



Standard Practice for Determining Allowable Tensile Load for Polyethylene (PE) Gas Pipe During Pull-In Installation¹

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1. Scope

1.1 This practice provides a means to determine an allowable tensile load (ATL) value for a polyethylene gas pipe that is to be installed underground using methods that pull the pipe into a trench (cut or plowed), bore hole, casing pipe, or the like. The ATL value takes into account pipe size, tensile yield strength, pipe temperature, and pulling load duration.

1.2 The ATL is used to set the break-away strength for a “weak-link” device, or as a limit setting for other devices that control the maximum pulling force exerted by equipment used to pull polyethylene gas pipe into an underground location, or to determine if pulling equipment can exert pulling force greater than the ATL value for the gas pipe being installed. A weak-link device is installed where the pipe pulling equipment is connected to the polyethylene gas pipe. If pulling load exceeds the ATL limit, the device de-couples the pipe from the pulling equipment. Other measures or equipment that limit the pulling force on the pipe are also used. When the ATL value is compared to the pulling force developed by the pull-in installation equipment and equipment cannot exert pulling force greater than the ATL value, a weak-link or other device for limiting the pulling force is not necessary.

1.3 This practice does not address weak-link device design or requirements, nor does it address the design or requirements for other equipment or procedures used to limit the pulling force applied to polyethylene gas pipe during pull-in installation.

1.4 This practice does not address installation methods or procedures employed for pull-in of polyethylene gas pipe.

1.5 Throughout this practice, inch-pound units shall be regarded as standard with SI units in parentheses for informational purposes.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

¹ This practice is under the jurisdiction of Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.60 on Gas.

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2. Referenced Documents

2.1 ASTM Standards:

- D 638 Test Method for Tensile Properties of Plastics²
- D 1600 Terminology for Abbreviated Terms Relating to Plastics²
- D 2513 Specification for Thermoplastic Gas Pressure Pipe, Tubing and Fittings³
- F 412 Terminology Relating to Plastic Piping Systems³

3. Terminology

3.1 Unless otherwise indicated, abbreviations are in accordance with Terminology D 1600, and terms are in accordance with Terminology F 412.

3.2 *allowable tensile load (ATL), n*—The maximum tensile load applied to a polyethylene gas pipe during pull-in installation that does not result in an unrecoverable tensile elongation of the pipe.

NOTE 1—Polyethylene gas pipe materials are visco-elastic, that is, they exhibit properties associated with both elastic materials such as rubber, and viscous materials such as wax or clay. When subjected to a tensile load that is significant, but less than the yield strength, polyethylene will elongate or stretch. If the load is then removed, polyethylene will, over time, recover all or part of the elongation, depending upon the magnitude of the load, and the length of time the load was applied. For the purposes of this practice, elongation that is not completely recovered in about 24 h after the load is released, is considered unrecoverable.

4. Significance and Use

4.1 The ATL value is used to set the break-away strength of a weak-link device, or to set other equipment used to limit pulling force during pull-in installation of polyethylene gas pipe, or to determine if pulling equipment can exert pulling force greater than the ATL value for the polyethylene gas pipe being installed.

4.2 The ATL value is determined before gas pipe installation.

5. Procedure

5.1 The following information about the polyethylene gas pipe is required: size (outside diameter), dimension ratio,

² *Annual Book of ASTM Standards*, Vol 08.01.

³ *Annual Book of ASTM Standards*, Vol 08.04.