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An American National Standard

Standard Test Method for Evaluating the Oxidative Resistance of Crosslinked Polyethylene (PEX) Tubing and Systems to Hot Chlorinated Water¹

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1. Scope

1.1 This test method describes the general requirements for evaluating the long-term, chlorinated water, oxidative resistance of cross-linked polyethylene (PEX) tubing produced in accordance with Specification F 876 or PEX tubing/fitting systems in accordance with Specification F 877 used in hot-and-cold water distribution systems by exposure to hot, chlorinated water. This test method outlines the requirements of a pressurized flow-through test system, typical test pressures, 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 by far the most common system in use today. Disinfecting systems other than chlorine have not been evaluated by this method.

1.2 Guidelines and requirements for test temperatures, test hoop stresses, and other test criteria have been established by prior testing of PEX tubing produced by the three most common commercial methods of cross-linking: silane, peroxide, and electron-beam (see Note 2). Other related system components that typically appear in a PEX hot-and-cold water distribution system can be evaluated with the PEX tubing. When testing PEX 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 impact 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), multilayer (polymer-metal composite), copper, and stainless steel.

1.3 This test method is applicable to PEX 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.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information purposes.

1.5 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:

- D 1600 Terminology for Abbreviated Terms Relating to Plastics²
- D 2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings³
- E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods⁴
- F 412 Terminology Relating to Plastic Piping Systems³
- F 876 Specification for Cross-linked Polyethylene (PEX) Tubing³
- F 877 Specification for Cross-linked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems³
- F 948 Test Method for Time-to-Failure of Plastic Piping Systems and Components Under Constant Internal Pressure With Flow³

2.2 ISO Standards:

- ISO 9080 Thermoplastic Pipe for Transport of Fluids—Methods of Extrapolation of Hydrostatic Stress Rupture Data to Determine the Long Term Strength of Thermoplastic Pipe⁵
- ISO 13760 Plastic Pipe for the Conveyance of Fluids Under

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 08.01.

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

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.