting socket or spigot with the pipe in upper or nether tier.

2. **Pipe stacking**

Stacking the pipes with same diameter in one files. For fittings and accessories, it is also better to stack same diameter together. If the fittings are in bulk, it is not allowed to stack more than one tier.

There are three ways used for stacking usually in the warehouse, pyramid type, uniform type and square type.

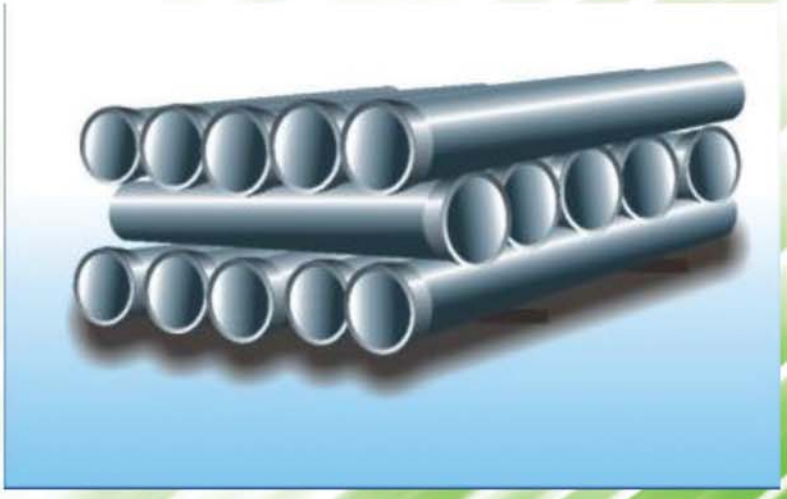
(1) Pyramid stacking

Pyramid stacking is the most usual way used in warehouse and inside the vessel. It can save the supporting materials to minimum and no need for big area for the stock yard.

The bottom tier is placed according to item 2. All the pipes must be laid in same

parallel. Then reverse the direction of the socket end of the second tier. The socket of each tier should be free from contacting with the ground or spigot end of another tier. The distance from the spigot end of second tier and the socket end of first tier is minimum 50 mm plus the length of the socket. In this way, the contacting area of each pipe with others are sufficient enough so the allowable tiers of pyramid stacking is more than the others two stacking method.

(2) Rectangle storage



The requirements of timbers and chocks for first tier are same as pyramid stacking and uniform stacking. But the directions of pipe's sockets are not same. The sockets are reversed one by one. The length of pipe should be considered for the first tier as the length of the first tier should not more than the effective length of the pipe. The direction of the second tier is changed at right angle. Also reverse the pipe one by one in same tier. It is not necessary to put timbers between each tier.

it is very important to place all the pipe in first tier parallelly. When the first tier

is placed in very good way,

it can guarantee the socket of pipe to be free from any other sockets in same tier or in others tier.

(3) Uniform stacking:

The first tier is placed same as the pyramid stacking. Then put timber on the top of the first tier as same as the bottom tier. The socket end of second tier is in same direction of the first one. Thickness of the timber should be at least 10mm than the socket of the pipe to avoid the socket between different tier contact each other. Pipes at the end of tier should be secured with chocks and cramps. Uniform stacking allows to use sling to lift the pipe. It is a suitable way when rubber covered hooks is not available. But the allowable height of uniform stacking is less than pyramid stacking. So it is not recommended to use for pipe with big quantity.

Repair damaged cement lining

Preface

Cement lining will withstand normal handling. Nevertheless, during transportation, loading and unloading, storage and installation, pipes may be found at times to have damaged linings which need to be repaired before placing in service.

ISO4179 standard provides that damaged lining may be repaired, and the following repair procedure is recommended:

1. Repair material and tools

(1) **Material needed for mortar application:** cement, sand, adjuvant (e.g. glue).

Cement: Sand: Adjuvant=1: 1: 0.5 by weight

(2) Mix cement and sand firstly, then pour adjuvant into the mixture of cement and sand, mix them thoroughly (immediately firm good pot after the usage of adjuvant, and keep in cool place)..

Cautions: Don't prepare too much mixture, they will harden and become unusable.

(3) Tools and equipment

For the convenience of the repair work, use of the following tools is recommended:

wire brush, brush, scraper knife, plastic sheet, spatulas, adhesive tape, portable

disc grinder, hammer

① wire brush

② brush

② scraper knife

④ plastic sheet

⑤ Spatulas

⑥ Adhesive tape

⑦ protable disc grinder

⑧ hammer

⑨ Chisel

2. Repair procedure

Cement mortar repair should not be carried out at very low or very high temperatures.

Whenever possible, rotate the pipe so that the area to be repaired is at the bottom.

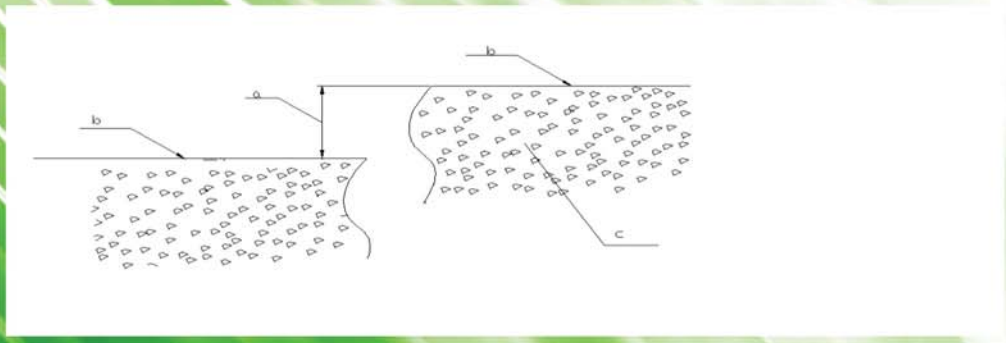
A. Crack

(1) Crack does not exceed 1.0 mm

If the crack does not exceed 1.0 mm, it is no need to repair. Because on contraction of the lining, the formation of cracks and radial displacements cannot be avoided. Cracks shall not be detrimental to the mechanical stability of the lining. These cracks and radial displacement will close and heal when the lining comes into contract with water due to re-swelling of the lining and continued hydration of the cement.

Hollow areas, which are detectable by acoustic means (knocking), are related to the shrinkage of the lining in hot and dry climates and are acceptable.

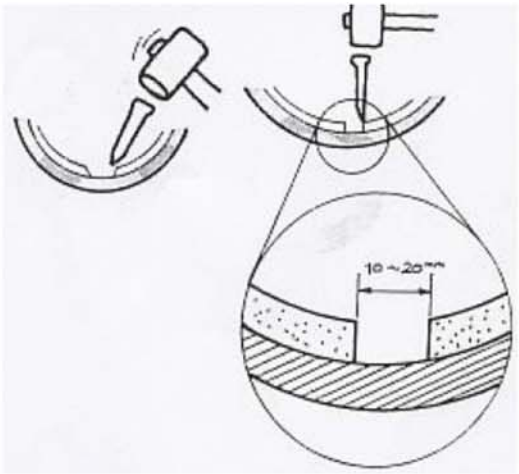
It is known that these hollow areas will disappear when the lining comes into contact with water.



a---Radial displacement b---bore of lining c---cement mortar lining

(2) Crack exceed 1.0 mm

① Using hammer and scraper knife cut back the lining.



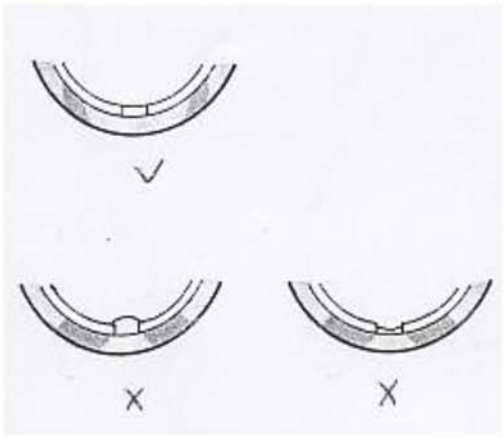
② A portable disc grinder maybe used instead of a scraper knife and hammer.

③ Clean the surface with a brush

④ Thoroughly wet the cut-out area and adjoining lining.

⑤ Fill the crack with the mortar,

(1) Trowelling the surface with a spatula to restore the thickness of the internal lining. Smooth the repaired surface with a scraper knife. (repaired area over or under internal lining is incorrect, see the right photo)



⑥ Inspect the finished surface, the repaired lining should be kept moist by covering wet cloth or watering, to avoid the new crack result from quick set of cement.

B. Chip

(1) Inspect carefully the damaged portion and confirm that there is no deformation or crack.

(2) Clean the surface with wire brush.

(3) Fill the chip with mortar.

(4) Finish the surface with the spatula.

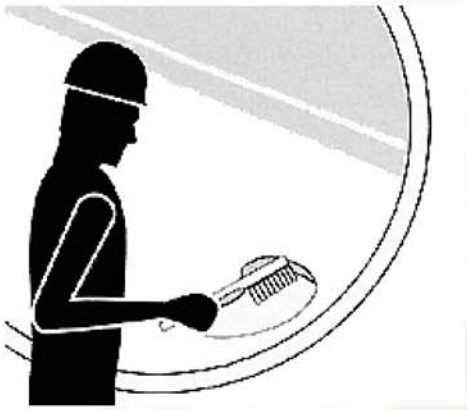
(5) The repaired lining should be kept moist by covering adhesive tape or wet cloth or watering.

C.Break

(2) Inspect well the affected area, if the cement lining is broken off in a large area, cut the pipe to remove the damage portion.

(3) Remove the damaged area and 1 or 2 cm of the surrounding sound mortar with the aid of a hammer and cold chisel. The edges of the cleared zone must be vertical to the iron surface.

(4) Clean with a wire brush to remove non-adherent material.



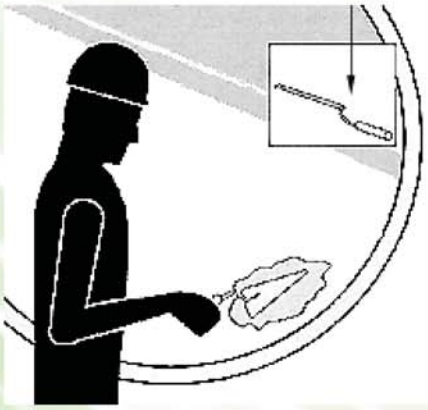
(5) Moisten the repair area.

A few minutes before making the repair, using a brush, wet with water or cement wash the original mortar over a width of about 20 cm around the affected area.

(6) Apply the mortar with a trowel, compacting it on adequately to restore the thickness of the internal lining. Smooth the repaired surface with a scraper knife. Check if there are no gaps between the newly applied mortar and the original mortar.

(7) Curing: After finishing the repair, cover the area with newspaper or damp cloth.

As an alternative the repaired lining may be seal coated with plastic film and adhesive tape. Keep it at least 24 hours to prevent it from drying too quickly and to give it good strength.



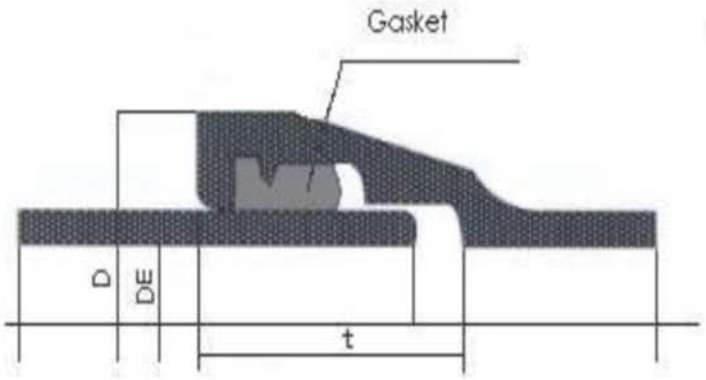
3. Remarks

(1) Other curing methods may be applied according to the condition at site and the supervisor's decision.

(2) Fresh linings that become frozen will not be serviceable. Avoid repair in freezing weather.

Manual for Installation Instruction

1. ASSEMBLY-----for T-Type Joint



T-TYPE JOINTS

1.1 Finding mounting level

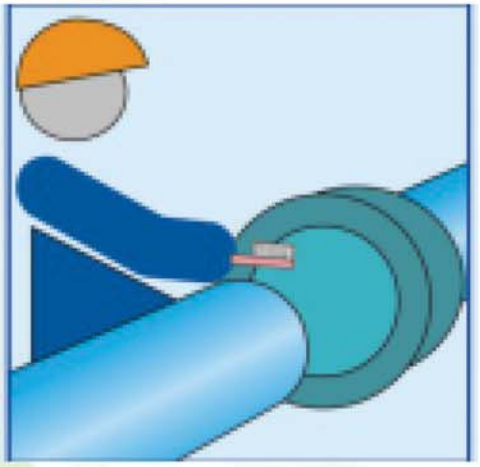
Water flowing direction is closely related to the socket direction. Normally, water flowing direction should be that from socket to socket. However, in case of deep slope, socket should be facing up and mounting is done from bottom to upside. When placing pipes down to ditch, strong hitting with the bottom and wall should be avoided.

1.2 Cleaning

1.2.1 Socket cleaning

Inside of socket should be carefully cleaned, especially there should be no paining, soil, sand or other residues left in the area of rubber gasket.

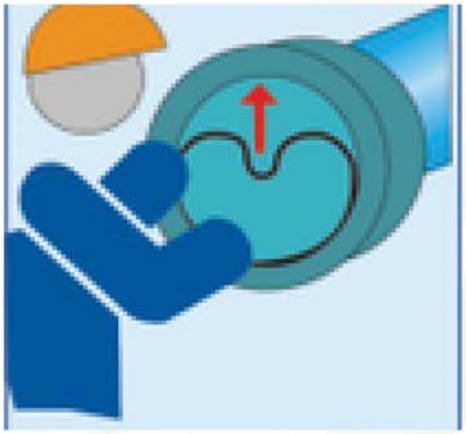
1.2.2 Clean the spigot of the jointing pipe with wire brush, as well as the gasket.



1.2.3. Check that the spigot is chambered and in good condition. If it is a cut pipe, it is essential to remark the chamfer.

1.3 Insert the gasket outside the trench, the gasket is inserted at the trench side.

1.3.1. Check the condition of the gasket and introduce it into socket, looping it into a heart shape, with the lip seal nose directed towards the back of the socket.

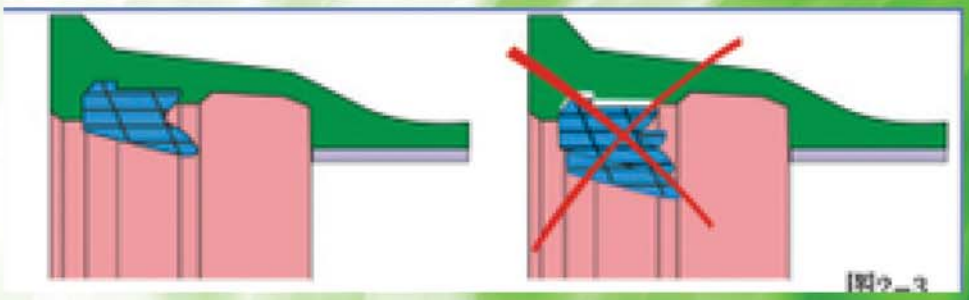


1.3.2 For large diameters (DN800 to 1200) it is preferable to loop the gasket into the shape of a cross for insertion.

1.3.3 Apply radial pressure to the gasket at the heart shaped loop (or cross loops) to force it into place.

1.3.4 Check the gasket position

Check that the gasket fits snugly around its circumference.



1.4 Marking the socket depth

If the pipe spigot is not already marked, mark the spigot of the pipe being laid , at a distance from the end equivalent to the socket depth P, minus 10mm.

DN	P mm	DN	P mm	DN	P mm	DN	P mm
80	90	300	105	700	145	1400	245
100	92	350	108	800	145	1500	265
125	95	400	110	900	145	1600	265
150	98	450	113	1000	155	1800	275
200	104	500	115	1100	160		
250	104	600	120	1200	165		

1.5 Lubrication

1.5.1 Apply lubrication paste(must use the specified lubrication paste) to:

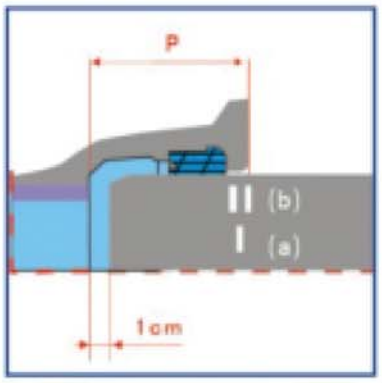
-- the exposed surface of the gasket ,

-- the spigot end and chamfer,

The lubrication paste is brush applied in reasonable amounts.

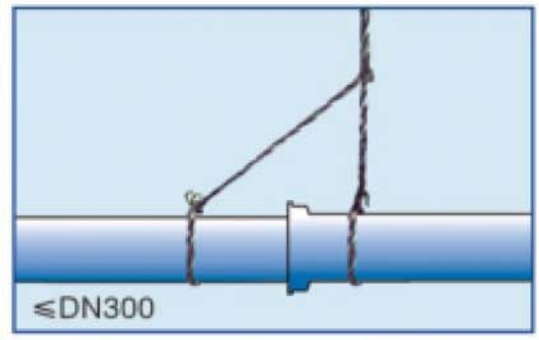
1.5.2 Center the spigot in the socket and maintain it in this position by resting it on two mounds of tamped soil , or preferably gravel.

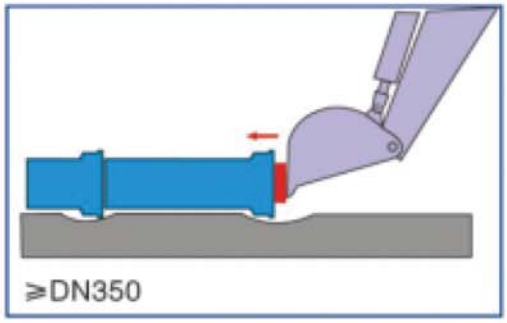
1.5.3 Push the spigot into the socket, checking that everything is correctly aligned.



1.6 Assembly

When connecting pipes, different machinery tools should be used for different diameter of pipes . Pipes should be inserted carefully and continuously step by step, till the standard line totally with the observe of the socket. Once the resistance is too big in placing, the operation should be stopped immediately , pull the pipe out, check the position of rubber gasket and socket , find out the reason and fix it , then insert again. After that , insert the straight metal gage into the space between socket inside and pipe wall, till it touches the rubber gasket . Check the connected pipes to see if they are axially centralized . If not , the concave and convex which might be occurred on the bottom of the ditch should be adjusted.



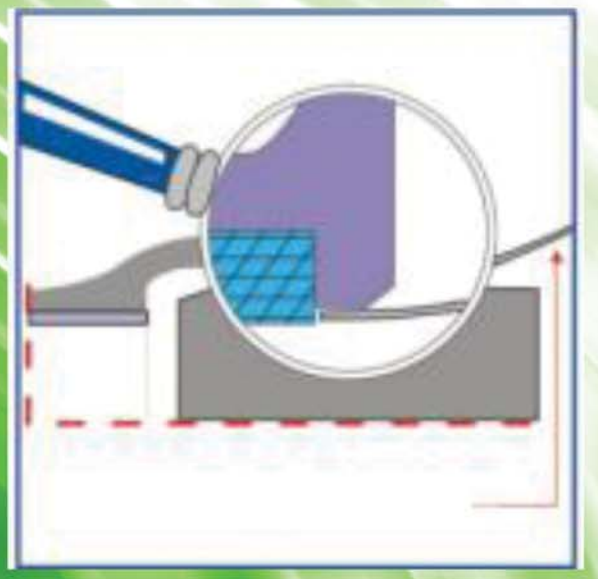


1.6.1 Push in the spigot until the mark is in line with the socket face , do not penetrate beyond this position.

1.6.2 Push in the spigot until the first mark disappears inside the socket. The second mark must still be visible after assembly.

1.7 Control

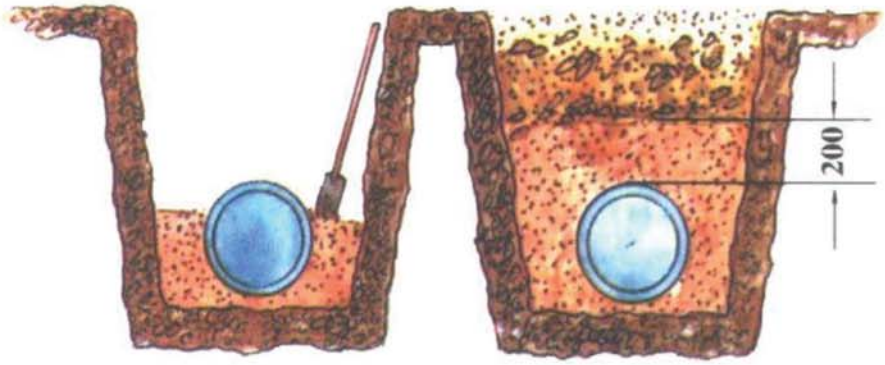
Check that the gasket is correctly seated by inserting the end of a metal rule through the annular spigot and socket gap until it touches the gasket. The rule must penetrate to the same depth around the whole circumference.



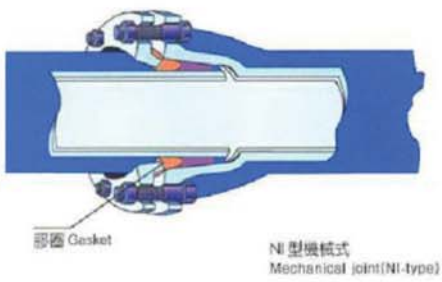
1.8 Ditch burying

Bury is done with the earth which not contains sand, grass, root of tree or

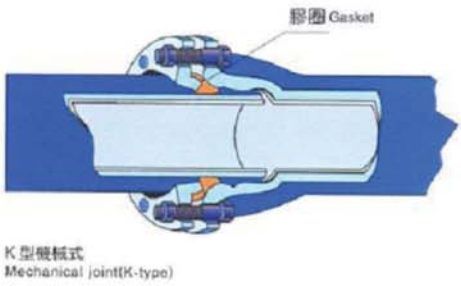
foreign matters. The burying depth should be at least 200mm above the bus bar line of the pipes. The earth on two sides of pipes should be rammed, and then put one more layer of earth with 200-300mm on it and ram, too.



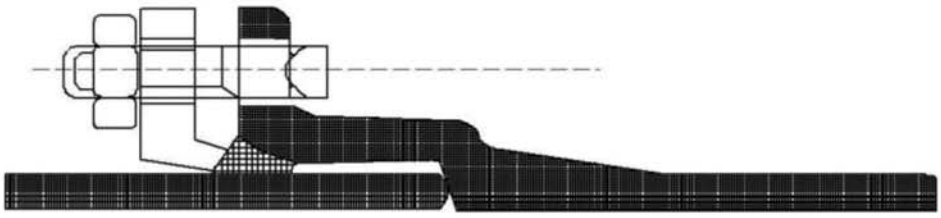
2. Assembly -----K-Type joint and N1-Type joint



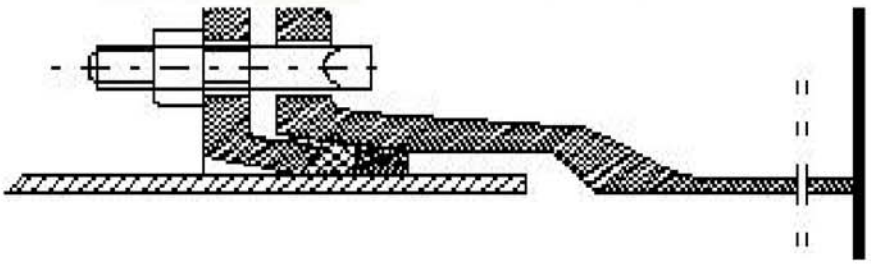
N1-Type



K-Type



K-TYPE JOINT



N1-TYPE JOINT

2.1 Cleaning

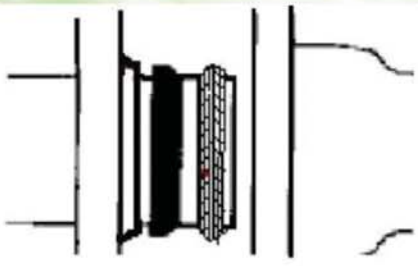
2.1.1 Carefully clean the socket chamber and pipe spigot . Pay particular attention to the gasket seat (eliminate all soil , sand, etc.).

2.1.2 Clean the spigot of the jointing pipe , as well as the gasket.

2.1.3 Check that the spigot is in good condition.

2.2 Positioning the gland and gasket(for N1-Type joint it also with the lock ring)

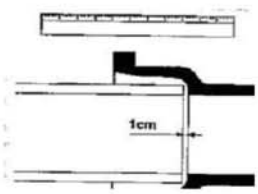
K-type



N1-type

Slip the gland over the spigot, then the gasket , (then the lock ring for N1-type joint) with gasket tip directed towards the spigot end.

2.3 Jointing



Insert the spigot in the socket, checking the alignment of the parts being assembled, then withdraw it about 1cm.

2.4 Gland assembly

Slide the gasket along the spigot to engage it in its seat, and being the gland into contact with the gasket, if it is N1-type, first move the lock ring toward to the spigot .Insert the bolts and tighten the nuts until they contact the gland.

2.5 Bolts tightening

2.5.1 Check the gland position, then tighten the nuts

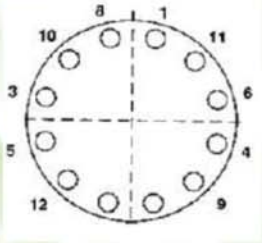
with a torque spanner progressively, in successive passes, following the order of the numbers in the diagram opposite.

2.5.2 Express bolt torques are as follows:

- dia. 22 bolts =12m daN (approx. 12 m kg f),
- dia. 27 bolts =12m daN (approx. 30 m kg f)

It is essential to check the bolts after the hydraulic test, retightening them if necessary.

2.5.3 With large diameter pipes, commence bolt tightening with the



pipe or fitting being assembled suspended by the lifting tackle. This will keep the spigot correctly centered in the socket and the gasket will engage correctly in its seat.

With regard to the other procedures you can refer to the assembly of T-type joints.

Any question about installation, please consult to YONGTONG technical center.

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