



Designation: C 1277 – 03

# Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings<sup>1</sup>

This standard is issued under the fixed designation C 1277; 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 materials and testing of shielded hubless couplings to join hubless cast iron soil pipe and fittings.

1.2 Several different types of hubless couplings are available for use in hubless cast iron sanitary and storm drain, waste and vent piping applications to connect hubless cast iron soil pipe and fittings by using a sleeve-type, or some other type coupling device. It is the purpose of this specification to furnish information as to the characteristics of one such sleeve type couplings when applied to cast iron soil pipe and fittings manufactured in accordance with Specification A 888, latest revision, and CISPI Designation 301, latest revision.

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

1.4 The committee with jurisdiction over this standard is aware of other comparable standard published by the Cast Iron Soil Pipe Institute, CISPI-310, FM 1680 published by Factory Mutual, and Specification C 1540 published by ASTM.

1.5 The following precautionary caveat pertains only to the test method portion, Section 7, 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 and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:

A 888 Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications<sup>2</sup>

C 564 Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings<sup>3</sup>

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.75 on Gaskets and Couplings for Plumbing and Sewer Piping.

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<sup>2</sup> Annual Book of ASTM Standards, Vol 01.02.

<sup>3</sup> Annual Book of ASTM Standards, Vol 04.07.

C 717 Terminology of Building Seals and Sealants<sup>3</sup>

C 1540 Specification for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings

### 2.2 CISPI Standard:

CISPI-301 Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications<sup>4</sup>

CISPI-310 Specification for Couplings for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications<sup>4</sup>

FM 1680 Couplings Used in Hubless Cast Iron Systems for Drain, Waste or Vent, Sewer, Rainwater or Storm Water System, Above or Below Ground, Industrial, Commercial and Residential<sup>5</sup>

## 3. Terminology

### 3.1 Definitions:

3.1.1 Definitions of the following terms used in this specification are found in Terminology C 717, paragraph 4.1: elastomeric, durometer and dynamic.

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *center stop, n*—an integral part of the gasket centered on the axial length of the gasket 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 and shield.

3.2.3 *corrugated, n*—any method of embossing.

3.2.4 *coupling, n*—the complete assembly.

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

3.2.6 *gasket, n*—the elastomeric portion of the coupling.

3.2.7 *joint, n*—the point of assembly consisting of the coupling and the joined pipes or fittings, or both.

3.2.8 *shield, n*—an external metallic protective device designed to protect the sealing gasket from external elements that could cause failure of the sealing gasket.

<sup>4</sup> Available from Cast Iron Soil Pipe Institute, 5959 Shallowford Rd., Suite 419, Chattanooga, TN 37421.

<sup>5</sup> Available from Factory Mutual Research, 1151 Boston Providence Turnpike, Norwood, MA, 02062.

4. Materials and Manufacture

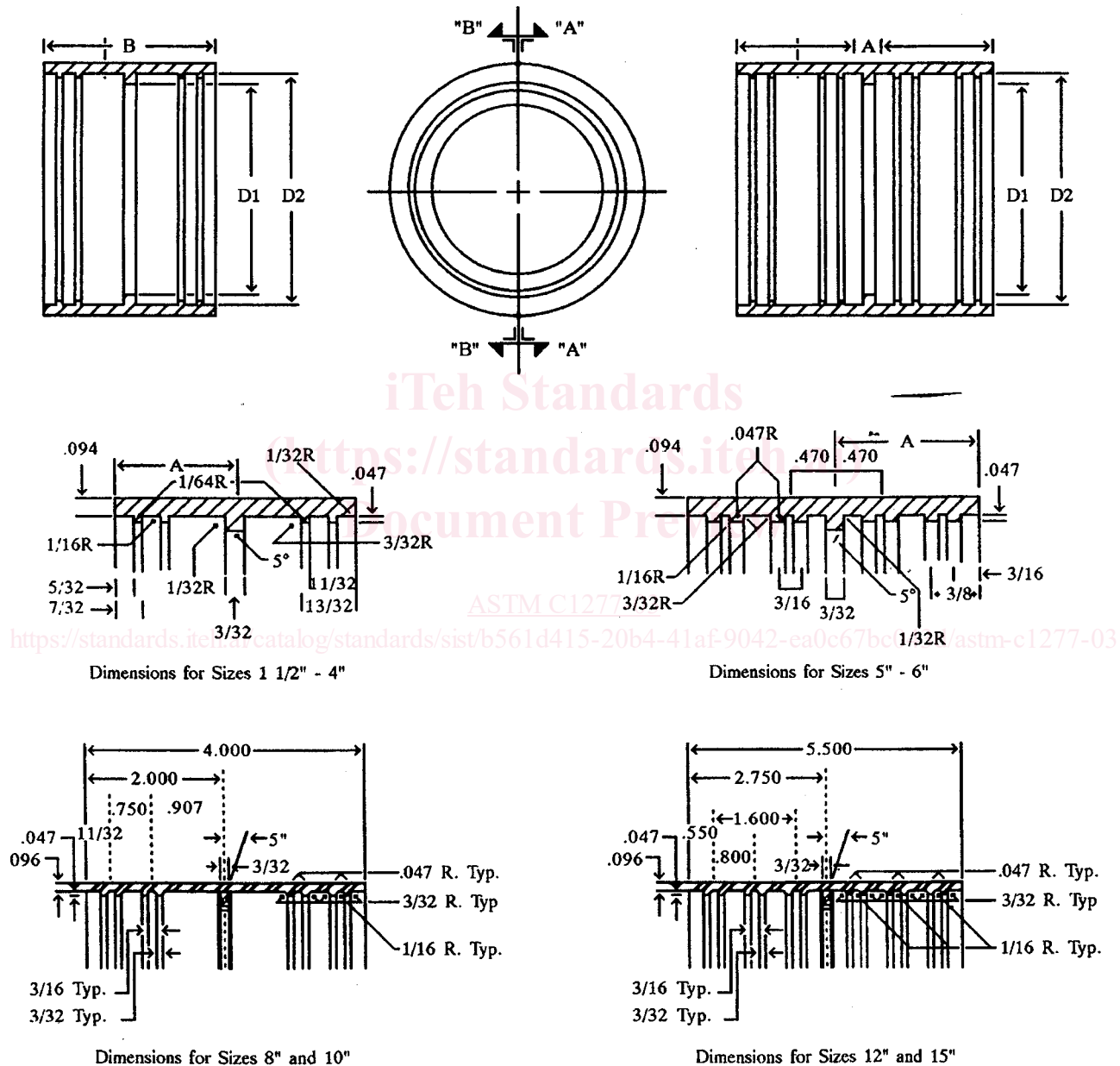
4.1 Physical properties of gaskets shall comply with Specification C 564 and the dimensions, material specifications, physical and chemical properties as shown in Fig. 1, Fig. 2, Table 1, and Table 2.

4.2 Clamp assembly screws or bolts shall not have screw-driver slots.

5. Elastomeric Gasket Requirements

5.1 The elastomeric gasket shall consist of one piece conforming to the physical requirements of Specification C 564.

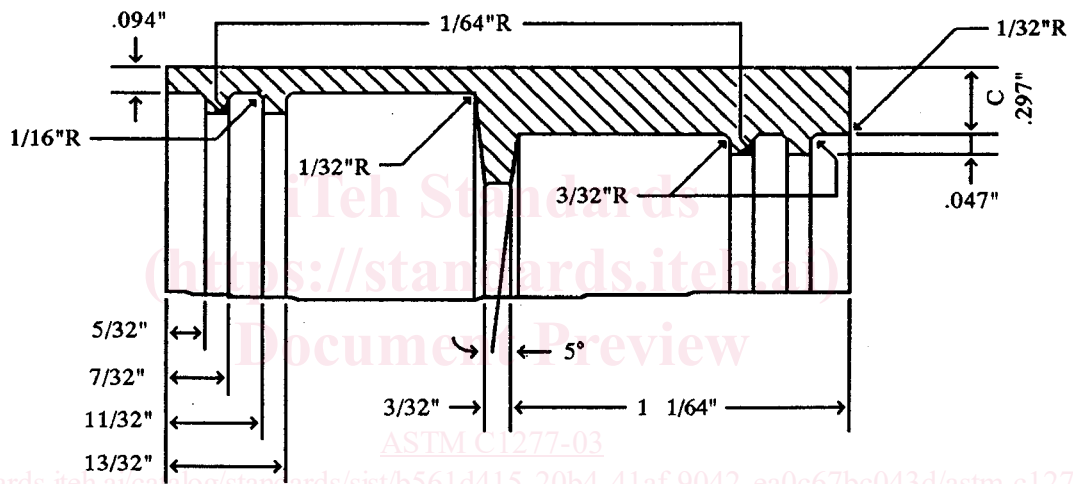
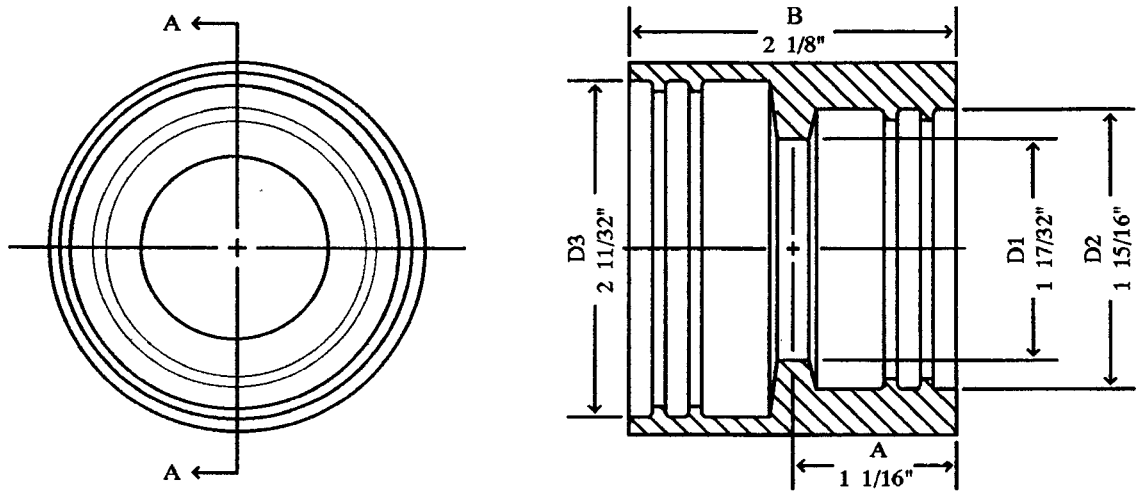
5.1.1 The elastomeric gasket shall have an inside center stop that does not create an enlargement chamber or recess with a ledge, shoulder, or reduction of pipe area or offer an obstruction to flow.



	1 1/2 in.	2 in.	3 in.	4 in.	Dimensions					
					5 in.	6 in.	8 in.	10 in.	12 in.	15 in.
A	1.062	1.062	1.062	1.062	1.500	1.500	2.000	2.000	2.750	2.750
B	2.125	2.125	2.125	2.125	3.000	3.000	4.000	4.000	5.500	5.500
D1	1.531	1.968	2.968	4.000	4.968	5.968	7.968	9.975	12.000	15.200
D2	1.937	2.343	3.343	4.406	5.343	6.343	8.343	10.350	12.430	15.650

Dimensional Tolerances to be RMA Class 3 (See Table 1).

FIG. 1 Rubber Gasket



	Dimensions for Reducing Sleeves		
	2 × 1-1/2	3 × 2	4 × 3
A	1.062	1.062	1.062
B	2.125	2.125	2.125
C	0.297	0.594	0.625
D1	1.531	1.968	2.968
D2	1.937	2.343	3.343
D3	2.343	3.343	4.406

Dimensional Tolerances to be RMA Class 3 (See Table 1).

FIG. 2 Reducing Rubber Gasket

TABLE 1 Dimensional Tolerances for Rubber—Standard Dimensional Tolerances RMA CLASS 3

Size, in.	Fixed, ±	Closure, ±
0 to 0.499	0.010	0.015
0.500 to 0.999	0.010	0.018
1.000 to 1.999	0.015	0.020
2.000 to 2.999	0.020	0.025
3.000 to 3.999	0.025	0.030
4.000 to 4.999	0.030	0.035
5.000 to 7.999	0.035	0.050

8.000 and over—multiplied by 0.0050. These are commercial tolerances.

5.1.2 The elastomeric gasket shall be free of defects that affect the use and serviceability.

## 6. Clamp Assembly Requirements

6.1 The shield and clamp assembly shall be made of material conforming to the requirements as outlined in Section 6, Table 3 and Fig. 3.

6.1.1 All parts shall be of 300 series stainless steel. All parts made from round stock shall be of 300 series stainless steel (excluding copper bearing alloys). The shield shall be corrugated or otherwise provided with a mechanism to accommodate maximum and minimum OD's of pipe and fittings and include 2 stainless steel bands for sizes 1 1/2 to 4 in. and 4 bands for 5 to 10 in. and 6 bands for 12 and 15 in. Each tightening device housing shall interlock with a band at the unslotted end. The bands are to be fastened to the shield by riveting or such

**TABLE 2 Rubber Gasket Physical Requirements**

NOTE 1—Material: The sealing sleeve shall be made from an elastomeric compound that meets the requirements of Specification C 564.

NOTE 2—Physical Tests: The test specimens shall be obtained from finished sleeves and tested pursuant to the methods described in the following table.

Test	Physical Tests, Min or Max Requirements	ASTM Method
Tensile Strength	1500 psi min	D 412
Elongation	250 min	D 412
Durometer (Shore A)	70 ± 5°F at 76 ± 5°F	D 2240
Accelerated Aging	15 % max tensile and 20 % max elongation deterioration, 10 points max; increase in hardness, all determinations after oven aging for 96 h at 158°F	D 573
Compression Set	25 % max after 22 h at 158°F	D 395 Method B
Oil Immersion	80 % max. volume change after immersion in ASTM oil no. IRM903 for 70 h at 212°F	D 471
Ozone Cracking	No visible cracking at 2 times magnification of the gasket after 100 h. Exposure in 1.5 ppm ozone concentration at 100°F. Testing and inspection to be on gasket which is loop mounted to give approximately 20 % elongation of outer surface	D 1149
Tear Resistance	Die C; 150 lb min per inch of thickness	D 624
Water Absorption	20 % max by weight after 7 days at 158°F	D 471

**TABLE 3 Material Specifications**

Band	Type 301 AISI Stainless Steel—Minimum Tensile 165 000 psi for 1½ to 15 in.; Type 304 AISI Stainless Steel is permitted Type 304 AISI Stainless Steel—Minimum Tensile 140 000 psi
Eyelets/Rivets	Type 300 AISI Stainless Steel
Screw Housing	Type 301 AISI Stainless Steel for 1½ to 15 in.; Type 304 AISI Stainless Steel is permitted
Screw	Type 305 AISI Stainless Steel— <sup>5</sup> / <sub>16</sub> Hex Head/Shoulder for 1½ to 10 in.; <sup>3</sup> / <sub>8</sub> Hex Head/Shoulder for 12 and 15 in. is required for couplings which require installed torque greater than 60 in.-lbf When other than <sup>3</sup> / <sub>8</sub> in. hex head screw is used on 12 and 15 in. couplings, the coupling shall be labeled with the required installation torque
Shield	Type 301 AISI Stainless Steel—Bright Annealed Only (Annealed and Pickled Not Acceptable) Hardness—Rockwell B-85 Max (Max Burr Height Not to Exceed 25 % of Thickness) for Type 301 AISI Stainless Steel; Rockwell B-95 Max (Max Burr Height Not to Exceed 25 % of Thickness) for Type 304 AISI Stainless Steel

- (1) Construction for sizes 1½ thru 10 in. shields have corrugations tapering in height from 0.000 to 0.030 in. at dimension “Y.” Y equals maximum of 1 in. (Type A Only)
- (2) Position clamps on shield as shown from inside end of clamp. Shield overlap to be as shown or reversed on 5, 6, 8, 10, 12, and 15 in. only.
- (3) Securely fasten each clamp to shield, two places for sizes 1½ to 4 in., three places for sizes 5, 6, 8, 10, 12, and 15 in.
- (4) Details of detent on 5, 6, 8, and 10 in. bands are shown in Fig. 4 (optional for 12 and 15 in.).
- (5) Max “X” is that dimension to which the clamp must open and still maintain positive engagement of the screw in the slots of the clamping band. Min. “X” is that dimension to which the clamping band must close and still maintain positive engagement of the screw in the slots of the clamping band.

other method that will insure that the bands will not become separated from the shield. The shield and clamp assembly shall comply with dimensions and material specifications, as are given in Table 3, Fig. 3, and Fig. 4.

6.1.2 Clamp assemblies shall be tested to withstand no less than 125 % of manufacturers stated installation torque or a minimum of 60 lbf-in. (6.78 N·m) of applied torque, whichever is greater, without visible signs of failure. The clamp assembly shall be tested over a steel mandrel of the appropriate diameter and torqued as required.

6.1.3 The clamped shield shall meet the requirements of Table 3.

6.1.4 The couplings shall meet the dimensional requirements of Fig. 3.

## 7. Couplings Requirements and Test Methods

7.1 Assemble each coupling tested according to the manufacturer’s instructions between two sections of randomly selected hubless cast iron soil pipe meeting the requirements of CISPI-301 or Specification A 888 and conduct the following test: deflection and shear. In addition, an unrestrained hydrostatic test will be performed between two sections of machined steel pipe.

### 7.1.1 Deflection Test:

7.1.1.1 A test apparatus such as the one shown in Fig. 5 is suggested. Other testing apparatus that provide restraint to the assembly shall also be permitted. Close the outboard ends of the pipe with test plugs.