

NFPA[®]

22

**Standard for
Water Tanks for
Private Fire Protection**

2018



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NFPA® 22

Standard for

Water Tanks for Private Fire Protection

2018 Edition

This edition of NFPA 22, *Standard for Water Tanks for Private Fire Protection*, was prepared by the Technical Committee on Water Tanks. It was issued by the Standards Council on November 10, 2017, with an effective date of November 30, 2017, and supersedes all previous editions.

This edition of NFPA 22 was approved as an American National Standard on November 30, 2017.

Origin and Development of NFPA 22

In 1909, the NFPA Committee on Gravity Tanks developed the *Standard on Gravity Tanks*. Amendments were considered in 1912 and 1913, and the standard was adopted in 1914. Revised or amended editions were adopted in 1915, 1917, 1918, 1919, 1922, 1926, 1928, 1930, 1931, 1933, 1936, 1941, 1949, and 1950.

The name of the committee was changed to the Committee on Water Tanks, and its recommendations resulted in changes adopted in 1957, 1958, 1962, 1965, 1967, 1970, 1971, 1974, 1976, 1978, 1981, and 1987.

Tanks other than gravity tanks (which, at that time, included concrete reservoirs) and valve pits were first covered in 1913, pressure tanks (formerly covered by *Standards for Sprinkler Systems*) were covered in 1915, and tank heating was covered in 1922. The standard title has been periodically amended to reflect the expanded scope of the standard.

The 1993 edition provided new, environmentally friendly requirements for tank-coating systems. Two new chapters were included to cover the design and erection of bolted steel tanks and concrete tanks. Information on fiberglass tanks also was included. These changes, along with other editorial changes, reflected the current information for water storage tank design.

The 1996 edition of NFPA 22 consolidated tank care and maintenance information within a single chapter. Further revisions addressed the corrosion resistance of certain tank components, access into tanks, the monitoring of internal conditions, and the structural stresses to which tanks are subjected. The figures in Appendix B were revised to reflect current practices. Editorial changes were also made.

The 1998 edition further addressed environmental issues. All inspection, testing, and maintenance requirements were removed and added to the appropriate chapter of the 1998 edition of NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

The 2003 edition was changed to conform to the *Manual of Style for NFPA Technical Committee Documents*, 2000 edition. Referenced publications were updated.

The 2008 edition recognized the use of fiberglass-reinforced plastic (FRP) tanks with a new Chapter 11. Acceptance test requirements were consolidated into a new Chapter 17, "Acceptance Test Requirements," to improve user-friendliness.

The 2013 edition added sizing requirements for break tanks in Chapter 4 and sizing procedures for pressure tanks in the Chapter 7 annex material. The term *suction tank* was defined, and the requirements for anti-vortex plates were revised. Table 5.4 was updated to align with current industry standards.

The 2018 edition substantially modified Chapters 5 and 6. In Chapter 5 all duplicate requirements to AWWA D100 have been removed and reference to AWWA D100 has been made; requirements specific to fire protection remain in Chapter 5. In Chapter 6 all duplicate requirements to AWWA D103 have been removed and reference to AWWA D103 made; requirements specific to fire protection remain in Chapter 6. Requirements for check valves in the discharge pipe of a suction tank have been clarified in Chapter 14, and tank repair requirements have been modified requiring the impairment procedures of NFPA 25 to be followed. Chapter 16 has added new criteria for electric immersion heaters, and the lowest one-day mean temperature map has been removed in lieu of using calculations to determine tank heating needs.

Technical Committee on Water Tanks

Robert M. Gagnon, *Chair*
Gagnon Engineering, MD [SE]

Kevin P. Bellew, Sprinkler Fitters & Apprentices Local 696, NJ [L]
Rep. United Assn. of Journeymen & Apprentices of the
Plumbing & Pipe Fitting Industry

Babanna Biradar, Bechtel India Pvt Ltd, India [SE]

John D. Campbell, Global Fire Protection Group, LLC, MO [SE]

Christopher Culp, Henderson Engineers, Inc., KS [SE]

Sullivan D. Curran, Fiberglass Tank & Pipe Institute, TX [M]
Rep. Fiberglass Tank & Pipe Institute

Douglas W. Fisher, Fisher Engineering, Inc., GA [SE]

Joseph R. Fowler, S.A. Comunale Company, Inc., OH [IM]

Greg Garber, Pittsburg Tank & Tower Inc., VA [M]

Andrew M. Henning, CAL FIRE, Office of the State Fire Marshal,
CA [E]

Jack Hillman, Hall-Woolford Tank Company, Inc., PA [M]

David Hochhauser, Isseks Brothers Incorporated, NY [IM]

Kevin J. Kelly, Victaulic, PA [IM]
Rep. National Fire Sprinkler Association

Todd M. Kidd, Liberty Mutual Insurance Companies, NC [I]

Nicholas A. Legatos, Preload Incorporated, NY [M]
Rep. American Concrete Institute

Keith McGuire, CST Storage, KS [M]

John M. Mitchard, Nuclear Service Organization, DE [I]

Bob D. Morgan, Fort Worth Fire Department, TX [E]

Thomas William Noble, American Fire Sprinkler Association, TX
[IM]

Leonard J. Ramo, Telgian Corporation, GA [SE]

Andrew Rosenwach, Rosenwach Tank Company, Inc., NY [M]
Rep. National Wood Tank Institute

Daniel Sanchez, City of Los Angeles, CA [E]

Mark A. Sornsin, Summit Companies, ND [IM]

Gregory R. Stein, Tank Industry Consultants, IN [SE]

Owen Stevens, Fiber Tech Corporation, VA [M]

Alternates

Roland A. Asp, National Fire Sprinkler Association, Inc., MD [IM]
(Alt. to Kevin J. Kelly)

Andrew J. Brady, Nuclear Service Organization, DE [I]
(Alt. to John M. Mitchard)

Patrick Jon Brown, Tank Industry Consultants, IN[SE]
(Alt. to Gregory R. Stein)

Skip Donnell, Liberty Mutual Insurance Company, IN[I]
(Alt. to Todd M. Kidd)

Christine Fowler, CAL FIRE, Office of the State Fire Marshal, CA
[E]
(Alt. to Andrew M. Henning)

Janna E. Shapiro, NFPA Staff Liaison

Jeremy W. John, Fisher Engineering, Inc., GA [SE]
(Alt. to Douglas W. Fisher)

Gary Koenig, Sprinkler Fitters Local Union 696, NJ [L]
(Alt. to Kevin P. Bellew)

R. Greg Patrick, Treasure Valley Fire Protection, Inc., ID [IM]
Voting Alternate

John J. Sweeney, Smith Engineered Storage Products Company, IL
[M]
(Alt. to Keith McGuire)

Daniel S. Vandergriff, Telgian Corporation, MO [SE]
(Alt. to Leonard J. Ramo)

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Committee Scope: This Committee shall have primary responsibility for documents on the design, construction, installation, and maintenance of tanks and accessory equipment supplying water for fire extinguishment, including gravity and pressure tanks, towers and foundations, pipe connections and fittings, valve enclosures and frost protection, and tank heating equipment.

Contents

| | | | |
|---|--------|---|--------|
| Chapter 1 Introduction | 22- 6 | 8.6 Workmanship. | 22- 18 |
| 1.1 Scope. | 22- 6 | 8.7 Accessories. | 22- 18 |
| 1.2 Purpose. | 22- 6 | | |
| 1.3 Retroactivity. | 22- 6 | Chapter 9 Embankment-Supported Coated Fabric | |
| 1.4 Equivalency. | 22- 6 | Suction Tanks | 22- 20 |
| 1.5 Types of Tanks. | 22- 6 | 9.1 General. | 22- 20 |
| 1.6 Units. | 22- 6 | 9.2 Standard Capacities. | 22- 20 |
| | | 9.3 Materials. | 22- 20 |
| Chapter 2 Referenced Publications | 22- 7 | 9.4 Embankment Preparation and Tank Installation | |
| 2.1 General. | 22- 7 | Procedure. | 22- 20 |
| 2.2 NFPA Publications. | 22- 7 | 9.5 Tank Sump and Support for Bottom Fittings. | 22- 22 |
| 2.3 Other Publications. | 22- 7 | 9.6 Pipe Connections and Fittings. | 22- 22 |
| 2.4 References for Extracts in Mandatory Sections. | | | |
| (Reserved) | 22- 8 | Chapter 10 Concrete Gravity Tanks and Suction Tanks .. | 22- 22 |
| | | 10.1 General. | 22- 22 |
| Chapter 3 Definitions | 22- 8 | 10.2 Prestressed Tanks. | 22- 22 |
| 3.1 General. | 22- 8 | 10.3 Standard Capacities. | 22- 22 |
| 3.2 NFPA Official Definitions. | 22- 8 | 10.4 Earthquake Load. | 22- 22 |
| 3.3 General Definitions. | 22- 9 | 10.5 Wall Treatments. | 22- 22 |
| | | | |
| Chapter 4 General Information | 22- 9 | Chapter 11 Fiberglass-Reinforced Plastic Tanks | 22- 22 |
| 4.1 Capacity and Elevation. | 22- 9 | 11.1 General. | 22- 22 |
| 4.2 Water Sources. | 22- 9 | 11.2 Application. | 22- 22 |
| 4.3 Location of Tanks. | 22- 9 | 11.3 Tank Specification. | 22- 22 |
| 4.4 Tank Materials. | 22- 9 | 11.4 Monolithic Tanks. | 22- 22 |
| 4.5 Workmanship. | 22- 10 | 11.5 Protection of Buried Tanks. | 22- 23 |
| 4.6 Plans. | 22- 10 | 11.6 Protection of Aboveground Tanks | 22- 23 |
| 4.7 Tank Contractor Responsibility. | 22- 10 | 11.7 Tank Connections. | 22- 23 |
| 4.8 Attachments to Tank Structures. | 22- 10 | | |
| 4.9 Lightning Protection. | 22- 10 | Chapter 12 Tank and Tower Foundations in the | |
| 4.10 Strength. | 22- 10 | Ground | 22- 23 |
| 4.11 National Standards. | 22- 10 | 12.1 Concrete Specifications. | 22- 23 |
| 4.12 Loads. | 22- 10 | 12.2 Suction Tank Foundations. | 22- 23 |
| 4.13 Welding. | 22- 11 | 12.3 Foundation Piers for Elevated Tanks. | 22- 24 |
| 4.14 Roofs. | 22- 11 | 12.4 Anchorage. | 22- 24 |
| 4.15 Roof Vent. | 22- 11 | 12.5 Grouting. | 22- 24 |
| 4.16 Test Reports. | 22- 11 | 12.6 Soil-Bearing Pressures. | 22- 24 |
| | | | |
| Chapter 5 Welded-Carbon Steel and Composite | | Chapter 13 Steel Tank Towers | 22- 25 |
| Concrete and Carbon Steel Gravity Tanks | | 13.1 General. | 22- 25 |
| and Suction Tanks | 22- 12 | 13.2 Materials. | 22- 25 |
| 5.1 General. | 22- 12 | 13.3 Loads. | 22- 25 |
| 5.2 Materials. | 22- 12 | 13.4 Unit Stresses. | 22- 26 |
| 5.3 Preventing Ice Damage. | 22- 12 | 13.5 Details of Design. | 22- 28 |
| 5.4 Corrosion Protection for Bottom Plates on Soil | | 13.6 Workmanship. | 22- 30 |
| or Concrete. | 22- 12 | 13.7 Accessories. | 22- 31 |
| 5.5 Painting Inaccessible Areas. | 22- 12 | | |
| 5.6 Painting and Corrosion Protection. | 22- 12 | Chapter 14 Pipe Connections and Fittings | 22- 32 |
| 5.7 Painting Application. | 22- 12 | 14.1 General Information. | 22- 32 |
| 5.8 Heavy Metals. | 22- 12 | 14.2 Discharge Pipe. | 22- 33 |
| | | 14.3 Expansion Joint. | 22- 35 |
| Chapter 6 Factory-Coated, Bolted Carbon Steel Tanks | 22- 12 | 14.4 Filling. | 22- 35 |
| 6.1 General. | 22- 12 | 14.5 Break Tanks. | 22- 36 |
| 6.2 Materials, Fabrication, and Installation. | 22- 13 | 14.6 Overflow. | 22- 36 |
| 6.3 Corrosion Protection. | 22- 13 | 14.7 Clean-Out and Drain. | 22- 37 |
| 6.4 Structural Shapes. | 22- 13 | 14.8 Connections for Other Than Fire Protection. | 22- 37 |
| | | 14.9 Sensors. | 22- 37 |
| Chapter 7 Pressure Tanks | 22- 13 | | |
| 7.1 General. | 22- 13 | Chapter 15 Valve Enclosures and Frost Protection | 22- 37 |
| 7.2 Pipe Connections and Fittings. | 22- 14 | 15.1 Valve Pit or House and Heater House. | 22- 37 |
| | | 15.2 Frostproof Casing. | 22- 39 |
| Chapter 8 Wood Gravity Tanks and Suction Tanks | 22- 15 | | |
| 8.1 General. | 22- 15 | Chapter 16 Tank Heating | 22- 40 |
| 8.2 Material. | 22- 16 | 16.1 General. | 22- 40 |
| 8.3 Loads. | 22- 16 | 16.2 Heating Requirements. | 22- 44 |
| 8.4 Unit Stresses. | 22- 16 | 16.3 Heating Systems. | 22- 45 |
| 8.5 Details of Design. | 22- 17 | 16.4 Tank Insulation. | 22- 49 |

| | | | |
|---|---------------|---|---------------|
| 16.5 Heating for Embankment-Supported Coated Fabric Suction Tanks. | 22- 49 | 17.10 Disposal of Test Water. | 22- 50 |
| Chapter 17 Acceptance Test Requirements | 22- 49 | 17.11 Anti-Vortex Plate Inspection. | 22- 50 |
| 17.1 Inspection of Completed Equipment. | 22- 49 | Chapter 18 Inspection, Testing, and Maintenance of Water Tanks | 22- 50 |
| 17.2 Testing. | 22- 49 | 18.1 General. | 22- 50 |
| 17.3 Welded Steel Tanks. | 22- 49 | Annex A Explanatory Material | 22- 50 |
| 17.4 Bolted Steel Tanks. | 22- 50 | Annex B Typical Installations | 22- 63 |
| 17.5 Pressure Tanks. | 22- 50 | Annex C Informational References | 22- 81 |
| 17.6 Embankment-Supported Coated Fabric Tanks. | 22- 50 | Index | 22- 82 |
| 17.7 Concrete Tanks. | 22- 50 | | |
| 17.8 Wood Tanks. | 22- 50 | | |
| 17.9 Fiberglass-Reinforced Plastic Tanks — Hydrostatic Test. | 22- 50 | | |

NFPA 22

Standard for

Water Tanks for Private Fire Protection

2018 Edition

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Information on referenced publications can be found in Chapter 2 and Annex C.

Chapter 1 Introduction

1.1 Scope. This standard provides the minimum requirements for the design, construction, installation, and maintenance of tanks and accessory equipment that supply water for private fire protection, including the following:

- (1) Gravity tanks, suction tanks, pressure tanks, and embankment-supported coated fabric suction tanks
- (2) Towers
- (3) Foundations
- (4) Pipe connections and fittings
- (5) Valve enclosures
- (6) Tank filling
- (7) Protection against freezing

1.2 Purpose. The purpose of this standard is to provide a basis for the design, construction, operation, and maintenance of water tanks for private fire protection.

1.3 Retroactivity. The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.3.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.3.2 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.3.3 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.4 Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.4.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.4.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.5 Types of Tanks. This standard addresses elevated tanks on towers or building structures, water storage tanks that are at grade or below grade, and pressure tanks.

1.5.1 Bladder Tanks Not Within NFPA 22 Scope. The following types of bladder tanks shall not be required to meet NFPA 22:

- (1) Listed bladder tanks used as surge suppressors on the discharge side of fire pumps installed in accordance with NFPA 20
- (2) Listed bladder tanks used as expansion tanks for anti-freeze sprinkler systems installed in accordance with NFPA 13
- (3) Bladder tanks used as foam concentrate tanks installed in accordance with NFPA 16 or NFPA 11

1.5.2 Bladder Tanks Within the Scope of NFPA 22. Bladder tanks shall be permitted to be a part of the water supply for a fire protection system when they meet the requirements for pressure tanks of this standard.

1.6 Units.

1.6.1 Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI). The bar unit, which is outside of but recognized by SI, is commonly used in international fire protection. Metric units and their conversion factors are shown in Table 1.6.1.

1.6.2 If a value for measurement in this standard is followed by an equivalent value that is expressed in other units, the first stated value shall be regarded as the requirement. A given equivalent value could be approximate.

Table 1.6.1 Metric Unit Conversion Factors

| Name of Unit | Unit Symbol | Conversion Factor |
|--------------|-------------|----------------------------|
| bar | bar | 1 psi = 0.0689 bar |
| bar | bar | 1 bar = 10 ⁵ Pa |

Note: For additional conversions and information, see IEEE/ASTM SI 10.

1.6.3 SI units in this standard have been converted by multiplying the number of units by the conversion factor and then rounding the result to the appropriate number of significant digits.

1.6.4 Where sizes for pipe, sheet and plate steel, and wire gages are indicated, they are noted in trade sizes and not by hard conversions.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2016 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2016 edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 2016 edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 2017 edition.

NFPA 16, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*, 2015 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2016 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2016 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2017 edition.

NFPA 70®, *National Electrical Code®*, 2017 edition.

NFPA 72®, *National Fire Alarm and Signaling Code*, 2016 edition.

NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*, 2013 edition.

NFPA 780, *Standard for the Installation of Lightning Protection Systems*, 2017 edition.

2.3 Other Publications.

2.3.1 ACI Publications. American Concrete Institute, 38800 Country Club Drive, Farmington Hills, MI 48331-3439.

ACI 318, *Building Code Requirements for Structural Concrete and Commentary*, 2014.

ACI 350R, *Code Requirements for Environmental Engineering Concrete Structures*, 2006.

2.3.2 AISC Publications. American Institute of Steel Construction, 103 East Randolph Street, Suite 2000, Chicago, IL 60601.

ANSI/AISC 360, *Specification for Structural Steel Buildings*, 2016.

2.3.3 API Publications. American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005-4070.

API SPEC 5L, *Specification for CRA Line Pipe*, 4th edition, 2015.

2.3.4 ASHRAE Publications. ASHRAE Inc., 1791 Tullie Circle, NE, Atlanta, GA 30329-2305.

ASHRAE *Handbook — Fundamentals*, 2013.

2.3.5 ASME Publications. American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

Boiler and Pressure Vessel Code, “Rules for the Construction of Unfired Pressure Vessels,” 2015.

2.3.6 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM A36/A36M, *Standard Specification for Carbon Structural Steel*, 2014.

ASTM A53/A53M, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*, 2012.

ASTM A106/A106M, *Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service*, Rev. A, 2015.

ASTM A108, *Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality*, 2013.

ASTM A131/A131M, *Standard Specification for Structural Steel for Ships*, 2014.

ASTM A139/A139M, *Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and over)*, 2016.

ASTM A283/A283M, *Standard Specification for Low- and Intermediate-Tensile Strength Carbon Steel Plates*, Rev. A, 2013.

ASTM A285/A285M, *Standard Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength*, 2012.

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2.4 References for Extracts in Mandatory Sections. (Reserved)

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.5 Shall. Indicates a mandatory requirement.

3.2.6 Should. Indicates a recommendation or that which is advised but not required.