INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS

IAPMO GUIDE CRITERIA

FOR

POLYETHYLENE OF RAISED TEMPERATURE MULTILAYER PIPING SYSTEMS FOR HOT- AND COLD- WATER

IAPMO IGC 265-2009

1. PURPOSE

1.1 The purpose of this standard is to establish a generally acceptable standard for Polyethylene of Raised Temperature (PE-RT) Multilayer Piping Systems for Hot and Cold Water, made up by welded pipes and fittings with unrestricted pipe flow. Its purpose is to also serve as a guide for producers, distributors, architects, engineers, contractors, installers, inspectors and users; to promote understanding regarding materials and manufacture; and to provide for identifying PE-RT Multilayer Piping Systems for Hot and Cold Water.

1.2 The provisions of this standard are not intended to prevent the use of any alternate material or method of construction, provided any such alternate meets the intent and requirements of this document and changes are amended to this standard.

2. SCOPE

2.1 This standard covers minimum standards for materials in the construction of PE-RT pipe and PE-RT fittings containing an inductive welded connection which may also be combined with other end connections such as threaded, and/or application types and to prescribe minimum test requirements for the performance, together with methods of marking and identification. The PE-RT Multilayer pipe is produced using PE-RT pipe as a core, an oxygen barrier, and an extruded outside layer of PE-RT.

2.2 The PE-RT Multilayer Piping Systems for Hot and Cold Water, covered by this standard, is intended for use in all installations when installed in compliance with the code and the manufacturer's installation instructions for indoor and outdoor use.

3. REFERENCE STANDARDS

3.1 All standards referenced herein shall be the current edition of that standard.

ASME B120.1	Pipe Threads, General Purpose, Inch
ASTM D 3350	Polyethylene Plastics Pipe and Fittings Materials

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ASTM D 2837	Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Product
ASTM D 3139	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM F 876	Crosslinked Polyethylene (PEX) Tubing
ASTM F 1281	Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe
ASTM F 2623	Polyethylene of Raised Temperature (PE-RT)
NSF/ANSI 61	Drinking Water System Components – Health Effects

4. GENERAL REQUIREMENTS

4.1 **Polyethylene of Raised Temperature Piping System.** The PE-RT multilayer pipe and fittings shall comply with the requirements in ASTM F 2623 corresponding to the nominal outside diameter(s) of the pipe(s). The PE-RT material from which the fittings are made shall be identical to the PE-RT pipe. The fitness for purpose of the fitting and pipe dimensions shall be classified for the manufacturer's rated pressure at a temperature of 180°F in accordance to ASTM D 2837.

4.1.1 The PE-RT material covered under this standard shall meet requirements shall be classified in accordance with ASTM D 3350 and as shown in Table 1 of ASTM F 2623. The material shall have a pressure rating of 160 psi at 73.4°F and 100 psi at 180°F.

4.1.2 For weatherability, the PE-RT material shall have a letter designation of C, D, or E at the end of the cell classification as referenced in Section 6.2 of ASTM D 3350 if the piping system is to be installed for continuous outdoor use with prolonged UV exposure.

4.2 **Welded Connections.** The composition of the PE-RT induction welding element as part of the fitting connection shall comply with NSF/ANSI 61. The nominal diameter(s) and wall thickness(s) of the fitting shall correspond to, and be designated by, the nominal outside diameter(s) and wall thickness(s) of the pipe(s).

4.3 **Toxicity.** PE-RT pipe and fittings for use in potable water systems shall comply with the in requirements NSF/ANSI 61.

4.4 **Threaded or Mechanical Connection.** An adapter fitting for joining existing plumbing products shall be connected by use of general purpose threads complying with ASME B120.1 or per manufacturer's specifications and shall have a minimum five thread engagement. The NPT connector rotates within the adaptor fitting which eliminates torsion during installation.

4.4.1 Seals and gaskets shall be of such design and quality to assure a leak-proof joint. Flexible elastomeric seals or gasketed joints shall comply with ASTM D 3139 using a rated minimum pressure of 150 psi.

4.5 **Valves.** Valves which are to be used with this piping system, shall comply with the Valve Closure Test, Handle Security Test, Life Cycle Test and Hydrostatic Burst Test from IAPMO IGC 157 and the material requirements within this standard.

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5. TESTING REQUIREMENTS

5.1 The system shall be composed of pipes and fittings, coupled together in accordance with the specifications indicated by the manufacturer. The joints and piping system shall be tested in accordance with Table 1. The tests in Table 1 are applicable for each of the different types of connections covered by this standard. The fittings shall be connected to the pipe with which they are intended to be used.

TABLE 1			
TEST	**4.2 - WELDED CONNECTION**	**4.4 - THREADED CONNECTION**	**TEST REQUIREMENTS**
Internal Pressure Test	Required	Required	5.2
Bending Test	Required	Required	5.3
Thermal Cycling Test	Required	Required	5.4
Vacuum Test	Required	Required	5.5
Hydraulic Shock Test	Required	Required	5.6

5.2 **Internal Pressure Test.** A specimen piping shall be prepared with pipe and fittings in accordance with the manufacturer's installation instructions. Six (6) test specimens shall be filled with pressurized water and tested at 73.4 ± 4°F (3 samples) and 180 ± 4°F (3 Samples) ambient by means of immersion in water or air. The test specimen shall be 12" or more between end fitting connections. Maintain the specimens at the indicated pressures in Table 2, for the appropriate temperature for a period of 1000 hours. Any evidence of leakage at the fittings or separation of fittings from pipe constitutes failure of the test.

TABLE 2		
Nominal Pipe Size	**Pressure Required for Testing psig**	
inches	**73.4°F**	**180°F**
1/8	600	300
1/4	515	260
5/16	455	230
3/8	425	215
1/2 and Larger	325	165

5.3 **Bending Test.** This test is only applicable to pipe of nominal diameter greater than or equal to 1.25". The leak tightness of the joint is checked for an assembly comprising of a pipe onto at least one end of which is mounted a fixed fitting with a welded connection and through which a necessary force is applied for bending the pipe throughout its free length. The test piece and the joints are subjected under a bend radius at a temperature of 73.4° ± 4° F and a hydrostatic pressure of 325 ± 10 psi for 1 hour until the joint fails by leakage or the pipe/fitting bursts. The bend has an average radius calculated as a function of the nominal diameter of the pipe and its nominal pressure (Table 3). Three test pieces are required.

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