**Designation: ~~C1619 – 19~~ C1619 – 20**

# Standard Specification for Elastomeric Seals for Joining Concrete Structures[1]

This standard is issued under the fixed designation C1619; 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 the physical property requirements of elastomeric seals (gaskets) used to seal the joints of precast concrete structures conforming to Specifications C14, C14M, C118, C118M, C361, C361M, C443, C443M, C505, C505M~~or,~~ ~~C505M~~or C1628 used in gravity and low head pressure applications.

1.2 Requirements are given for natural or synthetic rubber gaskets, or a combination of 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 following precautionary caveat pertains only to the test method 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.*

1.5 *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]

C14 Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
C14M Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)
C118 Specification for Concrete Pipe for Irrigation or Drainage
C118M Specification for Concrete Pipe for Irrigation or Drainage (Metric)
C361 Specification for Reinforced Concrete Low-Head Pressure Pipe
C361M Specification for Reinforced Concrete Low-Head Pressure Pipe (Metric)
C443 Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
C443M Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric)
C497 Test Methods for Concrete Pipe, Concrete Box Sections, Manhole Sections, or Tile
C497M Test Methods for Concrete Pipe, Concrete Box Sections, Manhole Sections, or Tile (Metric)
C505 Specification for Nonreinforced Concrete Irrigation Pipe with Rubber Gasket Joints
C505M Specification for Nonreinforced Concrete Irrigation Pipe With Rubber Gasket Joints (Metric)

[1] This specification is under the jurisdiction of ASTM Committee C13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.08 on Joints for Precast Concrete Structures.

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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.

C822 Terminology Relating to Concrete Pipe and Related Products
C1628 Specification for Joints for Concrete Gravity Flow Sewer Pipe, Using Rubber Gaskets
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
D573 Test Method for Rubber—Deterioration in an Air Oven
D1149 Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment
D1566 Terminology Relating to Rubber
D2240 Test Method for Rubber Property—Durometer Hardness
D2527 Specification for Rubber Seals—Splice Strength

## 3. Terminology

3.1 *Definitions*—For definitions of terms relating to concrete pipe, see Terminology C822. For definitions relating to rubber or elastomers, see Terminology D1566.

## 4. Classification

4.1 In order to provide for the various types of seals and requirements, multiple classifications have been established.

4.1.1 Class A is generally intended to cover seals in low head pressure piping applications not exceeding 125 ft (375 kPa) where premium physical properties are required.

4.1.2 Class B is generally intended for Class A and Class E applications that also require special oil resistant performance.

4.1.3 Class C is generally intended to cover seals in applications not exceeding 30 ft (9.14 m) of hydrostatic head.

4.1.4 Class D is generally intended for Class C applications that also require special oil resistant performance.

4.1.5 Class E is generally intended for gravity flow sewer pipe in applications not exceeding 30 ft (9.14 m) of hydrostatic head.

## 5. Composition and Manufacture

5.1 All gaskets shall be extruded or molded in such a manner that any cross-section will be dense, homogeneous, and free of blisters, pitting, or other defects that make them unfit for the use intended. The gaskets shall be fabricated from an elastomeric material meeting the appropriate classification physical property requirements in Section 7. The base polymer shall be natural rubber, synthetic rubber, or a blend of both that is acceptable to the owner.

## 6. Dimensions and Tolerances

6.1 Specified Durometer Shore A hardness shall be within the range given in Section 7, Table 1, and actual gasket durometer shall conform to ±5 points from the specified value.

6.2 Cross-sectional and circumferential dimensions and tolerances shall comply with the relevant standard specification that is referencing this standard.

**TABLE 1 Physical Property Requirements for Elastomeric Seals**

| | Class A | Class B | Class C | Class D | Class E |
|---|---|---|---|---|---|
| Tensile, min, psi (MPa) | 2300 (15.9) | 1500 (10.3) | 1200 (8-3) | 1200 (8.3) | 1800 (12.4) |
| Elongation at break, min, % | 425 | 350 | 350 | 350 | 425 |
| Specified Hardness, Shore A | 40-60 | 40-60 | 40-60 | 40-60 | 40-60 |
| Oven-Age Tensile reduction, max % of original | 15 | 20 | 15 | 20 | 15 |
| Oven-Age Elongation reduction, max % of original | 20 | 40 | 20 | 40 | 20 |
| Oven-Age hardness increase, max | — | 15 | — | 15 | — |
| Compression Set, max % | 20 | 20 | 25 | 25 | 20 |
| Water Absorption, max % weight increase | 5 | 15 | 10 | 15 | 5 |
| Ozone Resistance level, 50 pphm | No cracks | No cracks | No cracks | No cracks | No cracks |
| Liquid Immersion IRM 903 Oil. Max % volume change | — | 80 | — | 80 | — |
| Splice Strength Classification | Class 3 | Class 2 | Class 3 | Class 2 | Class 3 |

6.3 When in its assembled position, the gasket shall not be stretched more than 30 % of its original circumference.

## 7. Physical Requirements

7.1 The sealing portion of the gaskets shall comply with the physical requirements listed in Table 1 when testing in accordance with Section 8.

7.2 Gasket swell has a bearing on joint performance. It is the responsibility of the manufacturer to set appropriate limits for swell and durometer change of the gasket material and "wash off" for the gasket lubricant. These limits shall then be verified by test methods described in Test Method C497. Gasket lubricant shall not be altered, corrupted, or diluted from its original formulation as tested and certified prior to its use on the gasket for installation purposes.

7.3 Class B and Class D oil resistant gaskets shall contain not less than 50 % by volume, oil resistant polymer.

## 8. Test Methods

8.1 Laboratory tests to determine the physical properties of the gasket to be furnished under this specification shall be performed on the finished product as supplied or from test specimens taken from the finished product unless otherwise stated within this specification.

8.1.1 *Tensile Strength and Elongation*—See Test Methods D412.

8.1.2 *Hardness*—See Test Method D2240, with the exception of Section 5. The determination shall be taken directly on the gasket. The presser foot shall be applied on areas that are ¼ in. (6.4 mm) or greater in thickness. If ¼ in. (6.4 mm) or greater thickness is not available, thinner samples shall be plied up to obtain this thickness.



8.1.3 *Compression Set*—See Test Methods D395 Method B. Test conditions to be 22 h at 70°C. Specimen shall not be prepared from laboratory cured slabs or by direct molding. Because testing is required on the finished product, specimens shall not be prohibited from deviating from the standard dimensions as per Test Methods D395 section 5.6.



8.1.4 *Accelerated Aging*—See Test Method D573. Test conditions to be 96 h at 70°C.

8.1.5 *Water Absorption*—See Test Method D471. Use distilled water for the standard liquid test. When a 1 in. wide test sample cannot be obtained, use the greatest width obtainable. Test conditions shall be 48 h at 70°C. At test completion, immediately remove from water, blot the specimen dry, and determine specimen weight. Calculate the volume increase.

8.1.6 *Ozone Resistance*—Determine the resistance to ozone in accordance with Test Method D1149.

8.1.6.1 Test specimens shall be constructed from a finished gasket cross-section and of type A.

8.1.6.2 Conduct test for 72 h in 50 PPHM concentration at 40°C (104 ± 4°F) stressed at 20 % extension.

8.1.7 *Oil Immersion Testing*—See Test Method D471. Determine resistance to oil by calculating % volume change after immersing product specimen in ASTM IRM 903 oil for 70 h at 100°C.

8.1.8 *Splice Strength Classification*—See Specification D2527. No specimen for destructive test or no seal for nondestructive test shall show sign of damage at the splice.

## 9. Test Frequency

9.1 When specified in Table 1, verification of the physical properties for tensile, elongation, hardness, oven aging, and compression set shall be performed on the finished product for each run startup and at a minimum of every 20 000 lb (9072 kg) of rubber processed after a run setup. A run startup shall be defined as the beginning of the production run of a particular cross-section of gasket and/or after significantly changing the processing equipment set up parameters to recover from a substantial event.