



Standard Test Method for Evaluating the Oxidative Resistance of Multilayer Polyolefin Tubing to Hot Chlorinated Water¹

This standard is issued under the fixed designation F 2330; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method describes the general requirements for evaluating the long-term, chlorinated water, oxidative resistance of multilayer tubing which includes an inner layer of a polyolefin material such as PE or PEX (for example, see Specification F 1986 or F 1281). This test method outlines the requirements of a pressurized flow-through test system, test pressure, test-fluid characteristics, failure type, and data analysis.

NOTE 1—Other known disinfecting systems (chlorine dioxide, ozone, and chloramine) are currently used for protection of potable water; however, free-chlorine is the most common system in use today. Disinfecting systems other than chlorine have not been evaluated by this method.

1.2 This test method is valid for polyolefin materials that are stabilized with hindered phenolic type anti-oxidants that shall be analyzed using the Oxidative Induction Time (OIT) method (for example, D 3895).

1.3 Guidelines and requirements for test temperatures, test hoop stresses, and other test criteria shall be established by prior testing of multilayer tubing and solid-wall PEX and PE tubing. Other related system components that typically appear in a multilayer tubing hot-and-cold water distribution system shall be evaluated with the multilayer tubing. When testing multilayer tubing and fittings as a system, it is recommended that the anticipated end-use fitting type(s) and material(s) be included in the test circuit since it is known that some fitting types and materials can affect failure times. Specimens used shall be representative of the piping product(s) and material(s) under investigation.

NOTE 2—The procedures described in this test method (with some modifications of test temperatures or stresses, or both) have been used to evaluate pipes manufactured from polybutylene (PB), polyethylene (PE), polypropylene (PP), cross-linked polyethylene (PEX), and multilayer (polymer-metal composite) pipes.

1.4 This test method is applicable to multilayer tubing and systems used for transport of potable water containing free-

chlorine for disinfecting purposes. The oxidizing potential of the test-fluid specified in this test method exceeds that typically found in potable water systems across the United States.

1.5 The values stated in cm-gram units are to be regarded as the standard. The values given in parentheses are for information purposes.

1.6 The following precautionary caveat pertains only to the test method portion, Section 12, of this specification. *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:²

D 1600 Terminology for Abbreviated Terms Relating to Plastics

D 2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

F 412 Terminology Relating to Plastic Piping Systems

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology F 412 and abbreviations shall be accordance with Terminology D 1600, unless otherwise indicated.

3.1.1 *ductile failure (Stage I), n*—failure in the tubing wall that is characterized by obvious localized deformation of the material visible with the unaided eye. Ductile failures produced with this test method shall not be used for data analysis.

3.1.2 *brittle failure (Stage II), n*—failure in the tubing wall that is characterized by little or no material deformation in the failure area and is the result of a single crack emanating from the interior of the tubing to the outside surface typically resulting in a pinhole leak. Brittle failures produced with this test method shall not be used for data analysis.

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.

Current edition approved Jan. 1, 2004. Published February 2004.

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.

