



Standard Specification for Contact Molded “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Flanges¹

This standard is issued under the fixed designation D 5421; 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 circular contact-molded fiberglass reinforced-thermosetting-resin flanges for use in pipe systems and tank nozzles. Included are requirements for materials, workmanship, performance, and dimensions.

1.2 Flanges (see Fig. 1) may be produced as integral flanges, Type A, or flange on pipe, Type B.

1.3 This specification is based on flange performance and does not cover design.

1.4 These flanges are designed for use with pipe and tanks that are manufactured to Specifications D 2996, D 2997, D 3262, D 3299, D 3517, D 3754, D 3982, and D 4097.

1.5 Selection of gaskets is not covered in this specification, refer to the manufacturer’s recommendation.

NOTE 1—*ISO Equivalent*—There is no similar or equivalent ISO standard.

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

1.7 The following precautionary caveat pertains only to the test methods portion, Section 9, of this specification: *This standard does not purport to address the safety problems, 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:

- C 582 Specification for Contact-Molded Reinforced Thermosetting Plastic (RTP) Laminates for Corrosion Resistant Equipment²
- D 883 Terminology Relating to Plastics³
- D 1599 Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings²
- D 1600 Terminology Relating to Abbreviated Terms Relating to Plastics³

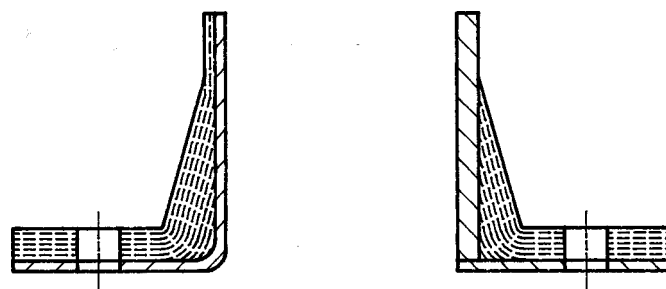


FIG. 1 Flange Types

D 2563 Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts⁴

D 2996 Specification for Filament Wound “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin Pipe)²

D 2997 Specification for Centrifugally Cast “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin Pipe)²

D 3262 Specification for Reinforced Plastic Mortar Sewer Pipe²

D 3299 Specification for Filament Wound Glass-Fiber-Reinforced Thermoset Resin Chemical-Resistant Tanks²

D 3517 Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pressure Pipe²

D 3754 Specification for Fiberglass Sewer and Industrial Pressure Pipe²

D 3982 Specification for Custom Contact-PressureMolded-Glass-Fiber-Reinforced Thermosetting Resin Hoods²

D 4097 Specification for Contact Molded Glass-Fiber-Reinforced Thermoset Resin Chemical Resistant Tanks²

F 412 Terminology Relating to Plastic Piping Systems²

F 436 Specification for Hardened Steel Washers⁵

2.2 ANSI Standards:

B 16.1 Cast Iron Pipe Flanges and Flanged Fittings⁶

B 16.5 Pipe Flanges and Flanged Fittings⁶

B 27.2 Type “A” Narrow Washers⁶

3. Terminology

3.1 Definitions:

¹ This specification is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.23 on Reinforced Plastic Piping Systems and Chemical Equipment.

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² Annual Book of ASTM Standards, Vol 08.04.

³ Annual Book of ASTM Standards, Vol 08.01.

⁴ Annual Book of ASTM Standards, Vol 08.02.

⁵ Annual Book of ASTM Standards, Vol 15.08.

⁶ Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, NY, NY 10036.

3.1.1 Definitions are in accordance with Terminology D 883. Abbreviations are in accordance with Terminology D 1600, unless otherwise indicated. The abbreviation for reinforced-thermosetting-resin pipe is RTRP.

3.2 *Descriptions of Terms Specific to This Standard:* Descriptions of Terms Specific to This Standard:

3.2.1 *contact molding (CM)*—a method of fabrication wherein the glass fiber reinforcement is applied to the mold in the form of all chopped-strand mat or chopped-strand mat and woven roving, in alternate plies by hand. The resin matrix is applied by brush or roller. Consolidation of the composite laminate is by roller.

3.2.2 *fiberglass pipe*—a tubular product containing glass-fiber reinforcements embedded in or surrounded by cured thermosetting resin. The composite structure may contain aggregate, granular, or platelet fillers, thixotropic agents, pigments, or dyes. Thermoplastic or thermosetting liners or coatings may be included.

4. Classification

4.1 *General*—This specification covers reinforced-thermosetting-resin flanges defined by type (method of manufacture), grade (generic type of resin), class (pressure end thrust capability), and pressure rating. Flanges complying with this specification are also given numerical classifications relating to rupture pressure and sealing test pressure.

4.1.1 *Types:*

4.1.1.1 *Type A*—Integral flange, contact molded with the stub integral with the flange.

4.1.1.2 *Type B*—Flange on pipe, contact molded onto an existing pipe or fitting.

4.1.2 *Grades:*

4.1.2.1 *Grade 1*—Epoxy resin.

4.1.2.2 *Grade 2*—Polyester resin.

4.1.2.3 *Grade 3*—Furan resin.

4.1.2.4 *Grade 4*—Vinylester resin.

4.1.2.5 *Grade 5*—Phenolic resin.

4.1.3 *Classes:*

4.1.3.1 *Class I*—Hoop and axial-pressure.

4.1.3.2 *Class II*—Hoop pressure only.

NOTE 2—All combinations of type, liner, grade, and class may not be commercially available. Additional type, liner, grade, and class may be added as they become commercially available. The purchaser should solely determine or consult with the manufacturer for the proper class, type, liner, and grade to be used under the installation and operating conditions that will exist for the project in which the flange is to be used.

4.1.4 *Pressure Rating*—Pressure rating shall be categorized by single-letter designation. Pressure designations are shown in Table 1.

4.1.5 Short-term rupture pressure and sealing-test pressure limits shall be categorized by single arabic number designations as indicated by the cell classification system of Table 2.

4.2 *Designation Code*—The flange-designation code shall consist of the abbreviation for contact molded (CM) followed by the type as a capital letter, grade as an Arabic numeral, class as a Roman numeral, and the pressure-rating category as a capital letter and two Arabic numbers identifying the cell-classification designations of the short-term rupture pressure and sealing-test pressure, respectively. Thus, a complete

TABLE 1 Pressure Categories

Designation	Pressure Rating ^A	
	psi	MPa
A	25	0.173
B	50	0.345
C	75	0.517
D	100	0.690
E	125	0.862
F	150	1.034

^A Flanges with higher pressure ratings are available by agreement between the purchaser and the manufacturer.

TABLE 2 Short-Term Rupture Pressure and Sealing-Test Pressure^A

Property/Cell Classification	1	2	3	4	5	6
Short-Term Rupture Pressure, psi (MPa)	100 (0.69)	200 (1.38)	300 (2.07)	400 (2.76)	500 (3.45)	600 (4.14)
Sealing-test pressure, psi (MPa)	37.5 (0.26)	75 (0.52)	112.5 (0.78)	150 (1.03)	187.5 (1.29)	225 (1.55)

^A Refer to Test Method D 1599 for explanation of failure.

flange-designation code shall consist of three letters, one Arabic numeral, one Roman numeral, one letter and two numerals.

4.2.1 *Example*—Contact molded fiberglass is CM-AIID-46. This designation described a stub flange, made using glass-fiber-reinforced polyester resin for full-axial pressure thrust. The flange has a 100-psi (0.69-MPa) pressure rating, a short-term rupture pressure of 400-psi (2.1-MPa), and a sealing-test pressure of 225-psi (1.6-MPa).

4.3 *Attachment of Flanges to Pipe, Pipe Fittings, or Tanks:*

4.3.1 Type “A” flanges are to be butt and strap welded to pipe described in Specifications D 2996, D 2997, D 3262, D 3517, D 3754, and D 3982 or using overlay joint into a tank as described in Specifications D 3299 and D 4097.

4.3.2 Type “B” flanges are built onto elbows, reducers, or other parts where the use of an integral flange (Type “A”) is not practical or required.

5. Materials and Manufacture

5.1 Flanges manufactured in accordance with this specification shall be composed of reinforcement embedded in or surrounded by cured thermosetting resin.

5.2 The resins, reinforcements, and other materials, when combined into composite structure, shall produce a flange that will meet the performance requirements of this specification.

5.3 Flanges manufactured in accordance with this specification shall have an inner corrosion barrier fabricated with the same resin, reinforcement, ply sequence, and nominal glass/resin ratio as required in the applicable ASTM standard for the tank or pipe on which the flange will be used.

6. Performance Requirements

6.1 The following performance requirements are intended to provide classification and performance criteria for the purpose of qualification testing and rating of prototype constructions and periodic reevaluation of the manufacturer’s stated ratings. They are not intended as routine quality assurance requirements for production runs of rated flanges:

6.1.1 *Sealing*—Flanges shall withstand a pressure of at least 1.5 times the pressure rating without leakage when tested in accordance with 9.4.