



Standard Specification for Thermoplastic Elastomeric (TPE) Gasket Materials for Drain, Waste, and Vent (DWV), Sewer, Sanitary and Storm Plumbing Systems¹

This standard is issued under the fixed designation C 1440; 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 thermoplastic elastomeric (TPE) gasket materials for preformed elastomeric gaskets used in shielded and non-shielded mechanical couplings. These couplings are used in gravity flow drain, waste and vent (DWV), sewer, sanitary and storm plumbing systems. They include couplings to join similar and dissimilar piping sizes and material.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 *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:²

- A 644 Terminology Relating to Iron Castings
- C 395 Specification for Chemical-Resistant Resin Mortars
- D 412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
- D 471 Test Method for Rubber Property—Effect of Liquids
- D 573 Test Method for Rubber—Deterioration in an Air Oven
- D 624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

- D 1149 Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment
- D 1415 Test Method for Rubber Property—International Hardness
- D 2240 Test Method for Rubber Property—Durometer Hardness
- D 5964 Practice for Rubber IRM 901, IRM 902, and IRM 903 Replacement Oils for ASTM No. 1, ASTM No. 2, and ASTM No. 3 Oils

3. Terminology

3.1 *Definitions*—Refer to Terminology A 644 for definitions of the following terms used in this specification *elastomer*, *elastomeric*, *elongation*, *gasket*, *hardness*, *preformed gasket* (see *gasket*), *thermoplastic elastomer*.

4. Materials and Manufacture

4.1 Gaskets shall be made of virgin thermoplastic elastomeric compound containing only clean reworked thermoplastic elastomer material from the manufacturer's own production of the same compound.

4.2 Where splices are made in the gasket, the strength of the splice shall be such that the gasket will withstand the stretch test described in 8.9 with no visible separation or peeling.

4.3 Many thermoplastic elastomeric materials (TPE) are temperature sensitive. Designed operating temperature range for the 87 Shore A TPE materials is 0° to 130° F (–18° to 55°C). These materials are not designed or intended for prolonged operation outside this range.

5. Physical Properties

5.1 Gaskets representative of the manufacturer's production shall be selected as specified in Section 7 and shall conform to the requirements for physical properties listed in Table 1 when tested in accordance with the methods specified in Section 8.

6. Workmanship, Finish and Appearance

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

¹ This Specification is under the jurisdiction of ASTM Committee A04 on Iron Castings and is the direct responsibility of Subcommittee A04.75 on Gaskets and Coupling for Plumbing and Sewer Piping.

Current edition approved Oct. 1, 2008. Published November 2008. Originally approved in 1999. Last previous edition approved in 2007 as C 1440 – 07.

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.

TABLE 1 Physical Requirements of Gasket Materials

Properties Tested	ASTM Test Method	TPE ^A
Hardness, Shore A (± 5 pts)	D 2240	87 (5 s Delay)
Elongation, min, %	D 412	250
Tensile Strength, min. psi (kPa)	D 412	1500 (10 342)
Heat Aging	D 573	
96 h at $70 \pm 2^\circ\text{C}$ ($158 \pm 4^\circ\text{F}$)		
Hardness increase, max. pts. Shore A		10
Loss in tensile strength, max, %		15
Loss in elongation, max, %		20
Tear Strength, min. lbf/in (N/cm)	D 624	150(268)
Water Absorption	D 471	
7 days at $70 \pm 2^\circ\text{C}$ ($158 \pm 4^\circ\text{F}$)		
Weight increase, max %		20
Ozone Resistance	D 1149	No cracks
100 h at $40 \pm 2^\circ\text{C}$ ($104 \pm 4^\circ\text{F}$)		
Ozone Concentration 150 pphm		
20 % Extension		
Compression Set, max %	D 395	12
22 h at $70 \pm 1^\circ\text{C}$ ($158 \pm 2^\circ\text{F}$)	Method A	
Oil Immersion in IRM 903 Oil	D 471	
70 h at $100 \pm 2^\circ\text{C}$ ($212 \pm 4^\circ\text{F}$)		
Max Volume Increase, %		80
Max Volume Decrease, %		15

^ADesigned operating temperature for Shore A TPE materials is 0° to 130°F (-18° to 55°C). These materials are not designed or intended for prolonged operation outside this range.

6.2 Neither the flash thickness nor the flash extension shall exceed 1/32 in. (0.8 mm), at any point on the ring.

6.3 The offset, or failure of the mold to register accurately, shall not exceed 1/64 in. (0.4 mm).

7. Sampling

7.1 For the stretch test specified in 8.9, sample gaskets shall be selected at random from each shipment of gaskets. For each of the other tests, gaskets shall be selected at random as required by the method of test specified.

8. Test Methods

8.1 *Hardness*—Test the gasket material for hardness in accordance with Test Method D 2240. As required, use Test Method D 1415 as the referee method. Make hardness measurements on specimens prepared in accordance with 8.2. However, hardness readings for guidance purposes shall be taken directly on the gasket, recognizing that these shall be permitted to vary slightly from those taken on the dumbbell specimens.

8.2 *Elongation and Tensile Strength*—Test the gasket material for elongation and tensile strength in accordance with Test Method D 412. Cut standard ASTM Type C dumbbell specimens conforming to Fig. 1 (Apparatus for Tensile Set Test) of Test Method D 412 from sections of the gasket for this test. To obtain a uniform thickness, these sections shall be permitted to be buffed prior to cutting into dumbbell specimens, so as to produce a finely ground surface without cuts or burns.

8.3 *Tear Strength*—Test the gasket material for tear strength in accordance with Test Method D 624 using Die C.

8.4 *Compression Set*—Test the gasket material for compression set using Test Method D 395. For materials with a hardness of 90 IRHD or higher Method A must be used. For materials with a hardness less than 90 IRHD Method B must be used. Oven age samples for 22 h at $70 \pm 1^\circ\text{C}$ ($158^\circ \pm 2^\circ\text{F}$). When using Test Method A, there shall be a maximum dimensional change of 12 %. When using Test Method B, there shall be a maximum dimensional change of 25 %.

8.5 *Heat Aging*—Test the gasket material for heat aging in accordance with Test Method D 573. Prepare specimens in accordance with 8.2, and for 96 h at $70 \pm 2^\circ\text{C}$ ($158 \pm 4^\circ\text{F}$). Make hardness measurements as specified in 8.1.

8.6 *Water Absorption*—Test the gasket material for weight increase due to water absorption in accordance with Test Method D 471. If a 1 in. (25.4 mm) specimen cannot be cut from the sample gasket, use the greatest width obtainable. Immerse the test specimen in distilled water at $70 \pm 2^\circ\text{C}$ ($158 \pm 4^\circ\text{F}$) for seven days.

8.7 *Ozone Resistance*—Test the gasket material for ozone resistance in accordance with Test Method D 1149, using specimens and procedure specified under Method B. The ozone concentration shall be 150 pphm of air by volume. Age specimens 100 h at $40 \pm 2^\circ\text{C}$ ($104 \pm 4^\circ\text{F}$) with a 20 % extension. Use a two-power hand magnification glass to examine the gasket

8.8 *Oil Immersion*—Test the gasket material for volume decrease due to oil absorption in accordance with Test Method D 471. If a 1-in. (25.4 mm) specimen cannot be cut from the sample gasket, use the greatest width obtainable. The test specimen shall be immersed in IRM 903 oil for 70 h at $100 \pm 2^\circ\text{C}$ ($212 \pm 4^\circ\text{F}$).

8.9 *Stretch Test for Spliced Gaskets*—Stretch gaskets until the circumference is increased by 50 %, then visually inspect for defects as described in 4.2 and 6.1. One percent of the total spliced gaskets shall be tested with no failures.

9. Certification

9.1 When specified in the purchase order or contract, the purchaser shall be furnished certification stating samples representing each lot have been tested and inspected as indicated in this specification and the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished.

10. Marking

10.1 Each gasket shall be permanently marked with clearly legible letters. These markings shall include the gasket manufacturer's name or registered trademark, the pipe size and class, the country of origin, and the ASTM standard specification designation.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).