Designation: C1173 – 22

Standard Specification for Flexible Transition Couplings for Underground Piping Systems[1]

This standard is issued under the fixed designation C1173; 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 describes the properties of devices or assemblies suitable for use as flexible transition couplings, hereinafter referred to as "couplings," for underground drainage and sewer piping systems.

1.2 Flexible transition couplings that conform to the requirements of this standard are suitable for joining plain-end pipe or fittings. The pipe to be joined shall be of similar or dissimilar materials, size, or both.

1.3 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.

1.4 The ASTM standards referenced herein shall be considered mandatory.

1.5 The committee with jurisdiction over this standard is not aware of another comparable standard for materials covered in this standard.

1.6 *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]

A240/A240M Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

A493 Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging

A644 Terminology Relating to Iron Castings

D395 Test Methods for Rubber Property—Compression Set

D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

D471 Test Method for Rubber Property—Effect of Liquids

D543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents

D573 Test Method for Rubber—Deterioration in an Air Oven

D624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

D638 Test Method for Tensile Properties of Plastics

D1149 Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment

D2240 Test Method for Rubber Property—Durometer Hardness

D3045 Practice for Heat Aging of Plastics Without Load

D6147 Test Method for Vulcanized Rubber and Thermoplastic Elastomer—Determination of Force Decay (Stress Relaxation) in Compression

3. Terminology

3.1 *Definitions*—For definitions of terms used in this standard, see Terminology A644.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *center stop, n*—an integral part of the gasket centered on its axial length, intended to limit the insertion depth of the pipe to be coupled.

3.2.2 *clamp assembly, n*—that portion of the coupling excluding the gasket.

3.2.3 *coupling, n*—the complete assembly.

3.2.4 *fitting, n*—parts of a pipeline other than straight pipe couplings or valves.

3.2.5 *flexible transition couplings, n*—devices used to form a leakproof joint between sections of plain-end pipe or fittings of the same or different materials, of the same or different size, or any combination of materials or pipe sizes.

3.2.6 *free torque, n*—the torque value expressed in lbf·in./Nm when the clamp is tightened four revolutions of the screw nut; while in the free state, this value does not include

[1] This specification is under the jurisdiction of ASTM Committee A04 on Iron Castings and is the direct responsibility of Subcommittee A04.75 on Gaskets and Coupling for Plumbing and Sewer Piping.

Current edition approved June 1, 2022. Published June 2022. Originally approved in 1991. Last previous edition approved in 2018 as C1173 – 18. DOI: 10.1520/C1173-22.

[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.

any breakaway effects due to staking or passage of the band ends beyond the screw heads.

3.2.7 *inserts, n*—a bushing or ring placed into the coupling socket to accommodate pipe materials of differing outside diameters.

3.2.8 *joint, n*—the completed assembly of parts consisting of the flexible transition coupling and the joined pipes, or fittings, or both.

3.2.9 *lot, n*—a specific quantity of similar material or collection of similar units from a common source; the quantity offered for inspection and acceptance at any one time. A lot might comprise a shipment, batch, or similar quantity.

3.2.10 *manufacturer, n*—the entity that produces the coupling.

3.2.11 *plain-end pipe, n*—any pipe that does not include any bell, hub, threaded area, or other means of joining.

3.2.12 *shear ring, n*—an interior or exterior element which is used to span the distance between the pipe ends within a coupling so as to provide increased resistance to axial displacement.

TABLE 1 Test Requirements

Properties	Physical Requirements	ASTM Test Method
Elastomeric materials		
Hardness, nominal shore "A" durometer as specified by the coupling manufacturer	50–75	D2240
Hardness, nominal shore "D" durometer as specified by the coupling manufacturer	35–45	D2240
Tensile strength, min psi (KPa)	1000 (6894)	D412, Die C, Fig. 2 or D638
Elongation at rupture, min, %	200	D412, Die C, Fig. 2 or D638
Heat aging, 70 h, 158 ± 3.6 °F (70 ± 2 °C)		D573 or D3045
Hardness increase, maximum Durometer points	10	
Change in tensile strength, max, %	25	
Change in elongation, max, %	35	
Ozone resistance	no cracks	D1149
At 20 % elongation		
For 100 h at 104 ± 3.6 °F (40 ± 2 °C)		
With 50 parts per 100 million		
Water absorption, weight gain, %, max	20	D471
Chemical resistance, 48 h, 74 ± 3.6 °F (23 ± 2 °C)	no weight loss	D543
Compression set, max, %	25	D395 Method B
Stress relaxation, min. % force retention	30	D6147
Tear strength, min, lbf/in. (N/cm)	150 (268.5)	D624 Die C

4. Classification

4.1 The couplings shall be permitted to have a center stop. The components shall be designed so that the elastomeric material is compressed to form a hydrostatic seal when the joint is assembled. The couplings shall be of the types described in 4.1.1 – 4.1.3.

4.1.1 *Type A*—A coupling consisting of an elastomeric gasket incorporating corrosion-resistant tension bands and tightening mechanism. Couplings shall be fabricated without shear rings, with or without inserts, and with or without a center stop.

4.1.2 *Type B*—A coupling consisting of an elastomeric gasket incorporating a corrosion-resistant shear ring, tension bands, and tightening mechanism. Couplings shall be fabricated with shear rings, with or without inserts, and with or without a center stop (Note 1).

4.1.3 *Type C*—A coupling fabricated with elastomeric compression seals.

NOTE 1—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 requirements of this standard.

5. Materials and Manufacture

5.1 Elastomeric materials used in the manufacturing of couplings and inserts shall comply with the requirements of 10.1 and Table 1.

5.2 All metallic components shall be manufactured of 300 series stainless steel.

6. Elastomeric Gasket Requirements

6.1 The elastomeric gasket shall conform to the physical properties as specified in 5.1.

6.2 Elastomeric gaskets and inserts of single, multi-piece, or spliced construction shall show no signs of separation, peeling, or other defects when tested in accordance with Section 9.

6.3 Elastomeric gaskets and inserts of single, multi-piece, or spliced construction shall be free from porosity and air pockets. Its surface shall be smooth and free from pitting, cracks, blisters, air marks, or any other imperfections that affect its performance in service. The flash extension shall not exceed 1 mm at any point where the presence of flash affects performance.

6.4 Elastomeric gaskets and inserts shall be compatible with the dimensions and tolerances of the specific material to which it is designed to join.

7. Clamp Assembly Requirements

7.1 All metallic components shall be of 300 series stainless steel conforming to the chemical composition requirements of Specification A240/A240M. All metallic components made from round stock shall be of 300 series stainless steel conforming to the requirements of Specification A493 (excluding copper-bearing alloys).

7.2 Clamp assemblies, tension bands, and tightening mechanisms shall conform to the performance requirements as set forth in 10.2.

8. Dimensions

8.1 Couplings and bushing dimensions shall be compatible with the dimensions and tolerances of the specific material to which it is designed to join.

9. Sampling, Tests, and Retests

9.1 Test specimens representative of the couplings to be used shall be randomly selected from the manufactured lot for testing.

9.2 One coupling for each size or type shall be tested, unless otherwise specified or waived by the purchaser.