



**American Water Works
Association**

The Authoritative Resource for Safe Drinking WaterSM

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(Revision of ANSI/AWWA D120-84)

AWWA Standard

Thermosetting Fiberglass-Reinforced Plastic Tanks



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Contents

All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.

SEC.	PAGE	SEC.	PAGE
Foreword			
I	Introduction..... vii	4.4	General Requirements..... 6
I.A	Background..... vii	4.5	Design..... 6
I.B	History..... vii	4.6	Physical and Mechanical Properties of Tank Shell 8
I.C	Acceptance viii	4.7	Environmental Resistance of Tank Shell 9
II	Special Issues..... x	4.8	Leakage Under Internal Pressure..... 9
III	Use of This Standard x	4.9	Additional Requirements for Underground Tanks 10
III.A	Purchaser Options and Alternatives ... x	4.10	Construction..... 10
III.B	Modification to Standard..... xi	5	Verification
III.C	Information to Be Supplied by Manufacturer xi	5.1	General 18
IV	Major Revisions xi	5.2	Production Tests..... 18
V	Comments xi	5.3	Physical and Mechanical Properties of Tank Shell 20
Standard			
1	General	5.4	Environmental Resistance 21
1.1	Scope 1	5.5	Additional Tests for Underground Tanks..... 22
1.2	Purpose 2	5.6	Aboveground Tank Surface Burning Characteristics..... 24
1.3	Application 2	5.7	Retest 24
2	References 2	5.8	Inspection and Testing by Purchaser 24
3	Definitions 3	6	Delivery
4	Requirements	6.1	Marking..... 25
4.1	Classification..... 4	6.2	Packaging and Shipping..... 25
4.2	Potable Water Service 5		
4.3	Materials 5		

SEC.		PAGE	SEC.		PAGE
6.3	Handling.....	26	3	Pipe for Nozzle Assembly	14
6.4	Installation.....	27	4	Minimum Flange Thickness	
6.5	Affidavit of Compliance.....	27		for FRP Nozzles.....	15
			5	Shear Bond Area–Nozzles	17
			6	Torques on Pipe Fittings	23
<i>Appendix</i>					
A	Explanatory Notes to D120.....	29			
B	Preinstallation Site Analysis for		<i>Figures</i>		
	Underground Tanks.....	31	1	Flanged Nozzle	15
			2	Reinforcement of Cut Tank Wall	
C	Accessories for Underground			for Nozzle Attachment.....	16
	Tanks.....	33	3	Installed Nozzle (With Pipe	
				Penetration)	17
<i>Tables</i>					
1	Design Loads	7	4	Installed Nozzle (Without Pipe	
2	Minimum Widths of Overlaid			Penetration)	17
	Joints (Exclusive of Taper).....	12			

Foreword

This foreword is for information only and is not a part of AWWA D120.

I. Introduction.

I.A. *Background.* The purpose of this standard is to establish the significant quality requirements for commercially available thermosetting fiberglass-reinforced plastic tanks for use in the water utility industry. This standard is based on the technology for the fabrication of the tanks by either the contact-molded or filament-wound process. It is intended that the tanks are to be used for the storage of water and other liquids. Both aboveground and underground tanks are covered. The specific application must consider the limitations as specified according to Sec. 1.1, and information must be provided by the user to completely describe the tank requirements.

I.B. *History.* In June 1971, the Engineering and Construction Committee, appointed by the AWWA Technical and Professional Council, evaluated the use of reinforced plastics in the water utility industry and found sufficient use of products made from this material to recommend the development of an AWWA standard. One of the most extensive uses of reinforced plastics was for the construction of tanks. At the 1974 fall meeting, the AWWA Standards Council approved the formation of a committee for the preparation of an AWWA standard for reinforced plastic tanks for the water utility industry.

The standards committee began the preparation of the new standard early in 1975. The responses to a questionnaire sent out by the Engineering and Construction Committee indicated that the methods being followed for specifying and purchasing reinforced plastic products varied within the water utility industry. Frequently, it was the practice for the water utilities that were planning on using reinforced plastic products to state the actual or anticipated service conditions, and the manufacturer then warranted the product for that service. In other instances, the manufacturer presented a product for a particular type and condition of service, and the water utility then made the selection based on this presentation. Because of these practices, functional and product-design specifications used by both water utilities and tank fabricators evolved, and many of these were available to the committee.

In addition, applicable standards, specifications, and test methods published by the American Society for Testing and Materials (ASTM) and the US Department of

Commerce were reviewed by the committee. There were two documents the committee used as the basis for the AWWA Standard: (1) ASTM D 3299, Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Chemical-Resistant Tanks, and (2) National Bureau of Standards Voluntary Product Standard PS-15, Custom Contact-Molded Reinforced Polyester Chemical-Resistant Process Equipment.

The initial draft of the first edition of the standard was prepared and circulated to the committee members in 1976. The final draft was submitted to the committee for letter ballot voting on Apr. 15, 1983, and a consensus for acceptance was received.

In June 1997, the AWWA Standards Committee on Thermosetting Fiberglass-Reinforced Plastic Tanks began preparation of the revised standard. Inquiries into the water storage industry indicated the need for standards governing underground fiberglass-reinforced plastic tanks. The committee decided to incorporate in the revised standard current relevant standards for underground tanks used for storage of other products. For this purpose, the committee referred to UL 1316, Glass-Fiber-Reinforced Plastic Underground Storage Tanks. Further, the committee recognized the need to update the standard to incorporate current standards for aboveground tank design and production. Standards referred to for this purpose included (1) ASTM D 3299, Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks and (2) ASTM D4097, Specification for Contact-Molded Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.

The initial draft of the second edition of the standard was prepared and circulated to the committee members in 1998. The final draft was submitted to the committee for letter ballot voting in December 2001, and a consensus for acceptance was received. This edition was approved by the AWWA Board of Directors on June 16, 2002.

I.C. Acceptance. In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with a consortium led by NSF International (NSF) to develop voluntary third-party consensus standards and a certification program for all direct and indirect drinking water additives. Other members of the consortium included the American Water Works Association Research Foundation (AWWARF), the Conference of State Health and Environmental Managers (COSHEM), the American Water Works Association (AWWA), and the Association of State Drinking Water Administrators (ASDWA). The consortium

is responsible for the cooperative effort of manufacturers, regulators, product users, and other interested parties that develop and maintain the NSF standards.

In the United States, authority to regulate products for use in, or in contact with, drinking water rests with individual states. Local agencies may choose to impose requirements more stringent than those required by the state. To evaluate the health effects of products and drinking water additives from such products, state and local agencies may use various references, including

1. An Advisory program formerly administered by USEPA, Office of Drinking Water, discontinued on Apr. 7, 1990.
2. Specific policies of the state or local agency.
3. Two standards developed under the direction of NSF, ANSI^{*}/NSF[†] 60, Drinking Water Treatment Chemicals—Health Effects, and ANSI/NSF 61, Drinking Water System Components—Health Effects.
4. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*,[‡] and other standards considered appropriate by the state or local agency.

Various certification organizations may be involved in certifying products in accordance with ANSI/NSF 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdiction. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A “Toxicology Review and Evaluation Procedures” to ANSI/NSF 61 does not stipulate a maximum allowable level (MAL) of a contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of “unregulated contaminants” are based on toxicity testing guidelines (noncarcinogens) and risk characterization methodology (carcinogens). Use of Annex A procedures may not always be identical, depending on the certifier.

AWWA D120 does not address additives requirements. Thus, users of this standard should consult the appropriate state or local agency having jurisdiction in order to

^{*}American National Standards Institute, 25 W. 43rd St., Fourth Floor, New York, NY 10036-7406.

[†]NSF International, 789 N. Dixboro Rd., Ann Arbor, MI 48105-9723.

[‡]Both publications available from National Academy of Sciences, 2102 Constitution Ave. N.W., Washington, DC 20418-0006.

1. Determine additives requirements, including applicable standards.
2. Determine the status of certifications by all parties offering to certify products for contact with, or treatment of, drinking water.

3. Determine current information on product certification.

II. Special Issues. This standard has no applicable information for this section.

III. Use of This Standard. AWWA has no responsibility for the suitability or compatibility of the provisions of this standard to any intended application by any user. Accordingly, each user of this standard is responsible for determining that the standard's provisions are suitable for and compatible with that user's intended application. Section III.A summarizes supplemental information that should be considered. The purchaser should review this information and other appropriate data and make provisions in the supplemental specifications to describe the specific service requirements.

III.A. Purchaser Options and Alternatives. Purchasers are advised that, while this standard presents information on materials and procedures for manufacture of the tank, it does not contain all of the engineering information needed to prepare a complete specification for a particular tank installation. A specific installation may require provisions more restrictive than those in the standard and most certainly will require additional design and installation features. In placing orders for thermosetting fiberglass-reinforced plastic tanks to be manufactured in accordance with this standard, the purchaser, in its specifications, should include the following information:

1. Standard used—that is, AWWA D120, Thermosetting Fiberglass-Reinforced Plastic Tanks, of latest edition.
2. Type of tank—aboveground or underground.
3. Capacity.
4. Material to be stored in the tank.
5. Height, width, and weight, limitations.
6. Temperature conditions.
7. Fittings and attachments to be provided and their description.
8. Installation conditions.
9. Operating conditions.
10. Whether certified drawings are to be provided (Sec. III. C, foreword).
11. Whether plant inspection is required (Sec. 5.8.1).
12. Tests to be performed by the manufacturer (Sec. 5.8.4).

13. Whether an affidavit of compliance is to be provided (Sec. 6.5).
14. Whether ultraviolet absorbers are to be added (Sec. 4.3.1.2).
15. Whether fire-retardant agents are to be added (Sec. 4.3.1.4).
16. Loading conditions and design criteria (Sec. 4.5).
17. Whether the outside surface is to be pigmented, painted, or dyed (Sec. 4.10.2.4).
18. Flange gaskets (Sec. 4.10.5).
19. Location of hold-down or lifting lugs (Sec. 4.10.7 and 4.10.8).
20. Test samples to be provided by the manufacturer (Sec. 5.1.3).
21. Test media for immersion tests (Sec. 5.4.2.2).
22. Test temperature for immersion tests (Sec. 5.4.2.4).
23. Retest agreement (Sec. 5.7).

III.B. *Modification to Standard.* Any modification to the provisions, definitions, or terminology in this standard must be provided in the purchaser's specifications.

III.C. *Information to Be Supplied by Manufacturer.* When required, the manufacturer or its representative shall submit, for approval by the purchaser, certified drawings showing the principal dimensions, construction details, and materials used for the fabrication. All work shall be done in accordance with these certified drawings after they have been approved by the purchaser.

IV. **Major Revisions.** The second edition of this standard incorporates the following major revisions:

1. Incorporate provisions for underground tanks.
2. Provide more comprehensive design requirements.
3. Modify test requirements to align with current standards.
4. Remove minimum hoop stress and wall thickness formulas for filament-wound laminates.
5. Remove Table 1—strength requirements for contact-molded laminates.
6. Modify chemical (environmental) immersion test media to be more representative of actual service conditions for tanks in the water works industry.
7. Add requirements for tank installation.

V. **Comments.** If you have any comments or questions about this standard, please call the AWWA Volunteer and Technical Support Group, (303) 794-7711 ext 6285, FAX (303) 795-7603, or write to the group at 6666 West Quincy Avenue, Denver, Colorado 80235.

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AWWA Standard

Thermosetting Fiberglass-Reinforced Plastic Tanks

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the composition, performance requirements, construction practices and workmanship, design, and methods of testing thermosetting fiberglass-reinforced plastic (FRP) tanks for the storage of water or other liquids used in water supply service.

1.1.1 *Limit of standard.* This standard is limited to atmospheric pressure, vented, cylindrical and spherical tanks, installed either aboveground or underground.

1.1.2 *Temperature limits.* This standard is limited to tanks whose service temperature does not exceed 180°F (82°C) for aboveground tanks and 150°F (66°C) for underground tanks.

1.1.3 *Service limits.* The service limits for environmental exposure and structural loads shall be determined based on tests of laminates that are determined by the engineer to be representative of the materials and methods of fabrication used in the tank.

Sec. 1.2 Purpose

The purpose of this standard is to provide purchasers, manufacturers, and suppliers with the minimum requirements for thermosetting fiberglass-reinforced plastic (FRP) tanks, including material and design.

Sec. 1.3 Application

This standard can be referenced in specifications for purchasing and receiving thermosetting FRP tanks. This standard can be used for manufacturing this type of tank. The stipulations of this standard apply when this document has been referenced and then only to FRP tanks.

SECTION 2: REFERENCES

This standard references the following documents. In their latest editions, these documents form a part of this standard to the extent specified within the standard. In any case of conflict, the requirements of this standard shall prevail.

The following is a list of references used in this standard:

ANSI/AWWA C115/A21.15—Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Grey-Iron Threaded Flanges.

ANSI/AWWA C207—Steel Pipe Flanges for Water Works Service—Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm).

ANSI/ASME B16.1[†]—Cast Iron Pipe Flanges and Flanged Fittings.

ANSI/ASME B16.5—Pipe Flanges and Flanged Fittings.

ANSI/ASME B36.10—Welded and Seamless Wrought Steel Pipe.

ASTM C581[‡]—Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass-Fiber-Reinforced Structures Intended For Liquid Service.

ASTM D229—Standard Test Methods for Rigid Sheet and Plate Materials Used for Electrical Insulation.

*American National Standards Institute Inc., 25 W. 43rd St., Fourth Floor, New York, NY 10036-7406.

†American Society of Mechanical Engineers, 3 Park Ave., Floor 21, New York, NY 10016-5990.

‡American Society for Testing and Materials, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959.

ASTM D618—Standard Practice for Conditioning Plastics for Testing.

ASTM D638—Standard Test Method for Tensile Properties of Plastics.

ASTM D790—Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

ASTM D883—Standard Terminology Relating to Plastics.

ASTM D2105—Standard Test Method for Longitudinal Tensile Properties of “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Tube.

ASTM D2290—Standard Test Method for Apparent Tensile Strength of Plastic or Reinforced Plastic Pipe by Split Disk Method.

ASTM D2563—Standard Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts.

ASTM D2583—Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.

ASTM D2584—Standard Test Method for Ignition Loss of Cured Reinforced Resins.

ASTM D3299—Standard Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.

ASTM D3567—Standard Practice for Determining Dimensions of “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings.

ASTM D4097—Standard Specification for Contact-Molded Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.

ASTM E 84—Standard Test Method for Surface Burning Characteristics of Building Materials.

ASTM G23—Standard Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials.

UL* 1316—Glass-Fiber-Reinforced Plastic Underground Storage Tanks.

SECTION 3: DEFINITIONS

Unless otherwise indicated, the plastics terminology used in this standard is in accordance with ASTM D883, Standard Terminology Relating to Plastics. In this standard, the following definitions shall also apply:

*Underwriter’s Laboratories Inc., 333 Pfingsten Rd., Northbrook, IL 60062-2096.