Designation: D5421 – 23

Standard Specification for Contact Molded "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Flanges[1]

This standard is issued under the fixed designation D5421; 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 D2996, D2997, D3262, D3299, D3517, D3754, and D4097.

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

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 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.*

NOTE 1—There is no known ISO equivalent to this standard.

1.8 *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:*[2]

C582 Specification for Contact-Molded Reinforced Thermosetting Plastic (RTP) Laminates for Corrosion-Resistant Equipment

D883 Terminology Relating to Plastics

D1599 Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings

D1600 Terminology for Abbreviated Terms Relating to Plastics

D2996 Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe

D2997 Specification for Centrifugally Cast "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe

D3262 Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe

D3299 Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks

D3517 Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe

D3754 Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer and Industrial Pressure Pipe

D4097 Specification for Contact-Molded Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks

2.2 *ASME Standards:*[3]

B 16.1 Cast Iron Pipe Flanges and Flanged Fittings

B 16.5 Pipe Flanges and Flanged Fittings

B 18.21.1 Type "A" Narrow Washers

3. Terminology

3.1 *Definitions:*

3.1.1 Definitions are in accordance with Terminology D883. Abbreviations are in accordance with Terminology D1600,

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[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.

[3] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, http://www.asme.org.

*A Summary of Changes section appears at the end of this standard

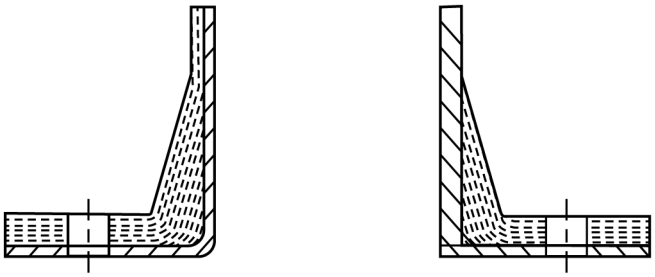

FIG. 1 Flange Types

unless otherwise indicated. The abbreviation for reinforced-thermosetting-resin pipe is RTRP.

3.2 *Definitions 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 with the resin matrix applied by brush or roller and the laminate consolidated by a 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*—Phenolic resin.

4.1.2.4 *Grade 4*—Vinylester resin.

4.1.2.5 *Grade 5*—Furan 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.

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.

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 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 epoxy 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 (2.76-MPa), and a sealing-test pressure of 225-psi (1. 55-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 D2996, D2997, D3262, D3517, and D3754, or using overlay joint into a tank as described in Specifications D3299 and D4097.

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.

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 D1599 for explanation of failure.