Book 3: Chapter 5 - Operational Guidelines

Disinfecting Water Mains

Applicable procedures for short-term disinfection of new and repaired potable water mains are presented in standards such as ANSI/AWWA C651, *Disinfecting Water Mains*. ANSI/AWWA C651 uses liquid chlorine, sodium hypochlorite, or calcium hypochlorite to chemically disinfect the main. Disinfecting solutions containing chlorine should not exceed 12% active chlorine, because greater concentration can chemically attack and degrade polyethylene.

Operational disinfection practices should limit available chlorine levels to <=5ppm for temperatures up to 75°F. At temperatures between 75°F and 90°F the active chlorine levels should be reduced further. DriscoPlex® piping systems are not recommended for potable hot water applications.

Cleaning

Pipelines operating at low flow rates (around 2 ft/sec or less) may allow solids to settle in pipe invert. Polyethylene has a smooth, non-wetting surface that resists the adherence of sedimentation deposits. If the pipeline is occasionally subject to higher flow rates, much of the sedimentation will be flushed from the system during these peak flows. If cleaning is required, sedimentation deposits can usually be flushed from the system with high-pressure water.

Water-jet cleaning is available from commercial services. It usually employs high-pressure water sprays from a nozzle that is drawn through the pipe system with a cable.

Pressure piping systems may be cleaned with the water-jet process or may be pigged. Pigging involves forcing a resilient plastic plug (soft pig) through the pipeline. Usually, hydrostatic or pneumatic pressure is applied behind the pig to move it down the pipeline. Pigging should employ a pig launcher and a pig catcher.

A pig launcher is a wye or a removable spool. In the wye, the pig is fitted into the branch, then the branch behind the pig is pressurized to move the pig into the pipeline and downstream. In the removable pipe spool, the pig is loaded into the spool, the spool is installed into the pipeline, and then the pig is forced downstream.

A pig catcher is a basket or other device at the end of the line to receive the pig when it discharges from the pipeline. **A pig may discharge from the pipeline with considerable velocity and force. A pig catcher provides a means of safe pig discharge from the pipeline.**

Soft pigs must be used with polyethylene pipe. **Scraping finger type or bucket type pigs will severely damage the pipeline, and must not be used.** Commercial pigging services are available if line pigging is required.

Frozen Pipes

Water can be frozen solid in polyethylene pipe without damaging the pipe, but an ice plug in the pipe will stop flow. *Do not apply pressure to a frozen pipeline that has an ice plug because it can move the plug down the line at significant velocity. If the plug stops suddenly at an obstruction, water hammer will result, which can burst or shatter the line.*

WARNING -- Severe water hammer shock (such as from an ice plug stopping suddenly at an obstruction) in a frozen, surface or above grade pipeline can shatter the pipeline and flying fragments can cause death, injury or property damage. Allow an ice plug to thaw before applying pressure to the line.

Squeeze-Off

Squeeze-off (or pinch-off) is a means of controlling flow in smaller diameter Performance Pipe OD controlled pipe by flattening the pipe between parallel bars. Flow control does not imply complete flow stoppage in all cases. For larger pipes, particularly at higher pressures, some seepage is likely. If the situation will not allow seepage, then it may be necessary to vent the pipe between two squeeze-offs.

Performance Pipe OD controlled Gas Pipe manufactured to ASTM D 2513 is suitable for squeeze-off; however, squeeze-off practices are not limited to gas applications. Squeeze-off is applicable to OD controlled MDPE and HDPE pressure pipe up to 16" IPS and 100 psi internal pressure. Larger sizes and higher pressures may be possible, but suitable commercial equipment is not presently available, so there is no demonstrated experience with larger sizes or higher pressures.

Squeeze-off procedures that are recommended for Performance Pipe OD controlled pipe are published in Performance Pipe Technical Note PP-801-TN *Polyethylene Pipe Squeeze-Off*. Copies may be obtained from any Performance Pipe representative or distributor.

Additional information on squeeze-off may be found in ASTM F 1041 *Standard Guide for Squeeze-off of Polyolefin Gas Pressure Pipe and Tubing,* ASTM F 1563 *Specification for Tools to Squeeze-Off Polyethylene (PE) Gas Pipe or* Tubing and ASTM F 1734 *Practice for Qualification of a Combination of Squeeze Tool, Pipe and Squeeze-Off Procedure to Avoid Long-Term Damage in Polyethylene (PE) Gas Pipe*.

Static Electricity Control

When pipe conveying a compressed gas is being flattened, the gas flow velocity through the flattened area increases. High velocity, dry gas, especially with particles present in the flow, can generate a static electric charge on pipe surfaces that can discharge to ground. Before flattening the pipe, the tool should be grounded and procedures to control static charge build-up on pipe surfaces should be employed. Grounding and static control procedures should remain in place for the entire procedure.

WARNING

Fire or Explosion – Static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Where a flammable gas or combustible dust atmosphere may be encountered and static electric charges may be present such as during squeeze-off, leak repair, purging, making a connection, etc., arc preventing safety precautions are necessary. Observe all Company (pipeline operator, utility, contractor, etc.) procedures for static electricity safety and control, including procedures for discharging static electricity and personal protection.

Routine or Emergency?

Squeeze-off procedures may be used for routine, scheduled changes to piping systems, or as an emergency procedure to control gasses or liquids escaping from a damaged pipe. For scheduled piping changes, the above procedure should be followed, and if followed, the pipe's service life is not expected to be compromised.

However, an emergency situation may require quickly flattening the pipe and controlling flow because the escaping fluid may be an immediate hazard of greater concern than damaging the pipe.

If an emergency situation requires rapid flattening, the pipe or tubing will probably be damaged.

Repairs

Repair situations may arise if DriscoPlex™ OD controlled or DriscoPlex™ 2000 SPIROLITE® pipe has been damaged. Damage may occur during shipping and handling, during installation, or after installation. Damage may include scrapes or abrasions, breaks, punctures, kinks, or emergency squeeze-off. Permanent repair usually involves removing and replacing the damaged pipe or fitting. However, temporary repairs may restore serviceability and allow time to effect permanent repairs in the future.

Damage Assessment

Damage may be assessed according to guidelines presented in the *Performance Pipe Engineering Manual, Book 3*, Chapters 1 and 4. Damaged pipe or fittings should be inspected and evaluated to determine if the damage impairs serviceability.

- **Pipe or fittings that have sustained service impairing damage should not be installed.** Post-installation damage may require that the damaged pipe or fitting be removed and replaced.
- **Scrapes or gouges cannot be repaired by filling-in with extrusion or hot air welding. The damaged section should be removed and replaced.**
- **Improperly made fusion joints cannot be repaired.** Improper butt fusions must be cut out and re-done from the beginning. Poorly joined socket or electrofusion fittings must be removed and replaced. Poorly joined saddle fittings must be removed by cutting out the main pipe section, or, if the main is undamaged, made unusable by cutting the branch outlet or chimney off the saddle fitting, and installing a new saddle fitting on a new section of main. Socket fusion fittings cannot be reused.
- **Broken or damaged fittings cannot be repaired.** They must be removed and replaced.
- **Kinked pipe must not be installed and cannot be repaired.** Kinked pipe must be removed and replaced.
- **Pipe damaged during an emergency squeeze-off cannot be repaired.** Squeeze-off damaged pipe must be removed and replaced.

Permanent Repairs

For buried large diameter Performance Pipe OD controlled or SPIROLITE® pipe that has been poorly backfilled, excessive deflection may be correctable by removing and reinstalling backfill in accordance with recommended procedures.

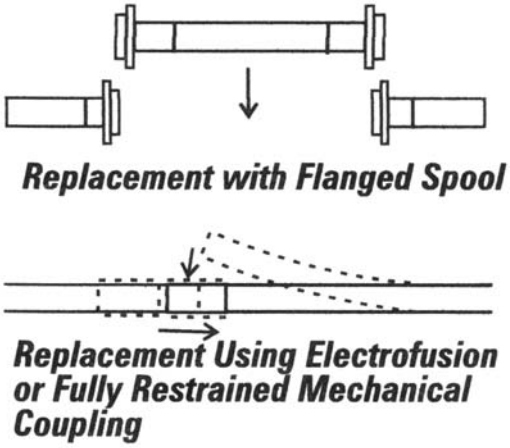
Where replacement is required, any joining method appropriate to the product and service requirements may be used. Butt and socket fusion to OD controlled pipe and butt fittings requires that one of the components move longitudinally. However, constrained installations, such as buried pipes, may not allow such movement. Permanent repairs of constrained pipes require techniques that do not require longitudinal movement. As illustrated in Figure 5-1, repairs may be effected by cutting out and replacing a section of pipe, or deflecting pipe ends to the side and installing an appropriate coupling. Typical joining methods include flanges, electrofusion, and fully restrained mechanical couplings.

To repair using a flanged spool, cut out, remove and discard the damaged pipe section. Install flanges on the two pipe ends. Measure the distance between the flange sealing surfaces, and prepare a flanged pipe spool of the same length. Install the flanged spool.

Repair using an electrofusion coupling or a fully restrained mechanical coupling is limited to pipe sizes for which such couplings are available. Mechanical or electrofusion coupling repairs are

made by deflecting one pipe end to the side for the coupling body to be slipped on. The pipe ends are then realigned, and the coupling joint fitted up. To allow lateral deflection, a length of about 10 times the pipe outside diameter is needed.

Figure 5-1 Constrained Pipe Repair



Temporary Repair

Temporary repairs may be needed to seal leaks or punctures, to restore pressure capacity, or to reinforce damaged areas until permanent repairs can be effected. Methods include but are not limited to mechanical repair couplings and welded patches.