

PROCEDURES

PIPE BENDING

9.0 PURPOSE (192.313 192.315)

Bending is an acceptable method to accomplish a change of direction during the installation of steel and plastic pipe.

9.1 SCOPE

- A. Plastic Pipe
- B. Steel Pipe

9.2 PLASTIC PIPE:

- A. Plastic pipe may not be installed with a bend radius of less than 20 times the diameter of the pipe.
- B. No fittings may be installed within the bend area.
- C. The bend area refers to the change in direction of the main other than the normal snaking of the pipe in the trench.
- D. Turns of 90 degrees or greater shall be accomplished by means of installing a manufactured elbow.

9.3 STEEL PIPE:

- A. Wrought steel elbows shall be used where bends are required to construct the pipeline on the alignment shown on the plans and when bending of the steel pipe is not practical or allowed.

Elbows may be trimmed to create the exact deflection angle. Wrought steel welding elbows and trimmed segments of these elbows may not be used for changes in direction unless the arc length measured along the crotch is at least 1 inch. Elbows shall be trimmed if necessary to taper the wall thickness to match the pipeline wall at welds.

- B. Mechanical bending of the steel pipe shall be allowed when done in compliance with the following requirements:
 - 1. A bend must not impair the serviceability of the pipe.
 - 2. Each bend must have a smooth contour and be free from buckling, cracks, or any other mechanical damage.

PROCEDURES

PIPE BENDING

3. Wrinkle bends are not permitted.
4. The longitudinal weld on the pipe must be near as possible to the neutral axis of the bend (straight up or down) unless: the bend is made with an internal bending mandrel; or the pipe is 12 inches or less in outside diameter or has a diameter to wall thickness ratio of less than 0.70.
5. Each circumferential weld of steel pipe which is located where the stress during bending causes a permanent deformation in the pipe must be non-destructively tested either before or after the bending process.
6. The bend shall not exceed the maximum bending radius for the particular pipe in use. The maximum bending radii for the pipe shall be specified by the engineer or as shown on the plans.
7. Sagging may be used to make vertical adjustments in the pipe to accommodate crossings of other structures. Minimum sag distances shall be calculated using the following formula:

$$L = 227 * (H*D)^{0.5}$$

L = the minimum length to achieve by the bend in feet,
H = the difference in elevation achieved by the bend in feet, and
D = the outside diameter of the pipe in inches.

Sags must begin and end a minimum of this distance from the structure to be crossed.