



Designation: C990/C990M – 24

## Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants<sup>1</sup>

This standard is issued under the fixed designation C990/C990M; 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 joints for precast concrete pipe and box, and other sections using preformed flexible joint sealants for use in storm sewers and culverts which are not intended to operate under internal pressure, or are not subject to infiltration or exfiltration limits. Joint material used in horizontal applications is intended to prevent the flow of solids through the joint.

1.2 For precast concrete manhole sections and other vertical structures, which are subject to internal or external pressure, infiltration or exfiltration limits are not prohibited from being specified. Joints in vertical structures covered by this specification are intended mainly to prevent the flow of solids or fluids through the joint.

1.3 This specification is to be used with pipe and structures conforming in all respects to Specifications C14, C14M, C76, C76M, C478/C478M, C506, C506M, C507, C507M, C655, C655M, C985, C985M, C1433, C1433M, C1504, C1504M, and C1577, provided that if there is a conflict in permissible variations in dimensions, the requirements of this specification shall govern.

1.4 The values stated in either inch pound or SI units are to be regarded separately as standard. The SI units are shown in brackets. The value stated in each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

NOTE 1—This specification covers the material and performance of the joint and sealant only. Infiltration and exfiltration quantities for installed sections are dependent on factors other than the joints which must be covered by other specifications and suitable testing of the installed pipeline.

1.5 *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.*

<sup>1</sup> 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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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:<sup>2</sup>

- C14 Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
- C14M Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)
- C76 Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
- C76M Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
- C478/C478M Specification for Circular Precast Reinforced Concrete Manhole Sections
- C506 Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
- C506M Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe (Metric)
- C507 Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe
- C507M Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe (Metric)
- C655 Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe
- C655M Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe (Metric)
- C822 Terminology Relating to Concrete Pipe and Related Products
- C972 Test Method for Compression-Recovery of Tape Sealant
- C985 Specification for Nonreinforced Concrete Specified Strength Culvert, Storm Drain, and Sewer Pipe

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.



- C985M** Specification for Nonreinforced Concrete Specified Strength Culvert, Storm Drain, and Sewer Pipe (Metric)
- C1433** Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
- C1433M** Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers (Metric)
- C1504** Specification for Manufacture of Precast Reinforced Concrete Three-Sided Structures for Culverts and Storm Drains
- C1504M** Specification for Manufacture of Precast Reinforced Concrete Three-Sided Structures for Culverts and Storm Drains (Metric)
- C1577** Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD
- D4** Test Method for Bitumen Content
- D6/D6M** Test Method for Loss on Heating of Oil and Asphaltic Compounds
- D36/D36M** Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
- D71** Test Method for Relative Density of Solid Pitch and Asphalt (Displacement Method)
- D92** Test Method for Flash and Fire Points by Cleveland Open Cup Tester
- D113/D113M** Test Method for Ductility of Asphalt Materials
- D217** Test Methods for Cone Penetration of Lubricating Grease
- D297** Test Methods for Rubber Products—Chemical Analysis
- 2.2 *AASHTO Standards:*<sup>3</sup>
- T47** Test for Loss of Heating of Oil and Asphaltic Compounds
- T48** Test for Flash and Fire Points by Cleveland Open Cup
- T51** Test for Ductility of Bituminous Material
- T111** Test for Inorganic Matter or Ash
- T229** Test for Specific Gravity of Asphalts and Tar Pitches Sufficiently Solid to be Handled in Fragments

### 3. Terminology

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

### 4. Basis of Acceptance

4.1 The acceptability of the pipe joint and sealant shall be determined by the results of the physical tests prescribed in this specification, if and when required, and by inspection to determine whether the pipe joint and the sealant conform to this specification as to design and freedom from defects.

### 5. Materials and Manufacture for Sealants

5.1 Bitumen sealants shall be produced from asphalt, hydrocarbon resins and plasticizing compounds reinforced with

inert mineral filler and shall contain no solvents. Butyl rubber sealants shall be produced from blends of butyl rubber and refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler and shall contain no solvents.

5.2 Blends of material used in the manufacture of flexible joint sealants shall be approved by the owner and meet the composition and physical requirements prescribed in Section 6. The joint sealant shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength and shall be supplied preformed and of suitable cross section and size to seal the joint annular space when the sections are joined. For a given joint size, the sealing material, as furnished, shall be such so as to encircle the outside circumference of the spigot or tongue of the joint or the inside circumference of the bell or groove and shall not be stretched when seated in the joint. Sealant material shall be furnished in the required length and cross-dimensions, and the dimensions shall be clearly marked. Sealant material shall be pre-formed to the following specified tolerances:

|                                                                    | Tolerance            |
|--------------------------------------------------------------------|----------------------|
| Length, %                                                          | +5, -0               |
| Cross sectional area, %                                            | +10, -5              |
| Volume, in. <sup>3</sup> /linear ft [mm <sup>3</sup> /linear m], % | +5, -5               |
| Cross-sectional dimensions, in. [mm], %                            | +10, -5 <sup>4</sup> |

<sup>4</sup>Dimensions in the field may vary from preformed dimensions.

### 6. Physical Requirements for Sealants

#### 6.1 Bitumen Sealants:

6.1.1 Bitumen sealants shall comply with the following composition and physical requirements. Testing shall be in accordance with the methods prescribed in Section 9.

|                                                                           |                                            |
|---------------------------------------------------------------------------|--------------------------------------------|
| Hydrocarbon Blends, % by weight                                           | 50 min                                     |
| Ash-Inert Mineral Matter, % by weight                                     | 25 min                                     |
| Volatile Matter, % by weight                                              | 3 max                                      |
| Specific Gravity at 77°F [25°C]                                           | 1.15 to 1.40                               |
| Ductility at 77°F [25°C], cm                                              | 5 min                                      |
| Flash Point, C.O.C.                                                       | 350°F [177°C] min                          |
| Fire Point, C.O.C.                                                        | 375°F [191°C] min                          |
| Softening Point                                                           | 320°F [160°C] min                          |
| Compression Index at 77°F, lbf/in <sup>3</sup> [25°C, N/cm <sup>3</sup> ] | 100 [27] max                               |
| Compression Index at 32°F, lbf/in <sup>3</sup> [0°C, N/cm <sup>3</sup> ]  | 350 [95] max                               |
| Cone Penetration at 77°F [25°C], 150 g, 5 s, dmm                          | 50 to 120                                  |
| Cone Penetration at 32°F [0°C], 150 g, 5 s, dmm                           | 15 min                                     |
| Chemical Resistance                                                       | No deterioration, no cracking, no swelling |

#### 6.2 Butyl Rubber Sealant:

6.2.1 Butyl rubber sealants (elastomeric polymer shall be butyl rubber only) shall comply with the following composition and physical requirements. Testing shall be in accordance with the methods prescribed in Section 9.

|                                                                            |                                            |
|----------------------------------------------------------------------------|--------------------------------------------|
| Butyl Rubber (hydrocarbon blends), % by weight                             | 50 min                                     |
| Ash-Inert Mineral Matter, % by weight                                      | 30 min                                     |
| Volatile Matter, % by weight                                               | 3 max                                      |
| Specific Gravity at 77°F [25°C]                                            | 1.15 to 1.40                               |
| Ductility at 77°F [25°C], cm                                               | 5 min                                      |
| Flash Point, C.O.C.                                                        | 350°F [177°C] min                          |
| Fire Point, C.O.C.                                                         | 375°F [191°C] min                          |
| Compression Index at 77°F, lbf/in. <sup>3</sup> [25°C, N/cm <sup>3</sup> ] | 100 [27] max                               |
| at 32°F, lbf/in. <sup>3</sup> [0°C, N/cm <sup>3</sup> ]                    | 200 [54] max                               |
| Cone Penetration at 77°F [25°C], 150 g, 5 s, dmm                           | 50 to 120                                  |
| at 32°F [0°C], 150 g, 5 s, dmm                                             | 30 min                                     |
| Chemical Resistance                                                        | No deterioration, no cracking, no swelling |

<sup>3</sup> Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.