



Designation: D 1869 – 95 (Reapproved 2000)

Standard Specification for Rubber Rings for Asbestos-Cement Pipe¹

This standard is issued under the fixed designation D 1869; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers rubber rings used to seal the joints of asbestos-cement pipe conforming to Specifications C 296, C 428, C 644, and C 668.

1.2 A specification is given for (1) natural or synthetic rubber rings, or both, where resistance to oil or solvents is not required, and (2) synthetic rubber rings for services involving resistance to oil or solvents.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 The following safety hazards caveat pertains only to the test methods portion, Section 9, of this standard: *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- C 296 Specification for Asbestos-Cement Pressure Pipe²
- C 428 Specification for Asbestos-Cement Nonpressure Sewer Pipe²
- C 644 Specification for Asbestos-Cement Nonpressure Small-Diameter Sewer Pipe³
- C 668 Specification for Asbestos-Cement Transmission Pipe²
- D 395 Test Methods for Rubber Property—Compression Set⁴
- D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension⁴
- D 471 Test Method for Rubber Property—Effect of Liquids⁴

¹ This specification is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.36 on Seals.
Current edition approved Dec. 10, 1995. Published February 1996. Originally published as D 1869 – 61 T. Last previous edition D 1869 – 94.

² Annual Book of ASTM Standards, Vol 04.05.

³ Discontinued—see 1981 Annual Book of ASTM Standards, Part 16.

⁴ Annual Book of ASTM Standards, Vol 09.01.

D 573 Test Method for Rubber—Deterioration in an Air Oven⁴

D 865 Test Method for Rubber—Deterioration by Heating in Air (Test Tube Enclosure)⁴

D 1415 Test Method for Rubber Property—International Hardness⁴

D 2137 Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics⁴

D 2240 Test Method for Rubber Property—Durometer Hardness⁴

2.2 Other Document:

Rubber Manufacturers Association (RMA), Rubber Handbook MO-1—Molded, Extruded, Lathe-Cut and Cellular Products⁵

3. Composition and Manufacture

3.1 The ring shall consist of a properly vulcanized virgin rubber compound. Virgin rubber is defined as one containing no scrap, reclaim, or rubber substitutes.

3.2 If a joint is used in the manufacture of the ring, the strength of the spliced joint shall be such that the ring will withstand the stretch test described in 9.8 with no visible separation or peeling.

4. Physical Requirements

4.1 Sample rings taken from the shipment shall conform to the requirements for physical properties prescribed in Table 1 when tested in accordance with the test methods specified in Section 9.

5. Dimensions and Tolerances

5.1 The rings shall conform to the dimensions specified by the manufacturer of the pipe in which the rings are to be used, with a RMA Class 3 (see 2.2) tolerance of ± 0.25 up to 25 mm (± 0.010 up to 1 in.) on all cross-section dimensions, and $\pm 1\%$ on all diametral dimensions, unless otherwise agreed upon by the pipe manufacturer and the ring supplier.

NOTE 1—The design and tolerances of asbestos-cement pipe are not sufficiently standardized to permit interchangeability of rings in many

⁵ Available from RMA, 1400 K St., NW, Washington, DC 20005.

TABLE 1 Physical Requirements of Rubber Rings for Asbestos-Cement Pipe

Test	Type of Rubber Ring	
	Nonoil-Resistant	Oil-Resistant
Original Properties:		
Tensile strength, min, MPa (psi):		
Average of three specimens	14.0 (2000)	10.5 (1500)
Lowest individual	12.5 (1800)	9.0 (1300)
Elongation, min, %:		
Average of three specimens	350	325
Lowest individual	325	300
Hardness number ^A	nominal $\pm$ 5	nominal $\pm$ 5
Stress at 300 % elongation, MPa (psi):		
Max	16.0 (2300)	16.0 (2300)
Min	8.4 (1200)	7.0 (1000)
Compression set, max, %	16	25
Low-temperature flexibility	no cracks	no cracks
After Oven Aging:		
Tensile strength, average decrease, max, %	15	20
Elongation, average decrease, max, %	25	30
Hardness, average increase, max, points	7	15
After Water Aging:		
Volume change, max, %	12	12
Appearance change	no surface degradation	no surface degradation
After Oil Aging:		
Tensile strength, average decrease, max, %	...	35
Elongation, average decrease, max, %	...	40
Hardness, average change, points	...	-10 to + 2
Volume change, average, %	...	-1 to + 15

^ANominal hardness shall be from 50 to 60 as specified by the pipe manufacturer.

cases from pipe of one manufacturer to that of another.

6. Workmanship

6.1 The surface shall be smooth and free of pitting, cracks, blisters, air marks, and any other imperfection that would affect its behavior in service. The body shall be free of porosity and air pockets.

6.2 The flash thickness shall not exceed 0.4 mm (0.015 in.), nor the flash width 0.8 mm (0.03 in.) at any point in the ring.

6.3 Offset, or failure of the mold to register accurately, shall not exceed 0.4 mm (0.015 in.)

7. Sampling

7.1 A number of sample rings shall be drawn at random from each shipment of rings in accordance with Table 2.

7.2 These shall be stretched and examined as specified in 9.8. A sufficient additional number of rings shall be drawn at random for the tests specified in Table 1.

8. Precision and Bias

8.1 This is a performance specification establishing limits for commercial product quality. No precision or bias statements are required.

9. Test Methods

9.1 *Tensile Strength, Elongation, and Stress at 300 % Elongation*—Test Methods D 412:

TABLE 2 Sampling Plan for Stretch Test for Visual Inspection

Number of Rings in Shipment	Number of Rings in Sample	Maximum Number of Defectives for Acceptance
Up to 800	75	4
801 to 3 200	150	8
3 201 to 8 000	225	11
8 001 to 22 000	300	14

9.1.1 Cut samples for tensile strength, elongation, and stress at 300 % elongation tests from circumferential sections of the ring itself.

9.1.2 From these samples stamp dumbbell test specimens using a standard ASTM Type C dumbbell conforming to Fig. 1 of Test Methods D 412.

9.1.3 The sections from which the dumbbells are cut shall be prepared by sectioning a sample ring held rigidly in a jig, which in turn is mounted in a chuck of a machinist's lathe. A sharp, thin cutting knife shall be mounted in the lathe holder and the cut made at a right angle to the jig face. The cutting site shall be lubricated at all times by a jet of cool water.

9.1.4 These sections shall be buffed lightly prior to cutting into dumbbell specimens in order to bring them to a uniform thickness for testing.

9.2 Hardness:

9.2.1 Test Method D 1415 shall be used as the referee method.

9.2.2 Test Method D 2240 may be used for quality control.

9.2.3 Hardness readings for guidance purposes may be taken directly on the ring, recognizing that those may vary slightly from those taken on dumbbell specimens.

9.3 Air Aging: Tensile Strength, Elongation, and Hardness:

9.3.1 Test Methods D 865 (preferred) or D573, in conjunction with Test Methods D 412 and D 1415 or D 2240. Prepare test specimens in accordance with 9.1.

9.3.2 Age nonoil-resistant specimens for 166 ± 2 h at $70 \pm 2^\circ\text{C}$.

9.3.3 Age oil-resistant specimens for 70 ± 0.7 h at $100 \pm 2^\circ\text{C}$.

9.4 Water Aging: Volume and Appearance Change:

9.4.1 Cut one specimen 50 ± 3 mm (2.0 ± 0.1 in.) long and not less than 13 mm^2 (0.2 in.^2) in cross section from each of three rings.