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An American National Standard

Standard Specification for Glass-Fiber-Reinforced Polyester Underground Petroleum Storage Tanks¹

This standard is issued under the fixed designation D 4021; 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 glass-fiber-reinforced horizontal, cylindrical, and spherical-type underground tanks for atmospheric pressure storage of petroleum based fuels and oils.

1.2 The values given in parentheses are provided for information purposes only.

1.3 The following safety hazards caveat pertains only to the test method portion, Section 8, of this specification: *This standard does not purport to address all of 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 33 Specification for Concrete Aggregates²
- C 581 Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass-Fiber-Reinforced Structures Intended for Liquid Service^{3,4}
- C 582 Specification for Contact-Molded Reinforced Thermosetting Plastic (RTP) Laminates for Corrosion Resistant Equipment⁴
- D 471 Test Method for Rubber Property—Effect of Liquids⁵
- D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing³
- D 698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm) Drop⁶
- D 790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials³
- D 883 Terminology Relating to Plastics^{3,4}
- D 1600 Terminology for Abbreviated Terms Relating to Plastics^{3,4}

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 (Section D20.23.16).

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² Annual Book of ASTM Standards, Vol 04.02.

³ Annual Book of ASTM Standards, Vol 08.01.

⁴ Annual Book of ASTM Standards, Vol 08.04.

⁵ Annual Book of ASTM Standards, Vol 09.01.

⁶ Annual Book of ASTM Standards, Vol 04.08.

D 2583 Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor⁷

D 2584 Test Method for Ignition Loss of Cured Reinforced Resins⁷

D 3299 Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Chemical-Resistant Tanks⁴

F 412 Terminology Relating to Plastic Piping Systems⁴

2.2 Other Documents:

ANSI B2.1 American Standard Tapered Pipe Threads⁸

ANSI B16.5 Steel Pipe Flanges, Flanged Valves, and Fittings⁸

ASME Boiler and Pressure Vessel Code Section III, Division I—Sub Section ND⁹

3. Terminology

3.1 **Definitions**—Definitions are in accordance with Terminology D 883 and F 412, and abbreviations with Terminology D 1600, unless otherwise indicated.

3.1.1 *cylinder wall*—that portion of a tank that forms the main body of a tank, and that part that lies horizontal in the ground after installation. (See Fig. 1 for further clarification.)

3.1.2 *fill tubes*—devices attached to a tank to assist in filling. These devices normally attach to a tank top and convey the liquid to or near to the tank bottom.

3.1.3 *fittings*—openings used to provide a means to fill, extract, or vent the contents of a tank.

3.1.4 *lifting device*—hook-on type device attached to a tank to provide means of lifting a tank.

3.1.5 *manways*—entrance ways installed in a tank for the purpose of access into a tank.

3.1.6 *spherical tanks*—tanks that are spherical or near spherical in shape. These tanks may be formed in one piece or may be formed by joining two hemispherical like tank heads together.

3.1.7 *tank heads*—that portion of a tank that closes the ends of the cylinder, making a tank into a container. Each tank has two tank heads. (See Fig. 1 for further clarification.)

4. Materials

4.1 **Resin**—The resin used shall be a commercial-grade unsaturated polyester resin.

4.2 **Reinforcing Materials**—Reinforcing materials shall be commercial “E” type glass in the form of mat, continuous

⁷ Annual Book of ASTM Standards, Vol 08.02.

⁸ Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.

⁹ Available from American Society of Mechanical Engineers, United Engineering Center, 345 E. 47th St., New York, NY 10017.