Designation: F905 – 04 (Reapproved 2022)

An American National Standard

Standard Practice for Qualification of Polyethylene Saddle-Fused Joints[1]

This standard is issued under the fixed designation F905; 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 practice describes test criteria suitable for qualification of polyethylene saddle-fused joints. These tests may be conducted by suppliers or users to qualify saddle-fused joints in accordance with the requirements found in the Department of Transportation (DOT) Code of Federal Regulations (CFR) Title 49, Part 192.283. At the discretion of the end user, these tests may also be conducted by users to qualify personnel making saddle fusion joints per DOT CFR 49, Part 192.285.

1.2 The impact resistance test described is a nonstandard test. This is not the only test that may be used to qualify saddle fusion joints per DOT regulations.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are mathematical conversion to SI units that are provided for information only and are not considered standard.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1598 Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure

D2513 Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings

D2683 Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing

D3261 Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

2.2 *DOT Document:*[3]

49 CFR, Part 192, Minimum Federal Safety Standards for Gaslines

2.3 *PPI Technical Report:*[4]

TR-41/2002 Generic Saddle Fusion Joining Procedure for Polyethylene Gas Piping

3. Significance and Use

3.1 The tests described in this practice are intended to present a method of satisfying the requirements of DOT CFR Title 49, Parts 192.283 and 192.285.

3.2 The sustained pressure test is intended to meet the burst test requirements of Part 192.283.

3.3 The impact resistance test is intended to meet the force requirements of Part 192.283 as follows:

3.3.1 ". . . For procedures intended for lateral pipe connections, subject a specimen joint made from pipe sections joined at right angles according to the (joining) procedure to a force on the lateral pipe until failure occurs in the specimen. If failure initiates outside the joint area, the (joining) procedure qualifies for use."

4. Materials

4.1 Pipe and fittings shall meet the requirements of Specification D2513.

4.2 The outlet portion of a saddle fitting shall conform to Specification D2683 for socket-fusion outlets or Specification D3261 for butt-fusion outlets.

4.3 The radius of the saddle portion of the fitting shall fit the pipe size to which it is intended to be joined. The surface contact area of the saddle portion of the fitting and the

[1] This practice is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.60 on Gas.

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[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] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

[4] Available from Plastics Pipe Institute (PPI), 105 Decker Court, Suite 825, Irving, TX 75062, http://www.plasticpipe.org.

thickness of saddle portion shall be sufficient to meet the qualification requirements of this practice.

4.4 Qualification tests shall be conducted on all saddle fittings with different base areas. Only the largest outlet diameter shall be tested per fitting type if base areas are the same.

5. Procedure

5.1 *General:*

5.1.1 Conduct each qualification test with the polyethylene saddle fitting fused to a polyethylene pipe that has a maximum pressure rating equal to or greater than that for which the gas distribution system is designed.

NOTE 1—It is recommended that the Generic Saddle Fusion Joining Procedure, developed by PPI (TR-41/2002), be used for selected polyethylene gas piping products. While other joining procedures can also be used, the use of this PPI procedure is intended to help DOT expedite the qualification of gas pipeline operators and add some uniformity to the industry.

5.1.2 Allow the saddle-fused joint to cool to room temperature prior to testing.

5.1.3 For each qualification test, tap the polyethylene pipe with the largest size hole used in the gas distribution system for that fitting.

5.1.4 Quantity of specimens to be tested in each test described in this practice has been omitted due to the varied goals of users of these tests. When these tests are utilized for qualification of a joining procedure (Part 192.283), a minimum of six specimens should be evaluated with each test type used. For qualification of a joiner (Part 192.285), a minimum of one specimen should be evaluated for each test type used. For qualification of the joint design by the manufacturer, as many tests as are needed may be run, but not less than six of each test type.

5.2 *Sustained Pressure Test:*

5.2.1 The minimum length of unreinforced pipe on both sides of any saddle fitting shall be equal to three times the diameter of the pipe, but in no case less than 12 in. (305 mm). Test multiple saddle fittings, if desired, on the same pipe specimen as long as they are separated by at least three pipe diameters. Make all saddle-fused joints with the pipe at the maximum allowable operating pressure of the gas distribution system. If tubing intended to be fused to the outlet of the saddle fitting has a higher SDR than the pipe, cap the saddle fitting outlet and do not use the tubing.

5.2.2 Test specimens for 1000 h using the equipment, procedures, and failure definition as specified in Test Method D1598 at 73 °F (23 °C). Hold systems having a hydrostatic design basis of 1250 psi (8.6 MPa) at a hoop stress of 1320 psi (9.1 MPa) based on the actual pipe dimensions. Hold systems having a hydrostatic design basis of 1600 psi (11.0 MPa) at a hoop stress of 1600 psi (11.0 MPa) based on the actual pipe dimensions.

5.3 *Impact Resistance Test:*

5.3.1 Center and fuse the saddle fitting on a piece of unreinforced pipe that has a minimum length on both sides of any saddle fitting equal to three times the diameter of the pipe, but in no case less than 12 in. (305 mm).

5.3.1.1 Firmly secure the pipe so that movement does not occur during impact. Suggested methods of securing the pipe are shown in Fig. 1. Other methods for securing the pipe may also be used.

5.3.2 Drop a weight in a vertical free-fall from a height of at least 10 in. (250 mm). Position the weight so that it strikes the stack of the saddle fitting 2 in. (50 mm) from the pipe. For large diameter saddle fittings, that is, 3-in. (76-mm) outlet or greater, socket or butt fuse a nipple (whose length is five times the outside diameter) to the outlet and position the weight so that it strikes the center of the nipple. Adjust the drop height or weight, or both, until failure occurs in the specimen by either tearing out the pipe wall, tearing the fitting, or bending the nipple at least 45° from the horizontal axis. Conduct impact evaluations on large diameter saddle fittings in two ways: (*1*) with the pipe parallel (axial) to the vertical path of the falling

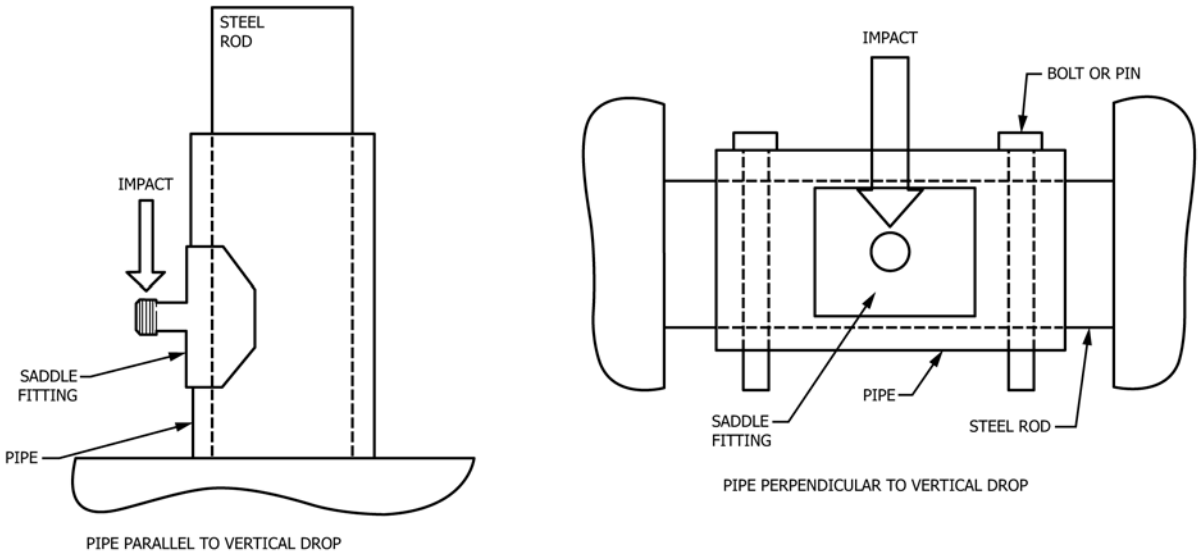

FIG. 1 Suggested Methods of Securing Pipe Assembly