Willard Says……

Really useful stuff to know about dredge pipelines

The Discharge Pipeline—Connections

Pipeline connections are necessary to join all pipeline components—lengths of pipe, discharge sleeves, elbows—into a continuous conduit that extends from the dredge discharge port to the discharge point. Components should be selected and connections made to prevent downtime due to discharge line parting. We will explore different ways, the good and the bad, to connect pipeline components.

Steel Pipe

Steel pipe is almost always supported on flotation cells to keep it above water where it is accessible for repair, lengthening or shortening.

Six ways to connect lengths of steel pipe:

1. Butt-weld into sections of 80 to 120 feet. This reduces the number of more expensive means of connection.
   Advantages:
   - Least expensive joint.
   - Strong joint.
   - Low hydraulic flow head loss.

   Disadvantages:
   - None.

2. Bolt-together using slip-on weld flanges welded to the ends of each pipe section. The flanged pipe sections are bolted together using a gasket to seal the joints.
   Advantages:
   - Rugged connection.
   - Sections can be added or removed with moderate effort.
   - Flanges, bolts and gasket can be reused.
   - Low hydraulic flow head loss.

   Disadvantages:
   - Connection in the water can be difficult.
   - Flanges bolt holes must be aligned when welded to pipe ends.

3. Short—four to six feet long—lengths of discharge sleeve slipped over and clamped to the ends of plain pipe.

   Advantages:
   - Does not require any pipe end preparation.
   - Connection in the water is relatively easy.
   - The sleeve and hardware can be reused.

   Disadvantages:
   - Sleeves crimp and impede flow when the joint is bent too far.
   - Crimp-damaged sleeves burst due to pressure.
   - Requires rugged clamping to prevent parting due to pressure or wind forces.
   - Moderate hydraulic flow head loss.

4. Dresser-type couplings consist of a short steel sleeve that slips over plain-end pipe ends. This pipe connection is not widely used for dredge pipelines.

   Advantages:
   - Do not require any pipe end preparation.
   - Joint assembly is reusable.
   - They are relatively inexpensive.
   - Low hydraulic flow head loss.

   Disadvantages:
   - Relatively difficult to connect on the water.
   - Very difficult to disconnect because gap between the pipe and the sleeve cements with fines.

5. Balljoints are little used by sand and gravel dredgers, but popular with contract dredges using large pipe.

   Advantages:
   - Easy to connect/disconnect in the water.
   - Moderate hydraulic head loss.

   Disadvantages:
   - Expensive.
   - Expensive to repair/rebuild.

6. Long discharge sleeves with Modified BIRF (Built In Rubber Flange) end connecting flanged pipe sections. These sleeves should have a length equal to 8 to 10 times their diameter so they can bend at least 90 degrees without crimping. The liner tube is carried out to the end and up over the surface of the steel flanges. A steel nipple and flange is built into the hose end so the liner material protects the steel and serves as flange gasket material.

This sleeve/joint is recommended for use at three points in the dredge-to-shore floating pipeline; Where the discharge pipe connects to the dredge; Near the midpoint of long sections of rigid floating pipelines; Where the floating steel pipeline connects to the shore pipe.

Advantages:

- Easy to connect/disconnect in the water.
- Low hydraulic head loss.
- Very flexible joint.
- Very resistant to pulling apart.
- Can be rotated for longer wear life.

Disadvantages:

- Relative expensive.
- Cannot be repaired or rebuilt.

Plastic Pipe

Five ways to connect lengths of HDPE pipe.

1. Fuse pipe into sections of 200 to 500 feet.

   Advantages:

   - Least expensive joint.
   - Strong joint.
   - Low hydraulic flow head loss.

   Disadvantages:

   - Requires fusion machine.

2. Bolt together using flange adapters fused onto the ends of each pipe section. This is probably the most popular method of making up plastic pipelines. It is suggested that pipeline be fused into 200-300 foot continuous lengths with flanges on each end.

   Advantages:

   - Rugged connection.
   - Low hydraulic flow head loss.

   Disadvantages:

   - Connection in the water is moderately difficult.
   - Flanges cannot be reused after the pipe wears out.
   - Flanges must be fused to each pipe end.

3. Short—4 to 6 foot—discharge sleeve segments slipped over and clamped to the ends of plain pipe.
   Advantages:
   - No pipe end preparation required.
   - Sleeve and hardware are reusable.

   Disadvantages:
   - Sleeves crimp and impede flow when the joint is bent too far.
   - Crimp-damaged sleeves burst due to pressure.
   - Requires rugged clamping to prevent parting due to pressure or wind forces.
   - Moderate hydraulic flow head loss.

4. Steel split-couplers with gaskets fitted over plain-end pipes and clamped in place by bolts. The following advantages assume that couplings intended for use on HDPE pipe are used.
   Advantages:
   - Commercially available.
   - Strong joint.
   - No pipe end preparation required.
   - Excellent hydraulic flow.
   - Reusable.

   Disadvantages:
   - Connection in the water is moderately difficult.
   - Easily confused with coupling made for steel pipe which will not work.

5. Long discharge sleeves with Modified BIRF (Built In Rubber Flange) end connecting flanged pipe sections. These sleeves should have a length equal to 8 to 10 times their diameter so they can bend at least 90 degrees without crimping. The liner tube rubber is carried out to the end and up over the surface of the steel flanges. A steel nipple and flange is built into the hose end so the liner material protects the steel and serves as flange gasket material. Recommended for use at dredge-to-HDPE connection.
   Advantages:
   - Easy to connect/disconnect in the water.
   - Low hydraulic head loss.
   - Very flexible joint.
   - Very resistant to pulling apart.
   - Can be rotated for longer wear life.

   Disadvantages:
   - Relative expensive.
   - Cannot be repaired or rebuilt.

6. Gheen couplers are made specifically for relatively thin walled HDPE plastic pipes as well as thin-wall steel or aluminum pipe. The male and female halves of the coupling assembly are pounded into the plain ends of the plastic pipe and fastened with stove bolts or self-drilling, self-tapping screws. The lightweight couplings are fabricated from sheet metal and usually galvanized. The connection is made by installing a large O-Ring and clamping the sections together with a hinged, over-center latch lever.

   Advantages:
   - Very easy to connect/disconnect in the water.
   - Lightweight.
   - Low hydraulic head loss.
   - Very resistant to pulling apart.
   - No pipe end preparation required.
   - Inexpensive.
   - Readily available.

   Disadvantages:
   - Subject to wear by abrasive particles.
   - Cannot be repaired or rebuilt.
   - Cannot be used on thick-walled pipe.

Contact willard@willardsays.com with questions, comment or criticism.