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An American National Standard

Standard Specification for Factory Assembled Anodeless Risers and Transition Fittings in Polyethylene (PE) Fuel Gas Distribution Systems[1]

This standard is issued under the fixed designation F 1973; 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 specification covers requirements and test methods for the qualification of factory assembled anodeless risers and transition fittings, in sizes through NPS 8, for use in polyethylene (PE) gas distribution systems.

1.2 The test methods described are not intended to be routine quality control tests.

1.3 The values given in parentheses are for informational purposes only.

1.4 Throughout this specification footnotes are provided for informational purposes and shall not be considered as requirements of this specification.

2. Referenced Documents

2.1 *ASTM Standards:*

A 53 Specification for Welded and Seamless Steel Pipe[2]

A 513 Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing[2]

D 638 Test Method for Tensile Property of Plastics[3]

D 1600 Abbreviations of Terms Relating to Plastics[3]

D 2513 Specification for Thermoplastic Gas Pressure Pipe, Tubing and Fittings[4]

E 515 Test Method for Leaks Using Bubble Emission Techniques[5]

F 412 Definitions of Terms Relating to Plastic Piping Systems[4]

F 1588 Test Method for Constant Tensile Load Joint Test (CTLJT)[4]

2.2 *US Government Document:*

United States Code of Federal Regulations Title 49 Part 192[6]

2.3 *ANSI Standards:*

ANSI B 31.8 Gas Transmission and Distribution Piping Systems[7]

ANSI/ASME B1.20.1 Pipe Threads, General Purpose (inch)[7]

ANSI B 16.5 Steel Pipe Flanges, Flanged Fittings[7]

2.4 *ASME Standard:*

ASME Boiler and Pressure Vessel Code[8]

2.5 *API Standard:*

API 1104 Standard for Welding Pipelines and Related Facilities[9]

2.6 *UL Standard:*

UL 360 Flexible Metal Hose[10]

2.7 *PPI Standard:*

PPI TR-4 Hydrostatic Design Bases and Maximum Recommended Design Stresses for Thermoplastic Piping Materials[11]

3. Terminology

3.1 The gas industry terminology used in this specification is in accordance with ANSI B31.8 or the United States CFR 49 Part 192, unless otherwise indicated.

3.1.1 The term "pipe" used herein refers to both "pipe" and "tubing" unless specifically stated otherwise.

3.1.2 The term "gas" used herein refers to any fuel gas unless specifically stated otherwise.

3.2 *Definitions*—Definitions are in accordance with Definitions F 412 unless otherwise specified. Abbreviations are in accordance with Abbreviations D 1600 unless otherwise specified.

3.2.1 *anodeless flex riser casing*—a flexible, plastic coated, metallic, non-gas carrying, protective outer sleeve portion of an anodeless riser which is sometimes selected as an alternate to rigid riser casings.

3.2.2 *anodeless riser*—a type of transition fitting which is designed to transport gas from an underground polyethylene service line to above-ground steel piping. In an anodeless riser polyethylene pipe is always the gas carrier, at least, in the below ground section.

[1] This specification is under the jurisdiction of ASTM Committee F-17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.60 on Gas.
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[2] *Annual Book of ASTM Standards*, Vol 01.01.

[3] *Annual Book of ASTM Standards*, Vol 08.01.

[4] *Annual Book of ASTM Standards*, Vol 08.04.

[5] *Annual Book of ASTM Standards*, Vol 03.03.

[6] Available from Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

[7] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

[8] Available from ASME, Three Park Ave., Codes & Standards, New York, NY 10016.

[9] Available from American Petroleum Institute, 1220 L St., NW, Washington, DC 20005.

[10] Available from Underwriters Laboratories, 333 Pfingsten Rd., Northbrook, IL 60062.

[11] Available from Plastics Pipe Institute, Inc., 1825 Connecticut Ave., NW, Suite 680, Washington, DC 20009.

3.2.3 *anodeless riser, flex design*[12]—an anodeless riser where the rise leg is a transition fitting which is fabricated to an anodeless flex riser casing which is field bent to form the base leg.

3.2.4 *anodeless riser nipple*—the metallic, aboveground, gas carrying pipe or fitting portion of an anodeless riser.

3.2.5 *anodeless riser rigid riser casing*—the metallic, non-gas carrying protective outer sleeve portion of an anodeless riser.

3.2.6 *anodeless riser, rigid, straight and prebent*—an anodeless riser which is produced straight or factory prebent, usually 90°, thus defining rise leg and base leg dimensions.

3.2.7 *base leg*—the steel horizontal portion of an anodeless riser measured from the centerline of vertical.

3.2.8 *Category 1*—a transition joint which provides for pressure tightness and resistance to end loads sufficient to cause no less than 25 % elongation of the PE piping as described in this standard.

3.2.9 *Category 3*—a transition joint which provides for pressure tightness and resistance to end loads greater than the maximum thermal stress that would be produced by a temperature change of 100°F (55°C).

3.2.10 *grade level marking*—a marking, tape or label applied to the riser to identify the point at which the transition from PE gas carrier to metallic gas carrier occurs. This marking assists the installer in determining the grade level of the installation.

3.2.11 *insert stiffener*—a rigid, non-split, solid wall tube which is inserted into the polyethylene piping to support compression loads in the area of the transition joint.

3.2.12 *joint*—the location at which two or more pieces of pipe or a pipe and a fitting are connected.

3.2.13 *MAOP*—the maximum allowable operating pressure of the fuel gas piping system, in psig, as determined in accordance with US DOT CFR, Title 49, Part 192.121 and as represented in the following:

$$\text{MAOP} = P = 2 \times S/(R-1) \times f_D \quad (1)$$

where:

S = The PE materials' HDB as published in the Plastics Pipe Institute PPI TR 4 publication,

R = The pipe's dimension ratio determined by dividing the pipe's specified nominal outside diameter by the pipes specified nominal wall thickness, and

f_D = the design (derating) factor for thermoplastic fuel gas piping as set by the authority having jurisdiction. In the United States the design factor is cited in CFR Title 49 Part 192.121.

3.2.14 *rise leg*—the vertical portion of an anodeless riser measured from the centerline of horizontal.

3.2.15 *service line*—a fuel gas distribution line which transports gas from a common source of supply (gas main) to the customer piping.

3.2.16 *spigot*—a rigid profiled solid wall metallic tube, inserted into the PE piping serving as the stiffener in the area of transition.

3.2.17 *transition fitting*—a fitting that makes a transition joint between two different types of piping materials. As used in this Standard, it is the transition between the PE and the metallic pipes.

3.2.18 *transition joint*—the joint at which two different piping materials (the PE and metal piping) are connected.

4. Materials and Manufacture [13]

4.1 *General*:

4.1.1 All materials of the fitting shall meet the performance requirements of this specification. Specific materials referenced in this section are common materials used in these types of products. Alternate materials proven to provide equal or better performance are acceptable.

4.2 *Casings and Nipples*:

4.2.1 Rigid riser casings shall be constructed of Specification A 53, Specification A 513 or equivalent metallic materials with a minimum nominal 0.065 in. (1.65 mm) wall thickness within the allowable tolerance ranges of the applicable metallic piping specification.

4.2.2 Flex riser casings shall be constructed of plastic coated flexible metallic tubing providing a crush strength of not less than 1000 lbs. When tested in accordance with UL 360, section 9.1. The flex shall also be capable of withstanding a tensile pull of 300 lbs force without breaking or unwinding.

4.2.3 Riser nipples shall be constructed of Specification A 53, or equivalent, steel pipe with a minimum of schedule 40 wall thickness.

4.2.4 All burrs on metal components, which could damage the PE piping, shall be removed prior to insertion of the PE piping so as to prevent any damage to the PE gas piping. Alternately, all such burrs shall be suitably covered with a protective device such as an ID plastic sleeve, to preclude any damage to the PE gas piping.

4.3 *Polyethylene Pipe*:

4.3.1 Polyethylene pipe shall comply with the requirements of Specification D 2513.

4.4 *Elastomers*:

4.4.1 Gas sealing elastomeric components shall be of materials compatible with all components of the fitting and the materials of the pipes being joined, and shall be resistant to fuel gases.

4.5 Specifications outlining the physical and chemical properties of all fitting materials shall be available from the fitting manufacturer upon request.

5. Dimensions, Mass, and Permissible Variations

5.1 Because of the varying designs, the actual spread of dimensions is quite different from manufacturer to manufacturer. A table of dimensions and tolerances encompassing these differences would be meaningless and without value and, therefore, are omitted from this specification.

[12] Anodeless flex risers usually require a riser bracket attached to a rigid supporting member to avoid meter set loads from being transmitted to the polyethylene service line.

[13] Materials used in components of the fitting that will be in long term contact with gas should be demonstrated by testing or history of successful usage not to be adversely affected.