



Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the determination of the time-to-failure of both thermoplastic and reinforced thermosetting/resin pipe under constant internal pressure.

1.2 This test method provides a method of characterizing plastics in the form of pipe under the conditions prescribed.

1.3 The values stated in inch-pound units are to be regarded as the standard.

1.4 *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.*

2. Referenced Documents

2.1 ASTM Standards:

D 1222 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings²

D 2837 Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials²

D 2992 Practice for Obtaining Hydrostatic or Pressure Design Basis for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Fittings²

D 3517 Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe²

D 3567 Practice for Determining Dimensions of “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Fittings²

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *failure*—any continuous loss of pressure with or without the transmission of the test fluid through the body of the specimen under test shall constitute failure. Failure may be by one or a combination of the following modes:

3.1.2 *ballooning*—any localized expansion of a pipe specimen while under internal pressure. This is sometimes referred to as ductile failure.

NOTE 1—Overall distention which results from creep caused by long-term stress is not considered to be a ballooning failure.

3.1.3 *free (unrestrained) end closure*—a pipe specimen end closure (cap) that seals the end of the pipe against loss of internal fluid and pressure, and is fastened to the pipe specimen.

3.1.4 *restrained end closure*—a pipe specimen end closure (cap) that seals the end of the specimen against loss of internal fluid and pressure, but is not fastened to the pipe specimen. Restrained end closures rely on tie-rod(s) through the pipe specimen or on external structure to resist internal pressure end thrust.

3.1.5 *rupture*—a break in the pipe wall with immediate loss of test fluid and continued loss at essentially no pressure. If rupture is not preceded by some yielding, this may be termed a non-ductile failure.

3.1.6 *seepage or weeping*—water or fluid passing through microscopic breaks in the pipe wall. A reduction in pressure will frequently enable the pipe to carry fluid without evidence of loss of the liquid.

4. Summary of Test Method

4.1 This test method consists of exposing specimens of pipe to a constant internal pressure while in a controlled environment. Such a controlled environment may be accomplished by, but is not limited to, immersing the specimens in a controlled temperature water or air bath. The time-to-failure is measured.

NOTE 2—Dimensional changes should be measured on specimens undergoing long-term strength tests. Measurements using circumferential tapes, strain gages, or mechanical extensometers provide useful information.

5. Significance and Use

5.1 The data obtained by this test method are useful for establishing stress versus failure time relationships in a controlled environment from which the hydrostatic design basis for plastic pipe materials can be computed. (Refer to Test Method D 2837 and Practice D 2992.)

¹ This test method is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.40 on Test Methods.

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² *Annual Book of ASTM Standards*, Vol 08.04.