

NFPA[®]

505

**Fire Safety Standard for
Powered Industrial Trucks
Including Type Designations,
Areas of Use, Conversions,
Maintenance, and Operations**

2018



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NFPA® 505

Fire Safety Standard for

Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations

2018 Edition

This edition of NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations*, was prepared by the Technical Committee on Industrial Trucks. It was issued by the Standards Council on July 28, 2017, with an effective date of August 18, 2017, and supersedes all previous editions.

This edition of NFPA 505 was approved as an American National Standard on August 18, 2017.

Origin and Development of NFPA 505

Chapter 1 (formerly Part A) of this standard was originally designated as NFPA 505A and was first adopted by the Association in 1951. Chapters 8 and 9 (formerly Parts A and B), “Maintenance of Industrial Trucks” and “Fuel Recharging, Marking, and Operation of Industrial Trucks,” were originally adopted in 1952 and published by NFPA under the designations NFPA 505B and 505C, *Standards for the Maintenance and Safe Operation of Industrial Trucks*. In 1955, the three documents were combined into one standard, NFPA 505. Revisions were made in 1955, 1957, 1963, 1965, 1966, 1967, 1968, 1969, 1971, 1972, 1973, 1975, 1978, 1982, and 1987. The 1971 edition was the first edition to be approved by ANSI.

In the 1992 edition, Group F was added to the list of classified locations to correlate with *NFPA 70®*, *National Electrical Code®*.

In the 1996 edition, changes were made to the types of trucks listed for operation in Class I, Division 2 locations, and a new Type DX designation was added. Also, a new section on compressed natural gas (CNG) was added, and related changes to the chapters on dual-fuel trucks and converted trucks were made.

The 1999 edition was revised to make the entire document more user-friendly and to facilitate its use with *NFPA 70*.

The 2002 edition was editorially reorganized to conform to the *Manual of Style for NFPA Technical Committee Documents* and to further clarify specific use areas for industrial trucks.

Changes to the 2006 edition were primarily editorial reviews that clarified requirements and provided additional information on hazardous areas and their classifications.

The 2011 edition saw an expansion of applicability to address fuel cell systems and conversions. The material on the electric hazard classifications was revised to incorporate the Class I, Zone concept, and other language was updated to the 2008 edition of *NFPA 70*.

The 2013 edition expanded the requirements for hydrogen-powered fuel cell systems for powered industrial trucks. Additional requirements and updated reference materials and standards were given for the use of these vehicles.

The 2018 edition was updated with current references. For this document revision cycle, the document scope was not revised to address other industrial trucks.



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Committee Scope: This Committee shall have primary responsibility for documents on the safe use, maintenance, and operation of industrial trucks and other material-handling equipment to minimize fire hazards.

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NFPA 505

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2018 Edition

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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 fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks powered by electric motors or internal combustion engines.

1.1.2 This standard shall not apply to compressed air-operated or nonflammable compressed gas-operated industrial trucks, farm vehicles, or automotive vehicles for highway use.

1.2 Purpose. (Reserved)

1.3 Application.

1.3.1 The design and installation of the compressed natural gas (CNG) fuel systems on CNG-powered and dual fuel-powered (gasoline and CNG) industrial trucks shall be in accordance with the applicable provisions of NFPA 52.

1.3.2 The design and installation of the LP-Gas fuel systems on LP-Gas-powered and dual fuel-powered (gasoline and LP-Gas) industrial trucks shall be in accordance with the applicable provisions of NFPA 58.

1.3.3 The design and installation of compressed gaseous hydrogen (CGH) fuel systems for fuel cell system-powered electric industrial trucks shall be in accordance with ANSI/UL 2267.

1.3.4 The approved powered industrial trucks addressed in this standard are trucks that are listed by a testing laboratory for the use intended and shall be tested and labeled in accordance with ANSI/UL 558 or ANSI/UL 583.

1.3.5 Fuel cell power systems shall be listed by a testing laboratory for the use intended and shall be tested and labeled in accordance with ANSI/UL 2267.

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 or be suitable for the intended purpose by the authority having jurisdiction.

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 2, *Hydrogen Technologies Code*, 2016 edition.

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

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

NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*, 2015 edition.

NFPA 52, *Vehicular Natural Gas Fuel Systems Code*, 2016 edition.

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

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

2.3 Other Publications.

2.3.1 ITSDF Publications. Industrial Truck Standards Development Foundation, 1750 K Street NW, Suite 460, Washington, DC 20006.

ANSI/ITSDF B56.1, *Safety Standard for Low-Lift and High-Lift Trucks*, 2012.

▲ **2.3.2 UL Publications.** Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

ANSI/UL 558, *Standard for Safety Industrial Trucks, Internal Combustion Engine-Powered*, 10th edition, 2012.

ANSI/UL 583, *Standard for Safety Electric-Battery-Powered Industrial Trucks*, 10th edition, 2012.

ANSI/UL 2267, *Standard for Fuel Cell Power Systems for Installation in Industrial Electric Trucks*, 2nd edition, 2013.

2.3.3 Other Publications.

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

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.

3.2.7 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 Dual-Fuel Truck. A truck that is equipped to be operated using either gasoline or LP-Gas or to be operated using either gasoline or compressed natural gas without further modification.

3.3.2* Type Designation. A system for identifying types of powered industrial trucks for operation in nonclassified and classified areas.

3.3.2.1 Type Designation CGH. A compressed hydrogen powered unit utilizing a fuel cell that has minimum acceptable safeguards against inherent fire and electrical shock hazards.

3.3.2.2 Type Designation CN. A compressed natural gas-powered unit that has minimum acceptable safeguards against inherent fire hazards.

3.3.2.3 Type Designation CNS. A compressed natural gas-powered unit that, in addition to meeting the requirements for Type CN units, is provided with additional safeguards to the exhaust, fuel, and electric systems.

3.3.2.4 Type Designation D. A diesel-powered unit that has minimum acceptable safeguards against inherent fire hazards.

3.3.2.5 Type Designation DS. A diesel-powered unit that, in addition to meeting all the requirements for Type D units, is provided with additional safeguards to the exhaust, fuel, and electric systems.

3.3.2.6* Type Designation DX. A diesel-powered unit in which the diesel engine and the electric fittings and equipment are so designed, constructed, and assembled that the unit can be used in atmospheres that contain specifically named flammable vapors, dusts, and, under certain conditions, fibers.

3.3.2.7 Type Designation DY. A diesel-powered unit that has all the safeguards of Type DS units and, in addition, any electric equipment is completely enclosed and equipped with temperature-limitation features.

3.3.2.8 Type Designation E. An electrically powered unit that has minimum acceptable safeguards against inherent fire and electrical shock hazards.

3.3.2.9 Type Designation EE. An electrically powered unit that, in addition to meeting all the requirements for Type E and ES units, has its electric motors and all other electric equipment completely enclosed.

3.3.2.10 Type Designation ES. An electrically powered unit that, in addition to meeting all the requirements for Type E units, is provided with additional safeguards to the electric system to prevent the emission of hazardous sparks and to limit surface temperatures.

3.3.2.11* Type Designation EX. An electrically powered unit in which the electric fittings and equipment are so designed, constructed, and assembled that the unit can be used in atmospheres containing specifically named flammable vapors, dusts, and, under certain conditions, fibers.

3.3.2.12 Type Designation G. A gasoline-powered unit that has minimum acceptable safeguards against inherent fire hazards.

3.3.2.13 Type Designation G/CN. A unit that operates on either gasoline or compressed natural gas that has minimum acceptable safeguards against inherent fire hazards.

3.3.2.14 Type Designation G/LP. A unit that operates on either gasoline or liquefied petroleum gas and that has minimum acceptable safeguards against inherent fire hazards.

3.3.2.15 Type Designation GS. A gasoline-powered unit that, in addition to meeting all the requirements for Type G units, is provided with additional safeguards to the exhaust, fuel, and electric systems.

3.3.2.16 Type Designation GS/CNS. A unit that operates on either gasoline or compressed natural gas and, in addition to meeting all the requirements for Type G/CN units, is provided with additional safeguards to the exhaust, fuel, and electric systems.

3.3.2.17 Type Designation GS/LPS. A unit that operates on either gasoline or liquefied petroleum gas and, in addition to meeting all the requirements for the Type G/LP units, is provided with additional safeguards to the exhaust, fuel, and electric systems.

3.3.2.18 Type Designation LP. An LP-Gas-powered unit that has minimum acceptable safeguards against inherent fire hazards.

3.3.2.19 Type Designation LPS. An LP-Gas-powered unit that, in addition to meeting the requirements for Type LP units, is provided with additional safeguards to the exhaust, fuel, and electric systems.

Chapter 4 Hazardous (Classified) Locations

4.1 General.

4.1.1 Locations shall be classified in accordance with *NFPA 70*. (See Annex B.)

4.1.2 The location shall be classified prior to considering the use of industrial trucks therein, and the type of industrial truck required shall be as specified in Sections 4.2 through 4.6 for the given location.

4.1.3 Different areas of any single plant or building shall be permitted to be classified differently.

4.1.4 The authority having jurisdiction shall limit the use of industrial trucks in hazardous (classified) areas according to the hazard classification assessment made of each area.

4.1.5 The management shall be responsible for the enforcement of restricted use in such areas.

4.1.6 The industrial trucks specified in Sections 4.2 through 4.6 shall be the minimum types required.

4.1.7 Industrial trucks with safeguards greater than those specified in Sections 4.2 through 4.6 shall be permitted to be used.

4.2 Summary for Hazardous (Classified) Location of Use. Table 4.2(a) and Table 4.2(b) shall be used as appropriate as a reference for industrial truck types for specific areas of use and are based on the information contained in Sections 4.3 through 4.6.

4.3* Class I Areas.

4.3.1 Division 1.

4.3.1.1 Groups A, B, and C. Power-operated industrial trucks shall not be permitted to be used in Class I, Division 1, Groups A, B, or C locations unless listed or approved as being suitable for use in hazardous (classified) locations.

4.3.1.2 Group D. Power-operated industrial trucks designated as Type DX or Type EX, and listed or approved power-operated industrial trucks determined to be suitable for the hazardous (classified) location, shall be permitted to be used.

4.3.2 Division 2.

4.3.2.1 Group A. Power-operated industrial trucks designated as Type DY, DX, EE, or EX, when approved for use in the hazardous (classified) location, and listed or approved power-operated industrial trucks determined to be suitable for the hazardous (classified) location, shall be permitted to be used.

4.3.2.2 Groups B and C. Power-operated industrial trucks designated as Type CNS, DS, DY, DX, ES, EE, EX, GS, LPS, GS/CNS, or GS/LPS, when approved for use in the hazardous (classified) location, and power-operated industrial trucks listed or approved as being suitable for the hazardous (classified) location, shall be permitted to be used.

4.3.2.3 Group D. Power-operated industrial trucks designated as Type CNS, DS, ES, GS, LPS, GS/CNS, or GS/LPS, when approved for use in the hazardous (classified) location, power-operated industrial trucks designated as Type DY, DX, EE, or EX, and power-operated industrial trucks listed or approved as being suitable for use in the hazardous (classified) locations, shall be permitted to be used.

4.4 Class II Areas.

4.4.1 Division 1.

4.4.1.1* Group E. Power-operated industrial trucks designated as Type DX or EX, when approved for use in the hazardous (classified) location, and power-operated industrial trucks listed or approved as being suitable for use in the hazardous (classified) locations, shall be permitted to be used.

4.4.1.2 Groups F and G. Power-operated industrial trucks designated as Type DX or EX, and power-operated industrial trucks listed or approved as being suitable for use in the hazardous (classified) locations, shall be permitted to be used.

4.4.2 Division 2.

4.4.2.1 Group E. Power-operated industrial trucks designated as Type DX or EX, when approved for use in the hazardous (classified) location, and power-operated industrial trucks