

BENDING OF PLASTIC PIPE

Whenever a change of direction is required in a pipeline, this is best accomplished using straight lengths of pipe and factory made fittings. Bending of pipe leaves residual stresses and consequently bending is not recommended as a normal practice, particularly if the line is intended to operate at or near maximum temperatures and/or pressures.

If field bending is required to meet special conditions the following techniques should be employed to give the best results.

1. To maintain the cross sectional area of the I.D. of the pipe in the area of the bend it must be supported during the bending operation. This can be done by sealing both ends of the pipe length with plumber's test plugs and introducing sufficient air pressure to prevent kinking during bending. (*Caution should be used to prevent over pressurizing. As the pipe is heated to be bent, the air will expand. A slight positive pressure is sufficient.*) Alternately, the I.D. can be supported by filling with preheated sand and plugging both ends or inserting a helically wound spring with an outside diameter several mils smaller than the pipe I.D.
2. Heat the pipe uniformly by immersing it in hot oil or water or by rotating it in front of a hot air gun or heat box. An open flame should never be used. Heating times will range from approximately one to five minutes, depending on the pipe size and type of heat source.
3. When the pipe becomes soft and pliable it should be placed in a forming jig or form and the bend should be made as quickly as possible to prevent weakening or deforming of the pipe. The minimum radius to which a bend should be made, measured from the inner edge of the curve, should be 8 pipe diameters for $\frac{3}{4}$ " pipe size and below and 6 pipe diameters for larger pipe. The initial forming bend will have to be slightly greater to allow for spring back.
4. The bend should be kept in the forming jig until the pipe cools and becomes rigid enough to be removed without deforming. It should then be immediately immersed in water to complete the cooling process. Air pressure should not be relieved or sand removed until final cooling is completed.
5. A straight section of at least two pipe diameters should be left at either side of the bend to insure a round, low stress section with which to make joints.
6. Highly crystalline thermoplastics such as PVDF should never be formed in this way because of the potential detrimental effect of the process on the molecular structure and properties of the material.

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