



Designation: **F3371—19 F3371 – 22**

An American National Standard

Standard Specification for Polyolefin Pipe and Fittings for Drainage, Waste, and Vent Applications¹

This standard is issued under the fixed designation F3371; 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—Scope*

1.1 This specification covers requirements for non-pressure polyolefin pipe and fittings for drainage, waste, and vent applications.

NOTE 1—This specification does not include requirements for pipe and fittings intended to be used to vent combustion gases.

1.2 Pipe is produced in Schedule 40 and 80 IPS sizes, in metric sizes, and in DR IPS sizes for two polyolefins; polyethylene (PE) and polypropylene (PP).

1.3 The interchangeability of pipe and fittings made by different manufacturers is not addressed in this specification.

1.4 Pipe and fittings are joined by the heat fusion method (Practice **D2657** for PP butt and saddle fusion, Practice **F2620** for PE butt, saddle and socket fusion and Practice **F1290** for polyolefin electrofusion) or by using mechanical or gasketed joints recommended by the pipe and fitting manufacturers.

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

1.6 The text of this specification references notes, footnotes, and appendixes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the specification.

1.7 The following safety hazards caveat pertains only to the test methods portion, Section 8, 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *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

¹ This test method is under the jurisdiction of ASTM Committee **F17** on Plastic Piping Systems and is the direct responsibility of Subcommittee **F17.63** on DWV. Current edition approved April 1, 2019. Published April 1, 2022. Originally published in 1919. Last previous edition approved in 2019 as F3371–19. DOI: 10.1520/F3371-19.10.1520/F3371-22

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.

*A Summary of Changes section appears at the end of this standard

[D570 Test Method for Water Absorption of Plastics](#)
[D618 Practice for Conditioning Plastics for Testing](#)
[D1600 Terminology for Abbreviated Terms Relating to Plastics](#)
[D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings](#)
[D2321 Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications](#)
[D2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading](#)
[D2444 Practice for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup \(Falling Weight\)](#)
[D2657 Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings](#)
[D3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals](#)
[D3311 Specification for Drain, Waste, and Vent \(DWV\) Plastic Fittings Patterns](#)
[D3350 Specification for Polyethylene Plastics Pipe and Fittings Materials](#)
[D4101 Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials](#)
[F412 Terminology Relating to Plastic Piping Systems](#)
[F477 Specification for Elastomeric Seals \(Gaskets\) for Joining Plastic Pipe](#)
[F585 Guide for Insertion of Flexible Polyethylene Pipe Into Existing Sewers](#)
[F913 Specification for Thermoplastic Elastomeric Seals \(Gaskets\) for Joining Plastic Pipe](#)
[F1290 Practice for Electrofusion Joining Polyolefin Pipe and Fittings](#)
[F1498 Specification for Taper Pipe Threads 60° for Thermoplastic Pipe and Fittings](#)
[F2620 Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings](#)

2.2 *Federal Standard*.³

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)

2.3 *Military Standard*.³

MIL-STD-129 Marking for Shipment and Storage

2.4 *ISO Standard*.⁴

ISO 265-1 Pipes and Fittings of Plastics Materials – Fittings for Domestic and Industrial Waste Pipes – Basic Dimensions: Metric Series – Part 1: Unplasticized Poly (Vinyl Chloride) (PVC-U)

3. Terminology

3.1 Definitions:

3.1.1 Definitions used in this specification are in accordance with the definitions given in Terminology [F412](#), and abbreviations are in accordance with Terminology [D1600](#), unless otherwise indicated.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *fire retardant*—material that exhibit reduced surface burning characteristics and resist propagation of fire.

3.2.2 *toe-in, n*—a small reduction of the outside diameter at the cut end of a length of thermoplastic pipe.

4. Classification

4.1 *General*—This specification covers polyolefin pipe made from polyethylene or polypropylene in Schedule 40 and 80 IPS sizes, metric sizes, and DR IPS sizes.

4.2 This specification also includes molded fittings and in larger sizes (~~8, 10,~~ 8 in., 10 in., 12 in.) fabricated fittings.

4.3 The requirements of this specification are intended to provide pipe and fittings suitable for the drainage and venting of sewage and certain other liquid wastes.

NOTE 2—Industrial waste disposal lines should be installed only with the specific approval of the cognizant building code authority since chemicals not commonly found in drains and sewers and temperatures in excess of 180 °F (82 °C) may be encountered.

³ Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

⁴ Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <http://www.iso.org>.

5. Materials and Manufacture

5.1 Polyethylene (PE) virgin material for pipe or fittings shall be from a single compound manufacturer and shall be made from PE material that meets or exceeds the cell-classification requirements of 112110, 213330, or 324430 as defined in Specification **D3350**.

5.2 Polypropylene (PP) virgin material for pipe or fittings shall meet the requirements for polypropylene Group 01, 02, or 03, as defined in Specification **D4101**.

5.3 The polyolefin material shall contain suitable stabilizers and antioxidants and may contain pigments and fillers not detrimental to pipe and fittings provided the pipe and fittings produced meet the requirements of this specification.

5.3.1 Polyolefin material can be produced in both regular and flame-retardant compounds for pipe and fittings.

5.4 *Rework Material*—Clean rework material generated from the manufacturer’s own pipe or fitting products may be used by the same manufacturer, using the same type and grade resin, provided that the pipe or fittings produced meet the requirements of this specification.

5.5 *Gaskets*—The elastomeric seal (gasket) shall comply with the requirements of Specification **F477** or **F913** at the time the fittings are manufactured.

5.6 *Lubricant*—The lubricant used for field assembly shall be the type recommended by the manufacturer of the gasketed joint.

6. Requirements

6.1 *General*—The pipe and fittings shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, or other injurious defects. The pipe shall be as uniform as commercially practicable in color, opacity, density, and other physical properties.

6.1.1 The requirements in this section are intended only for use as quality control tests, not as simulated service tests.

6.2 *Dimensions and Tolerances—Pipe:*

6.2.1 Standard dimensions and tolerances shall meet the requirements as shown in **Table 1**, **Table 2**, and **Table 3** and when measured in accordance with Test Method **D2122**. The tolerance for out-of-roundness shall apply only to pipe prior to shipment.

6.2.2 Metric dimensions and tolerances shall meet the requirements as shown in **Table 4** and **Table 5** and when measured in accordance with Test Method **D2122**. The tolerance for out-of-roundness shall apply only to pipe prior to shipment.

**TABLE 1 Outside Diameters and Tolerances for Polyolefin Pipe
in. (mm)**

| Nominal Pipe | Size Average Outside | Diameter Tolerance | Out-of- Roundness (maximum minus minimum) |
|-----------------|-------------------------|-----------------------|--|
| 1¼ | 1.660 (42.16) | ±0.005 (±0.13) | 0.050 (1.27) |
| 1½ ^A | 1.750 (44.45) | ±0.010 (±0.25) | 0.060 (1.52) |
| 1½ | 1.900 (48.26) | ±0.006 (±0.15) | 0.060 (1.52) |
| 2 | 2.375 (60.32) | ±0.006 (±0.15) | 0.070 (1.78) |
| 3 | 3.500 (88.90) | ±0.008 (±0.20) | 0.080 (2.03) |
| 4 | 4.500 (114.30) | ±0.009 (±0.23) | 0.100 (2.54) |
| 6 | 6.625 (168.28) | ±0.011 (±0.28) | 0.100 (2.54) |
| 8 | 8.625 (219.08) | ±0.015 (±0.38) | 0.150 (3.81) |
| 10 | 10.750 (273.05) | ±0.015 (±0.38) | 0.150 (3.81) |
| 12 | 12.750 (323.85) | ±0.015 (±0.38) | 0.150 (3.81) |

^ANot an IPS size. Pipe shall be used with compatible fittings designed for this outside diameter. The wall thickness is the same as 1½ in. IPS Schedule 40 shown in **Table 2**.

TABLE 2 Wall Thickness and Tolerances for Polyolefin Pipe Schedules 40 and 80, in. (mm)

NOTE 1—For fittings, the wall thickness is a minimum value, except that a 10 % variation resulting from core shift is allowable. In such a case, the average of the two opposite wall thicknesses shall equal or exceed the value shown in the Schedule 40 table.

| Nominal Pipe Size | Schedule 40 | | Schedule 80 | |
|-------------------|---------------|----------------|---------------|----------------|
| | Minimum | Tolerance | Minimum | Tolerance |
| 1 ¼ | 0.140 (3.56) | +0.020 (+0.51) | 0.191 (4.85) | +0.023 (+0.58) |
| 1½ | 0.145 (3.68) | +0.020 (+0.51) | 0.200 (5.08) | +0.024 (+0.61) |
| 2 | 0.154 (3.91) | +0.020 (+0.51) | 0.218 (5.54) | +0.026 (+0.66) |
| 3 | 0.216 (5.49) | +0.026 (+0.66) | 0.300 (7.62) | +0.036 (+0.91) |
| 4 | 0.237 (6.02) | +0.028 (+0.71) | 0.337 (8.56) | +0.040 (+1.02) |
| 6 | 0.280 (7.11) | +0.034 (+0.86) | 0.432 (10.97) | +0.052 (+1.32) |
| 8 | 0.322 (8.18) | +0.039 (+0.99) | 0.500 (12.70) | +0.060 (+1.52) |
| 10 | 0.365 (9.27) | +0.044 (+1.12) | 0.593 (15.06) | +0.071 (+1.80) |
| 12 | 0.406 (10.31) | +0.049 (+1.24) | 0.687 (17.45) | +0.082 (+2.08) |

TABLE 3 Wall Thickness and Tolerances for Polyolefin Pipe SDR, in. (mm)

NOTE 1—For fittings, the wall thickness is a minimum value, except that a 10 % variation resulting from core shift is allowable. In such a case, the average of the two opposite wall thicknesses shall equal or exceed the value shown in the Table 3.

| Nominal Pipe Size | SDR 26 | | SDR 17 | |
|-------------------|---------------|----------------|---------------|----------------|
| | Minimum | Tolerance | Minimum | Tolerance |
| 1 ¼ | 0.091 (2.32) | +0.020 (+0.51) | 0.140 (2.32) | +0.017 (+0.43) |
| 1½ | 0.091 (2.32) | +0.020 (+0.51) | 0.140 (2.32) | +0.017 (+0.43) |
| 2 | 0.091 (2.32) | +0.020 (+0.51) | 0.140 (2.32) | +0.017 (+0.43) |
| 3 | 0.135 (3.42) | +0.020 (+0.51) | 0.206 (3.43) | +0.025 (+0.63) |
| 4 | 0.173 (4.40) | +0.021 (+0.53) | 0.265 (4.40) | +0.032 (+0.81) |
| 6 | 0.255 (6.47) | +0.031 (+0.78) | 0.390 (6.47) | +0.047 (+1.19) |
| 8 | 0.332 (8.43) | +0.040 (+1.01) | 0.507 (8.43) | +0.061 (+1.55) |
| 10 | 0.413 (10.50) | +0.050 (+1.26) | 0.632 (10.50) | +0.076 (+1.93) |
| 12 | 0.490 (12.46) | +0.059 (+1.50) | 0.750 (12.46) | +0.090 (+2.29) |

TABLE 4 Outside Diameters and Tolerances for Polyolefin Pipe Metric Sizes OD

| Nominal Pipe Size | Minimum Average OD, in. (mm) | Maximum Average OD, in. (mm) | Maximum Out-of-Roundness, in. (mm) |
|-------------------|------------------------------|------------------------------|------------------------------------|
| 32 | 1.260 (32.0) | 1.272 (32.3) | 0.020 (0.5) |
| 40 | 1.575 (40.0) | 1.591 (40.4) | 0.020 (0.5) |
| 50 | 1.969 (50.0) | 1.988 (50.5) | 0.024 (0.6) |
| 75 | 2.953 (75.0) | 2.980 (75.7) | 0.039 (1.0) |
| 90 | 3.543 (90.0) | 3.575 (90.8) | 0.039 (1.0) |
| 110 | 4.331 (110.0) | 4.370 (111.0) | 0.039 (1.0) |
| 125 | 4.921 (125.0) | 4.937 (125.4) | ... (...) |
| 160 | 6.299 (160.0) | 6.358 (161.5) | ... (...) |
| 200 | 7.874 (200.0) | 7.953 (202.0) | ... (...) |
| 250 | 9.842 (250.0) | 9.941 (252.5) | ... (...) |
| 315 | 12.401 (315.0) | 12.528 (318.2) | ... (...) |

6.2.3 *Toe-In*—The outside diameter when measured in accordance with Test Method **D2122** shall meet the requirements of **Table 1** or **Table 4** when measured at any point within 1.5 pipe diameters or 11.8 in. (300 mm), whichever is less, to the cut end of the pipe length.

6.3 Dimensions and Tolerances—Fittings:

6.3.1 The minimum wall thickness of the body of all fittings shall not be less than the corresponding pipe size and shall be measured in accordance with Test Method **D2122**.

6.3.2 Spigot ends of fittings shall conform to the diameter and out-of-roundness requirements for pipe.

6.3.3 Socket ends of fittings shall conform to the dimensional requirements for size and tolerances as provided on request by the manufacturer.

TABLE 5 Wall Thickness and Tolerances for Polyolefin Pipe Metric Sizes SDR, in. (mm)

NOTE 1—For fittings, the wall thickness is a minimum value, except that a 10 % variation resulting from core shift is allowable. In such a case, the average of the two opposite wall thicknesses shall equal or exceed the value shown in the Table 5.

| Nominal Pipe Size | SDR 26 | | SDR 21 | | SDR 17.6 | |
|-------------------|---------------|----------------|---------------|----------------|---------------|----------------|
| | Minimum | Tolerance | Minimum | Tolerance | Minimum | Tolerance |
| 32 | ... (...) | ... (...) | 0.070 (1.80) | +0.012 (+0.30) | 0.070 (1.80) | +0.012 (+0.30) |
| 40 | 0.070 (1.80) | +0.012 (+0.30) | 0.079 (2.00) | +0.012 (+0.30) | 0.094 (2.30) | +0.016 (+0.40) |
| 50 | 0.079 (2.00) | +0.012 (+0.30) | 0.094 (2.40) | +0.016 (+0.40) | 0.114 (2.90) | +0.016 (+0.40) |
| 75 | 0.114 (2.90) | +0.016 (+0.40) | 0.142 (3.60) | +0.020 (+0.50) | 0.169 (4.30) | +0.025 (+0.63) |
| 90 | 0.136 (3.50) | +0.020 (+0.50) | 0.169 (4.30) | +0.024 (+0.60) | 0.208 (5.30) | +0.028 (+0.72) |
| 110 | 0.165 (4.20) | +0.024 (+0.60) | 0.208 (5.30) | +0.028 (+0.70) | 0.248 (6.30) | +0.032 (+0.81) |
| 125 | 0.189 (4.80) | +0.028 (+0.70) | 0.234 (6.00) | +0.031 (+0.80) | 0.280 (7.10) | +0.039 (+1.00) |
| 160 | 0.272 (6.90) | +0.031 (+0.80) | 0.303 (7.70) | +0.035 (+0.90) | 0.358 (9.10) | +0.047 (+1.19) |
| 200 | 0.339 (8.60) | +0.035 (+0.90) | 0.377 (9.60) | +0.043 (+1.10) | 0.449 (11.40) | +0.061 (+1.55) |
| 250 | 0.377 (9.60) | +0.043 (+1.10) | 0.468 (11.90) | +0.052 (+1.30) | 0.559 (14.20) | +0.076 (+1.93) |
| 315 | 0.476 (12.10) | +0.055 (+1.40) | 0.590 (15.00) | +0.063 (+1.60) | 0.705 (17.90) | +0.079 (+2.00) |

6.3.4 The average minimum diameters of waterways of fittings excluding adapters shall be as specified in Table 6 or Table 7, as applicable.

6.3.5 For all fittings having taper pipe threads, threads shall conform to Specification F1498 and be gaged in accordance with 8.7.

6.3.6 The patterns, dimensions, and laying lengths of molded fittings, including adapters, shall meet the requirements of Specification D3311 or shall be of a proven design and shall allow a smooth transition of fluid flow from one direction to another. Specialty fittings or fittings with laying lengths exceeding those shown in Specification D3311 shall not be excluded. For these fittings, laying lengths shall be provided by the manufacturer. Metric fittings shall conform to ISO 265-1.

6.3.7 *Cleanouts*—All polyolefin fitting cleanouts having female threads shall be supplied with polyolefin plugs to suit.

6.3.8 Cleanouts, cleanout plugs, and caps shall have a thread size and depth sufficient to ensure that the minimum waterway sizes are maintained.

6.3.9 *Traps*—All traps shall have a minimum water seal of 2 in. (50 mm).

6.4 *Water Absorption*—Pipe and fitting materials shall not change in weight more than 0.50 % when tested in accordance with 8.3.

6.5 ~~System Integrity~~: *System Integrity*:

6.5.1 Fused joints and pipe associated with them shall withstand a pressure of 5 psi (0.034 MPa) without leaking when tested in accordance with 8.4.1.

6.5.2 Mechanical joints shall withstand a pressure of 5 psi (0.034 MPa) without leaking when tested in accordance with 8.4.2.

NOTE 3—Mechanical joints include transition, compression, threaded, and other mechanical type joints.

TABLE 6 Average Waterway Diameter, in. (mm)

| Nominal Pipe Size | Unthreaded Fittings, min | Threaded Male Adapters | |
|-------------------|--------------------------|------------------------|----------------|
| | | min | max |
| 1 ¼ | 1.227 (31.17) | 1.220 (31.00) | 1.280 (32.50) |
| 1½ | 1.446 (36.73) | 1.458 (37.00) | 1.501 (38.10) |
| 2 | 1.881 (47.78) | 1.915 (48.60) | 1.946 (49.40) |
| 3 | 2.820 (71.63) | 2.849 (72.30) | 2.983 (75.70) |
| 4 | 3.737 (94.92) | 3.806 (96.60) | 3.972 (100.80) |
| 6 | 5.646 (143.41) | 5.851 (148.50) | 6.005 (152.40) |
| 8 | 7.490 (190.25) | ...(...) | ...(...) |
| 10 | 9.407 (238.94) | ...(...) | ...(...) |
| 12 | 11.197 (284.40) | ...(...) | ...(...) |

TABLE 7 Average Waterway Diameter, Metric

| Pipe OD (mm) | Pip ID (mm), min |
|--------------|------------------|
| 32 | 26 |
| 40 | 34 |
| 50 | 44 |
| 75 | 68.8 |
| 90 | 79 |
| 110 | 100 |
| 125 | 113 |
| 160 | 146 |
| 200 | 184 |
| 250 | 230 |
| 315 | 290 |

6.5.3 Mechanical joints shall incorporate a positive mechanical system for axial restraint in addition to any restraint provided by friction.

6.5.4 Mechanical joints shall show no evidence of separation at the joint under force P when tested in accordance with 8.5.1 nor shall they leak or show any other damage when tested in accordance with 8.5.2. Two fittings shall be tested and both shall pass.

6.5.5 Gasketed joints shall show no evidence of leakage when tested in accordance with 8.4.3.

6.6 All stainless steel internal grab rings shall be manufactured from corrosion-resistant steel containing not less than 16 % chromium and not less than 6 % nickel by weight.

6.7 *Sealing Rings*—Polyethylene sealing rings shall be of a Type 1 (LDPE) compound.

6.8 *Flattening*—There shall be no evidence of splitting, cracking, or breaking when the pipe is tested in accordance with 8.7.

6.9 *Impact Resistance*—The minimum impact resistance of pipe and fittings, when tested at the time of manufacture in accordance with 8.8, shall comply with Table 8.

7. Workmanship, Finish, and Appearance

7.1 The manufacture of fittings and pipe shall be in accordance with good commercial practice so as to produce fittings meeting the requirements of this specification. Fittings and pipe shall be homogeneous throughout, smooth, clean and free from grooving, visible blistering, pores, cracks, holes, foreign inclusions, or injurious defects. The fittings and pipe shall be as uniform as commercially practicable in opacity, density, and other physical properties. Pipe ends shall be cleanly cut and the ends of pipe and fittings shall be square to each axis.

8. Test Methods

8.1 *Conditioning*—Condition the test specimens at 73.4 ± 3.6 °F (23 ± 2) °C and 50 ± 5 % relative humidity for not less than 40 h prior to test in accordance with Procedure A of Practice D618, for those tests where conditioning is required.

TABLE 8 Impact Resistance of Plastic Drain, Waste and Vent Pipe and Fittings

| Description | Impact Resistance, min., ft·lbf (J) 73 °F (23 °C) |
|---|--|
| All pipe sizes | 60 (81) |
| Fitting sizes and types (larger than 2 in. nominal OD) (larger than 40 mm nominal OD) | 15 (20) |
| Fitting sizes and types (2 in. and smaller nominal OD) (40 mm and small nominal OD) | 7.5 (10) |

8.2 *Test Conditions*—Conduct tests in the standard laboratory atmosphere of ~~73.4~~73.4 °F ± 3.6 °F (~~23~~23 °C ± 2 °C) and ~~50~~50 % ± 5 % relative humidity, unless otherwise specified in the test methods or in this specification.

8.3 *Water Absorption*—Weigh three cleanly cut specimens having smooth edges to the nearest 0.001 g and immerse in distilled water at ~~73.4~~73.4 °F ± 1.8 °F (~~23~~23 °C ± 1 °C) for 24 h + ½–0 h, in accordance with Test Method **D570**. Remove the specimens, wipe dry with a clean, dry cloth, and reweigh immediately. Calculate the average percent gain in weight to the nearest 0.01 % on the basis of the initial weight.

8.4 *Hydrostatic Pressure Tests:*

8.4.1 *Fused-Joint Pressure Test*—Select at random six specimens of pipe, each five times the nominal diameter or a maximum of 18 in. (450 mm) in length, for each size of piping and each type of system being considered. Also select three suitable couplings at random. Prepare three joined specimens by joining two pipe specimens with one coupling, using the fusion equipment and instructions supplied by the manufacturer of the system. Fill each specimen with water at ~~73.4~~73.4 °F ± 3.6 °F (~~23~~23 °C ± 2 °C) and cap, taking care to exclude all air from the system. Fix one end of the specimen to a pressurizing apparatus, and support the free end if necessary. Pressurize each specimen to 5 psi (0.034 MPa) for a minimum of 5 min and inspect for leaks. None of the three specimens shall leak (laboratory performance test only, not for field use).

8.4.2 *Mechanical Joint Pressure Test*—Perform the pressure test on mechanical joints on test specimens prepared in a manner similar to that described in **8.5.1**, except use appropriate pipe specimens where the joint is intended to join pipes of similar or dissimilar material and sizes. Pressurize the assembly to 5 psi (0.034 MPa) for a period of 24 h + 15, – 0.0 min and inspect for signs of leakage. Apply this test to each size and type of joint being considered (laboratory performance test only, not for field use).

8.4.3 *Gasketed Joint Pressure Test*—The joint assembly shall be in accordance with the fitting manufacturer’s recommendation. The end of the pipe or fitting spigot shall not damage or dislodge the gasket during insertion. Lubricant is required on the spigot and sometimes additionally on the gasket. All surfaces of the joint that make contact with the gasket shall be smooth and free of imperfections, ridges, fractures, or cracks that could adversely affect the seal. Subject the assembly to internal and external hydrostatic tests using Test Method **D3212** and examine the assembly for evidence of leakage (laboratory performance test only, not for field use).

8.5 *Mechanical-Joint Pullout Test:*

8.5.1 Join two sections of pipe by a coupling with the positive mechanical axial restraint system removed or deactivated. Mount the assembly with the outer ends of the pipe sections fastened in the clamps of a tensile testing machine. Pull the two pipe sections apart at a rate of approximately 1 in./min (25 mm/min) until at least one pipe section has separated from the coupling. Record the maximum force *F* applied.

8.5.2 Using the set-up described above, subject a complete joint assembled in accordance with the manufacturer’s instructions to an axial pullout force *P* of 25 lbf (110 N) greater than force *F*. In no case shall this force *P* be less than 50 lbf (220 N). Apply force *P* within ~~5~~5 s to 30 s and maintain for at least 60 s.

8.5.3 Remove the axial force and pressurize the complete joint assembly to 5 psi (0.034 MPa) hydrostatic pressure for a period of 1 h and inspect for leaks.

8.6 *Threads*—All taper pipe threads shall be gaged in accordance with Specification **F1498**.

8.7 *Flattening*—Using Test Method **D2412**, flatten three specimens of pipe ~~6-in. (152-mm)~~6 in. (152 mm) long, between parallel plates in a suitable press until the distance between the plates is 40 % of the original outside diameter of the pipe. The rate of vertical displacement shall be uniform and such that the flattening is completed within 22 min. to 5 min. On removal of the load, examine the specimens for evidence of splitting, cracking, or breaking.

8.8 *Impact Resistance:*

8.8.1 *Polyolefin Pipe and Fittings*—Test in accordance with Test Method **D2444** using Tup C and Holder A for pipe and Tup A and Holder B for fittings. Use a ~~12-lb (5-kg)~~12 lb (5 kg) tup for testing pipe sizes 4 in. and smaller and a ~~20-lb (10-kg)~~20 lb (10 kg)