

## ALLOWABLE TOE-IN OF HDPE PIPE

A characteristic of extruded polyethylene pipe is a slightly smaller diameter at the cut end of the pipe. Manufacturing specifications (ASTM F714, ASTM D2513, AWWA C-906, etc.) allow the outside diameter at the cut end of the pipe to be as much as 1.5% smaller than the undistorted diameter. On the larger diameters of HDPE pipe this characteristic is especially noticeable. 54" HDPE pipe can be 53.190" at the cut end.

Toe-in is due to residual stresses that are introduced in the polyethylene while being externally cooled during the extrusion process. Cutting off the reduced diameter section can temporarily eliminate the toe-in. Due to the viscoelastic nature of polyethylene, the toe-in will reappear after a given time period. Generally speaking, this is a benign characteristic that can be ignored.

Toe-in should be considered when using mechanical couplings and electrofusion couplings. Pipe-to-pipe butt fusion will not be affected due to toe-in being present on both ends of the pipes being fused.

Mechanical couplings generally require the use of a metallic inserts on the inside diameter of HDPE pipe. The metallic insert resists the compressive forces of the external coupling and allows the mechanical coupling to provide pull out resistance. Toe-in can impede the insertion of the metallic insert. Generally, the insertion can be facilitated by merely cutting off a short length (usually less than several inches) of pipe and installing the insert immediately after making the cut.

Toe-in can generally be ignored for electrofusion couplings that are 12" nominal diameter and less. Some users of large diameter (greater than 12") electrofusion couplings have experienced problems producing a sound pressure performance joint on HDPE pipe. Electrofusion couplings depend on various factors to produce performance joints. One of the factors is close intimate contact of the joining surfaces. Toe-in can reduce the contact area and thereby may reduce the integrity of the electrofusion joint. End-users of PolyPipe<sup>®</sup> HDPE pipe are encouraged to require reference lists from all HDPE pipe appurtenance manufacturers to help insure satisfactory performance. If further information on this subject is required, contact the Technical Services Department at (800) 433-5632.

**NOTICE:**

The data contained herein is a guide to the use of PolyPipe<sup>®</sup> polyethylene pipe and fittings and is believed to be accurate and reliable. However, general data does not adequately cover specific applications, and its suitability in particular applications should be independently verified. In all cases, the user should assume that additional safety measures may be required in the safe installation or operation of the project. Due to the wide variation in service conditions, quality of installation, etc., no warranty or guarantee, expressed or implied, is given in conjunction with the use of this material.

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