

NFPA® 385

**Standard for
Tank Vehicles for Flammable
and Combustible Liquids**

2017



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NFPA® 385

Standard for

Tank Vehicles for Flammable and Combustible Liquids

2017 Edition

This edition of NFPA 385, *Standard for Tank Vehicles for Flammable and Combustible Liquids*, was prepared by the Technical Committee on Transportation of Flammable Liquids. It was issued by the Standards Council on July 19, 2016, with an effective date of August 8, 2016, and supersedes all previous editions.

This edition of NFPA 385 was approved as an American National Standard on August 8, 2016.

Origin and Development of NFPA 385

This standards project was initiated in 1926, and the first edition of NFPA 385 was officially adopted in 1929. NFPA 385 was revised in 1933, 1948, 1953, 1954, 1955, 1957, 1958, 1959, 1960, 1963, 1964, 1966, 1971, 1974, 1979, 1985, 1990, 2000, 2006, and 2011. Editions prior to 1948 had different titles.

The 2000 edition incorporated the following amendments:

- (1) Revised requirements for warning signs, in 3-4.5
- (2) Revised requirements for fire extinguishers for tank vehicles, in 6-3.1

The 2007 edition incorporated the following amendments:

- (1) Revised definitions to correlate with NFPA 30, *Flammable and Combustible Liquids Code*
- (2) Correction of an error in 6.3.1 related to fire extinguisher rating
- (3) Complete editorial revision to comply with the NFPA *Manual of Style for NFPA Technical Committee Documents*

The 2012 edition incorporated the following amendments:

- (1) Addition of NFPA standard statements of retroactivity (1.4), equivalency (1.5), and units and formulas (1.6), as specified in *Manual of Style for NFPA Technical Committee Documents*
- (2) Replacement of the definitions for *combustible liquid* and *flammable liquid* with the definitions specified by NFPA 30, *Flammable and Combustible Liquids Code*
- (3) Addition of new 8.2.6.1 prohibiting the storage of flammable or combustible materials in any enclosure intended for an auxiliary generator or motor
- (4) Expansion of 9.1.1 to include training of drivers in emergency and safety procedures and addition of an annex item (A.9.1.1) detailing some of the procedures to be addressed
- (5) In 9.2.16, addition of a requirement to chock the wheels of the tank vehicle in addition to setting the parking brake prior to cargo transfer
- (6) In new 9.3.1.1, specification of a minimum discharge rate for the portable extinguisher mounted on the tank vehicle
- (7) Clarification of the mounting location for the portable extinguisher mounted on the tank vehicle

The 2017 edition incorporates the following amendments:

- (1) Revision of 9.3.4 to be consistent with the provisions of NFPA 10, *Standard for Portable Fire Extinguishers*
- (2) Updating of all referenced publications in Chapter 2 and Annex C to current editions

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This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on safeguarding against the fire and explosion hazards associated with over-the-road transportation of flammable and combustible liquids in tank vehicles and in portable tanks and containers.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex C. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

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

Chapter 1 Administration**1.1 Scope.**

1.1.1* This standard shall apply to tank vehicles used for the transportation of asphalt and for the transportation of normally stable flammable and combustible liquids with flash points below 200°F (93°C).

1.1.2 This standard shall also provide minimum requirements for the design and construction of cargo tanks and their appurtenances and shall set forth certain matters pertaining to tank vehicles.

1.1.3 The provisions of this standard shall not preclude the use of additional safeguards for tank vehicles used for the transportation of flammable and combustible liquids having charac-

teristics that introduce additional factors such as high rates of expansion, instability, corrosiveness, and toxicity.

1.1.4 The provisions of this standard shall also apply to cutback asphalts that have flash points below 100°F (37.8°C) and to liquids transported at temperatures elevated above their flash points.

1.1.5 The requirements for aircraft fuel servicing tank vehicles shall be in accordance with NFPA 407.

1.1.6 A tank vehicle transporting a flammable or combustible liquid in interstate service shall be considered to be in compliance with this standard while it is in interstate service if it meets the requirements of the U.S. Department of Transportation in 49 CFR 171–179, "Hazardous Materials Regulations."

1.2 Purpose. The purpose of this standard shall be to provide for safe transportation of flammable and combustible liquids in tank vehicles.

1.3 Application. (Reserved)

1.4 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.

1.4.1 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.

1.4.2 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.

1.4.3 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.

1.5 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.

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

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

1.6 Units and Formulas.

1.6.1 The units of measure in this standard are presented first in U.S. customary units (inch-pound units). International System (SI) units follow the inch-pound units in parentheses.

1.6.2 Either system of units shall be acceptable for satisfying the requirements in this standard.

1.6.3 Users of this standard shall apply one system of units consistently and shall not alternate between systems of units.

1.6.4 The values presented for measurements in this standard are expressed with a degree of precision appropriate for practical application and enforcement. It is not intended that the application or enforcement of these values be more precise than the precision expressed.

1.6.5 Where extracted text contains values expressed in only one system of units, the values in the extracted text have been retained without conversion to preserve the values established by the responsible technical committee in the source document.

1.7 Enforcement. (Reserved)

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 10, *Standard for Portable Fire Extinguishers*, 2017 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2015 edition.

NFPA 58, *Liquefied Petroleum Gas Code*, 2017 edition.

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

NFPA 407, *Standard for Aircraft Fuel Servicing*, 2017 edition.

2.3 Other Publications.

2.3.1 ANSI Publications. American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

ANSI Z535.1, *Safety Color Code*, 2011.

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

Boiler and Pressure Vessel Code, 2015.

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

ASTM B209, *Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate*, 2014.

ASTM D5/D5M, *Standard Test Method for Penetration for Bituminous Materials*, 2013.

ASTM D323, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)*, 2015a.

ASTM D4359, *Standard Test for Determining Whether a Material is a Liquid or a Solid*, 2013.

2.3.4 U.S. Government Publications. U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

Title 49, Code of Federal Regulations, Parts 171–179, “Hazardous Materials Regulations.”

Title 49, Code of Federal Regulations, Part 393.86, “Rear Impact Guards and Rear End Protection.”

2.3.5 Other Publications.

Merriam-Webster’s Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 30, *Flammable and Combustible Liquids Code*, 2015 edition.

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 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Baffle. For the purposes of this standard, a nonliquid-tight transverse partition in a cargo tank.

3.3.2 Bulkhead. For the purposes of this standard, a liquid-tight transverse closure between compartments of a cargo tank.

3.3.3 Cargo Tank. For the purposes of this standard, any tank having a liquid capacity in excess of 110 gal (415 L) used for carrying flammable and combustible liquids or asphalt and mounted permanently or otherwise upon a tank vehicle. The term *cargo tank* does not apply to any container used solely for the purpose of supplying fuel for the propulsion of the tank vehicle upon which it is mounted.

3.3.4 Combustible Liquid. See 3.3.9.1.

3.3.5 Compartment. For the purposes of this standard, a liquidtight division in a cargo tank.

3.3.6 Flammable Liquid. See 3.3.9.2.

3.3.7* Flash Point. The minimum temperature at which a liquid or a solid emits vapor sufficient to form an ignitable mixture with air near the surface of the liquid or the solid.

3.3.8 Head. A liquidtight transverse closure at the end of a cargo tank.

3.3.9 Liquid. Any material that (1) has a fluidity greater than that of 300 penetration asphalt when tested in accordance with ASTM D5/D5M, *Standard Test Method for Penetration for Bituminous Materials*, or (2) is a viscous substance for which a specific melting point cannot be determined but that is determined to be a liquid in accordance with ASTM D4359, *Standard Test for Determining Whether a Material is a Liquid or a Solid*. [30, 2015]

3.3.9.1* Combustible Liquid. Any liquid that has a closed-cup flash point at or above 100°F (37.8°C), as determined by the test procedures and apparatus set forth in Section 4.4 of NFPA 30. Combustible liquids are classified according to Section 4.3 of NFPA 30. [30, 2015]

3.3.9.2* Flammable Liquid. Any liquid that has a closed-cup flash point below 100°F (37.8°C), as determined by the test procedures and apparatus set forth in Section 4.4 of NFPA 30, and a Reid vapor pressure that does not exceed an absolute pressure of 40 psi (276 kPa) at 100°F (37.8°C), as determined by ASTM D323, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)*. Flammable liquids are classified according to Section 4.3 of NFPA 30. [30, 2015]

3.3.10 Tank.

3.3.10.1 Full-Trailer Tank. Any vehicle with or without auxiliary motive power, equipped with a cargo tank mounted thereon or built as an integral part thereof, used for the transportation of flammable and combustible liquids or asphalt, and so constructed that practically all of its weight and load rests on its own wheels.

3.3.10.2 Semi-Trailer Tank. Any vehicle, with or without auxiliary motive power, equipped with a cargo tank mounted thereon or built as an integral part thereof, used for the transportation of flammable and combustible liquid or asphalt, and so constructed that, when drawn by a tractor by means of a fifth wheel connection, some part of its load and weight rests upon the towing vehicle.

3.3.11 Tank Truck. Any single self-propelled motor vehicle equipped with a cargo tank mounted thereon and used for the transportation of flammable and combustible liquids or asphalt.

3.3.12 Tank Vehicle. Any tank truck, tank full-trailer, or tractor and tank semi-trailer combination.

3.3.13* Vapor Pressure. The pressure, measured in pounds per square inch, absolute (psia), exerted by a liquid, as determined by ASTM D323, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)*. [30, 2015]

Chapter 4 Classification of Flammable and Combustible Liquids

4.1 Scope.

4.1.1 This chapter shall establish a uniform system of defining and classifying flammable and combustible liquids for the purpose of proper application of this standard.

4.1.2 Classifications established by this chapter shall apply to any liquid within the scope of, and subject to, the requirements of this standard.

4.2 Classification of Liquids. Any liquid within the scope of this standard and subject to the requirements of this standard shall be classified in accordance with this section.

4.2.1 Flammable liquids, as defined in 3.3.9.2, shall be classified as Class I liquids and shall be further subclassified in accordance with the following:

- (1) Class IA Liquid. Any liquid that has a flash point below 73°F (22.8°C) and a boiling point below 100°F (37.8°C).
- (2) Class IB Liquid. Any liquid that has a flash point below 73°F (22.8°C) and a boiling point at or above 100°F (37.8°C).
- (3) Class IC Liquid. Any liquid that has a flash point at or above 73°F (22.8°C) but below 100°F (37.8°C). [30, 2015]

4.2.2 Combustible liquids, as defined in 3.3.9.1, shall be subclassified in accordance with the following:

- (1) Class II Liquid. Any liquid that has a flash point at or above 100°F (37.8°C) and below 140°F (60°C).
- (2) Class III Liquid. Any liquid that has a flash point at or above 140°F (60°C). Class III liquids shall be further subclassified in accordance with the following:
 - (a) Class IIIA Liquid. Any liquid that has a flash point at or above 140°F (60°C), but below 200°F (93°C).
 - (b) Class IIIB Liquid. Any liquid that has a flash point at or above 200°F (93°C).

[30, 2015]

Chapter 5 Tank Vehicle Design

5.1 Requirements Applicable to All Tank Vehicles — General.

5.1.1 Design of the tank vehicle shall give engineering consideration to the structural relationship between the cargo tank, the propulsion equipment, and the supporting members, if any, with due regard to the weight and temperature of the cargo, road performance, braking, and required ruggedness.