



Standard Specification for External Sealing Bands for Noncircular Concrete Sewer, Storm Drain, and Culvert Pipe¹

This standard is issued under the fixed designation C 877; 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 external sealing bands to be used in conjunction with noncircular concrete pipe as defined in Terminology C 822 and conforming to Specifications C 506, C 507, C 789, and C 850.

1.1.1 Type I, Rubber and Mastic Bands.

1.1.2 Type II, Plastic Film and Mesh Reinforced Mastic Bands.

1.1.3 Type III, Chemically Bonded Adhesive Butyl Bands.

1.2 A complete metric companion to Specification C 877 has been developed—C 877M; therefore, no metric equivalents are presented in this specification.

NOTE 1—This specification covers only the design and material of the sealing bands. Sealing bands covered by this specification should be adequate, when properly installed, for external hydrostatic pressures up to 13 psi, (30 ft) without leakage. The amount of infiltration or exfiltration flow in an installed pipeline is dependent upon many factors other than the sealing bands; allowable quantities and suitable testing of the installed pipeline and system must be covered by other specifications.

2. Referenced Documents

2.1 ASTM Standards:

C 506 Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe²

C 507 Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe²

C 681 Test Method for Volatility of Oil- and Resin-Based, Knife-Grade, Channel Glazing Compounds³

C 789 Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers²

C 822 Terminology Relating to Concrete Pipe and Related Products²

C 850 Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 ft of Cover Subjected to Highway Loadings²

C 990 Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants²

D 5 Test Method for Penetration of Bituminous Materials⁴

D 36 Test Method for Softening Point of Bitumen (Ring and Ball Apparatus)⁵

D 217 Test Method for Cone Penetration of Lubricating Grease⁶

D 395 Test Methods for Rubber Property—Compression Set⁷

D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension⁷

D 471 Test Method for Rubber Property—Effect of Liquids⁷

D 570 Test Method for Water Absorption of Plastics⁸

D 573 Test Method for Rubber—Deterioration in an Air Oven⁷

D 624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers⁷

D 882 Test Methods for Tensile Properties of Thin Plastic Sheeting⁸

D 1171 Test Method for Rubber Deterioration—Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)⁷

D 1278 Test Methods for Rubber from Natural Sources—Chemical Analysis⁷

D 1682 Test Methods for Breaking Load and Elongation of Textile Fabrics⁹

D 1963 Test Method for Specific Gravity of Drying Oils, Varnishes, Resins, and Related Materials at 25/25 C¹⁰

D 2202 Test Method for Slump of Sealants³

D 2240 Test Method for Rubber Property—Durometer Hardness⁷

D 3407 Methods of Testing for Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements⁴

D 3953 Specification for Strapping, Flat Steel and Seals¹¹

3. Terminology

3.1 *Definitions*—For definitions of terms relating to concrete pipe, see Terminology C 822.

¹ This specification is under the jurisdiction of ASTM Committee C13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.08 on Rubber Gaskets.

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² *Annual Book of ASTM Standards*, Vol 04.05.

³ *Annual Book of ASTM Standards*, Vol 04.07.

⁴ *Annual Book of ASTM Standards*, Vol 04.03.

⁵ *Annual Book of ASTM Standards*, Vol 04.04.

⁶ *Annual Book of ASTM Standards*, Vol 05.01.

⁷ *Annual Book of ASTM Standards*, Vol 09.01.

⁸ *Annual Book of ASTM Standards*, Vol 08.01.

⁹ *Annual Book of ASTM Standards*, Vol 07.01.

¹⁰ *Annual Book of ASTM Standards*, Vol 06.03.

¹¹ *Annual Book of ASTM Standards*, Vol 15.09.

4. Basis of Acceptance

4.1 The acceptability of the sealing bands 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 sealing bands conform to this specification as to design and freedom from defects.

5. Materials and Manufacture for Sealing Bands

5.1 Type I, Rubber and Mastic Bands:

5.1.1 Sealing bands shall be composed of rubber, mastic, and protective film elements as schematically shown in Fig. 1 and with dimensions as required in the following:

5.1.1.1 Length of Sealing Band—For a given pipe size, the length of the sealing band as furnished shall be such that after being stretched longitudinally 8 to 12 % as part of the installation procedure, the sealing band will encircle the outside circumference of the pipe and overlap by an amount equal to, but not less than, the width of the sealing band. Sealing bands may be furnished in the required length or multiples thereof.

5.1.1.2 Width of Sealing Band—The width of the sealing band shall conform to the requirements of Table 1.

5.1.2 Rubber Element—The rubber element may be extruded or molded from a high-grade rubber compound and shall be cured in such a manner that any cross section will be dense, homogeneous, and free of porosity, blisters, pitting, and other imperfections. The basic polymer may be natural, synthetic, or a blend of both and shall meet the physical requirements prescribed in Section 6. The rubber element shall have ribs with a height of $\frac{3}{16}$ in., spaced $\frac{3}{4}$ to $1\frac{1}{4}$ in. apart, and have a thickness between the ribs of $\frac{1}{16}$ in. The thickness of the ribs may vary from $\frac{1}{8}$ in. at the base to $\frac{1}{32}$ in. at the top.

5.1.3 Mastic Element—The mastic element may contain rubber, reclaimed rubber and asphaltic derivatives, clay, asbestos, and resin and shall meet the physical requirements prescribed in Section 6. The mastic element shall have a thickness of $\frac{1}{8}$ in. and be free of porous areas, air pockets, and contamination by foreign matter.

5.1.4 Protective Film—The protective film shall be water soluble, have a 1-mil (0.001 in.) thickness, and meet the physical requirements prescribed in Section 6.

NOTE 2—The function of the film is to protect the mastic surface prior to installation. It is intended to dissolve away in the presence of moisture during installation and expose the mastic for sealing.

5.2 Type II Plastic Film and Mesh Reinforced Mastic Bands:

5.2.1 Sealing bands shall be composed of a plastic film, reinforced, rubberized, asphalt, mastic coating with steel straps

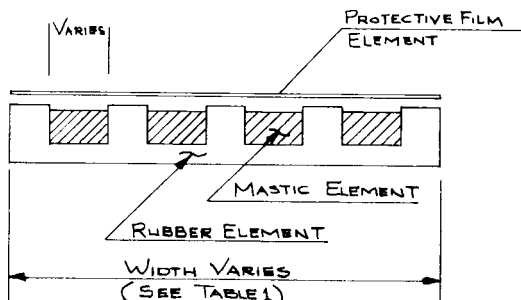


FIG. 1 Sealing Band Type I Schematic (Not to Scale)

TABLE 1 Required Sealing Band Width

Equivalent Circular Pipe Diameter, in.	Sealing Band Width, in.
18 to 33	7
36 to 78	9
84 to 108	11
114 to 144	13

as schematically shown in Fig. 2, with dimensions as required in the following:

5.2.1.1 Length of Sealing Band for a Given Pipe Size—The length of the sealing band shall be equal to the outside circumference of the joint plus 8 in. to provide for overlap.

5.2.1.2 Width of Sealing Band—The width of the sealing band shall conform to the requirements of Table 1.

5.2.2 Plastic Film Element—The plastic film element shall be an extended polymer which provides external reinforcement and shall meet the physical requirements prescribed in Section 6.

5.2.3 Mesh Reinforcement Element, The mesh reinforcement shall consist of a woven plastic mesh and shall meet the physical requirements prescribed in Section 6.

5.2.4 Rubberized Asphalt Mastic Element—The rubberized, asphalt, mastic element shall be a self adhering composition and shall meet the requirements prescribed in Section 6.

5.2.5 Tie Strap Element—The tie strap element shall be steel straps with a minimum width of $\frac{5}{8}$ in. and a minimum thickness of 0.020 in. and shall conform to Specification D 3953. Steel straps shall be secured around the pipe with appropriate strapping tools as recommended by the sealing band manufacturer.

5.2.6 Tie Strap Sleeve Element—The tie strap sleeve element shall consist of a minimum of 1 in. wide flat sleeve inside which the steel tie straps may slide freely. The sleeve may be made from woven or non-woven polypropylene fabric with nominal weight of 3.5 oz/yd².

5.2.7 Release Sheet Element—The disposable release sheet element shall consist of a silicone coated paper with a minimum basis weight of 50 lb/3000 ft².

5.3 Type III, Chemically Bonded Adhesive Butyl Bands:

- Type A (Plastic backing band)
- Type B (Rubber backing band)

5.3.1 Sealing bands shall be composed of a backing band, an applied continuous butyl adhesive coating, and an optional release element (as schematically shown in Fig. 3), with width and overlap dimensions as required by 5.3.1.1 and 5.3.1.2. The primer shall consist of a semi-liquid paintable butyl rubber-based compound. Optional equipment may include clamping devices or tie strips if specified by the purchaser.

5.3.1.1 Length of Sealing Band for a Given Pipe Size—The length of the sealing band shall be equal to two times the width

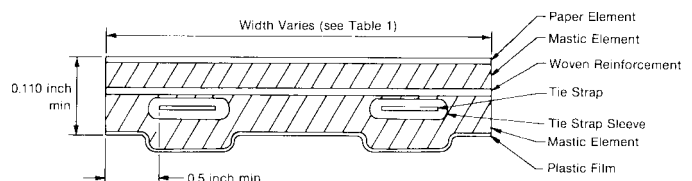


FIG. 2 Sealing Band Type II (Not to Scale)