



Standard Test Method for Determination of Gel Content of Crosslinked Polyethylene (PEX) Pipes and Tubing¹

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1. Scope

1.1 The gel content of pipe and tubing produced from crosslinked polyethylene plastics as described in Specification **F876** and other pipe or tubing standards is determined by extracting with solvents such as xylenes. A test method for quantitative determination of gel content is described herein. The method is applicable to PEX pipe and tubing of all densities, including those containing fillers, and provides correction for the inert fillers present in some of those compounds.

1.2 Continuous extraction (see definition in Section 3) is used in this method to test the gel content of crosslinked polyethylene specimens. Continuous extraction when used for testing gel content has the advantages of decreased the cost of testing, increased accuracy and consistency of results, and decreased test time. This is because extraction with a pure solvent is more efficient than extraction with a partially saturated solvent.

1.3 While extraction tests may be made on articles of any shape, this test method is applicable for determining the gel content of crosslinked polyethylene pipes and tubing.

1.4 This test method makes use of xylenes or alternative solvents which have lower toxicity than xylenes. The alternative solvents are also potentially beneficial from an economic and environmental viewpoint. **Xylenes are used for referee tests.**

1.5 The values stated in SI units are to be regarded as standard. The inch-pound units in brackets are for information only.

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 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. Referenced Documents

2.1 ASTM Standards:²

D883 Terminology Relating to Plastics

D1603 Test Method for Carbon Black Content in Olefin Plastics

D2765 Test Methods for Determination of Gel Content and Swell Ratio of Crosslinked Ethylene Plastics

D7567 Test Method for Determining Gel Content in Cross-linked Ethylene Plastics Using Pressurized Liquid Extraction (Withdrawn 2015)³

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

F876 Specification for Crosslinked Polyethylene (PEX) Tubing

2.2 ISO Standard:⁴

ISO 10147 Pipes and Fittings Made of Crosslinked Polyethylene (Pe-X) – Estimation of the Degree of Crosslinking by Determination of the Gel Content

3. Terminology

3.1 Terms as shown in Terminology **D883** are applicable to this test method.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *continuous extractor, n*—test apparatus for performing a continuous extraction.

3.2.1.1 *Discussion*—Soxhlet, Knofer-Bohm, and Kumagawa extractors are examples of continuous extractors. A continuous extractor has three main components which are a boiling flask or vessel for the solvent, a condenser, and a siphon cup. There are various designs for the siphon cup; the Soxhlet, Knofer-Bohm, and Kumagawa designs are the most common.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <http://www.iso.org>.