NFPA 505

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

2006 Edition

NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

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

2006 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 and acted on by NFPA at its June Association Technical Meeting held June 6–10, 2005, in Las Vegas, NV. It was issued by the Standards Council on July 29, 2005, with an effective date of August 18, 2005, and supersedes all previous editions.

This edition of NFPA 505 was approved as an American National Standard on August 18, 2005.

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 7 and 8 (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 with the *Manual of Style for NFPA Technical Committee Documents* and to further clarify specific use areas for industrial trucks.

Changes to the 2006 edition are primarily editorial reviews that clarify requirements and provide additional information on hazardous areas and their classifications.

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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 the safe use, maintenance, and operation of industrial trucks and other material-handling equipment to minimize fire hazards.

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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.

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

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

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 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 UL 558 or UL 583.

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.

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,* 2002 edition.

NFPA 30, *Flammable and Combustible Liquids Code,* 2003 edition.

NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages,* 2003 edition.

NFPA 52, *Vehicular Fuel Systems Code,* 2006 edition.

NFPA 58, *Liquefied Petroleum Gas Code,* 2004 edition.

NFPA 70, *National Electrical Code®,* 2005 edition.

2.3 Other Publications.

2.3.1 ASME Publication. American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.

ASME/ANSI B56.1, *Safety Standard for Low Lift and High Lift Trucks,* 1993.

2.3.2 ASTM Publication. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 3175, *Standard Test Method for Volatile Matter in the Analysis Sample of Coal and Coke*, 1989.

2.3.3 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 558, *Standard for Safety Industrial Trucks, Internal Combustion Engine-Powered*, 1991.

UL 583, *Standard for Safety Electric-Battery-Powered Industrial Trucks*, 1991.

2.3.4 Other Publication. *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.

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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. A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

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 CN.*** A compressed natural gas–powered unit that has minimum acceptable safeguards against inherent fire hazards.

3.3.2.2 ***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.

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

3.3.2.4 ***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.

3.3.2.5* ***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.

3.3.2.6 ***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.

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

3.3.2.8 ***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.

3.3.2.9 ***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.

3.3.2.10* ***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.

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

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

3.3.2.13 ***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.

3.3.2.14 ***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.

3.3.2.15 ***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.

3.3.2.16 ***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.

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

3.3.2.18 ***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.

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 Section 4.2 for the given location.

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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 classified areas in plants or buildings according to the hazard classification 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 Section 4.2 shall be the minimum types required.

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

4.2 Specific Areas of Use. Table 4.2 shall be used as a reference for industrial truck types for specific areas of use and is based on the information contained in this section.

4.2.1* Class I, Division 1, Groups A, B, C. Power-operated industrial trucks shall not be permitted to be used in Class I, Division 1, Groups A, B, or C locations.

4.2.2* Class I, Division 1, Group D. Approved power-operated industrial trucks designated as Type DX or Type EX and classified for Class I, Group D chemicals shall be permitted to be used in locations that contain gases or vapors.

4.2.3 Class I, Division 2, Group D.

4.2.3.1 Approved power-operated industrial trucks designated as Type DX, Type DY, Type EE, or Type EX (classified for Class I, Group D locations) shall be used in locations where volatile flammable liquids or flammable gases are handled, processed, or used under the following conditions:

(1) Where confined within closed containers or closed systems from which they can escape only in the event of the accidental rupture or breakdown of such containers or systems or in the event of abnormal operation of equipment
(2) In locations in which ignitible concentrations of gases or vapors are normally prevented by positive mechanical ventilation but where such concentrations can become hazardous through failure or abnormal operation of the ventilating equipment

Table 4.2 Summary Table on Use of Powered Industrial Trucks

	CNG-Powered Trucks		Diesel-Powered Trucks				Electrically Powered Trucks				Gasoline-Powered Trucks		LP-Gas–Powered Trucks		Dual Fuel–Powered Trucks				Text
Locations*	**CN**	**CNS**	**D**	**DS**	**DY**	**DX**	**E**	**ES**	**EE**	**EX**	**G**	**GS**	**LP**	**LPS**	**G/CN**	**GS/CNS**	**G/LP**	**GS/LPS**	**Ref.**
Class I, Division 1																			
Group A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.2.1
Group B	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.2.1
Group C	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.2.1
Group D	NA	NA	NA	NA	NA	A	NA	NA	NA	A	NA	NA	NA	NA	NA	NA	NA	NA	4.2.2
Class I, Division 2																			
Group A	NA	NA	NA	NA	K	K	NA	NA	K	K	NA	NA	NA	NA	NA	NA	NA	NA	4.2.10
Group B	NA	K	NA	K	K	K	NA	K	K	K	NA	K	NA	K	NA	K	NA	K	4.2.10
Group C	NA	K	NA	K	K	K	NA	K	K	K	NA	K	NA	K	NA	K	NA	K	4.2.10
Group D	NA	J	NA	J	A	A	NA	J	A	A	NA	J	NA	J	NA	J	NA	J	4.2.3
Class II, Division 1																			
Group E	NA	NA	NA	NA	NA	J	NA	NA	NA	J	NA	NA	NA	NA	NA	NA	NA	NA	4.2.4
Group F	NA	NA	NA	NA	NA	A	NA	NA	NA	A	NA	NA	NA	NA	NA	NA	NA	NA	4.2.5
Group G	NA	NA	NA	NA	NA	A	NA	NA	NA	A	NA	NA	NA	NA	NA	NA	NA	NA	4.2.6
Class II, Division 2																			
Group F	NA	J	NA	J	A	A	NA	J	A	A	NA	J	NA	J	NA	J	NA	J	4.2.7
Group G	NA	J	NA	J	A	A	NA	J	A	A	NA	J	NA	J	NA	J	NA	J	4.2.7
Class III, Division 1	NA	J	NA	J	A	A	NA	J	A	A	NA	J	NA	J	NA	J	NA	J	4.2.8
Class III, Division 2	NA	A	NA	A	A	A	J	A	A	A	NA	A	NA	A	NA	A	NA	A	4.2.9
Ordinary (Unclassified)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	4.1.1

Notes:
(1) A = Type truck authorized for location described
(2) J = Type truck authorized for location described with approval of the authority having jurisdiction
(3) K = Type truck authorized to be determined by the authority having jurisdiction
(4) NA = Type truck not authorized in location described
*The references to class, division, and group in the headings in 4.2.1 through 4.2.9 correspond to classifications that are in accordance with NFPA 70 and are provided for the convenience of the user.

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(3) In locations adjacent to Class I, Division 1 locations and to which ignitible concentrations of gases or vapors can occasionally be communicated

4.2.3.1.1 The requirement of 4.2.3.1(3) shall not apply where such communication is prevented by adequate positive-pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided.

4.2.3.2 In locations used for the storage of flammable liquids in sealed containers or liquefied or compressed flammable gases in containers, approved power-operated industrial trucks designated as Types CNS, DS, ES, GS, LPS, GS/CNS, and GS/LPS shall be permitted to be used where approved by the authority having jurisdiction.

4.2.4 Class II, Division 1, Group E.

4.2.4.1 Power-operated industrial trucks shall not be used in locations that contain Group E combustible metallic dusts, including aluminum, magnesium, and their commercial alloys, or other combustible dusts whose particle size, abrasiveness, and conductivity present similar hazards in the use of electrical equipment.

4.2.4.2 As an alternative, the authority having jurisdiction shall be permitted to conduct a survey of the fire and explosion hazards related to the truck and the specific area of use to determine if a Type DX or Type EX truck is permitted to be used.

4.2.4.3 In atmospheres where the dust of magnesium, aluminum, or aluminum bronze can be present, truck fuses, switches, motor controllers, and circuit breakers shall have enclosures that are specifically approved for such locations.

4.2.5 Class II, Division 1, Group F.

4.2.5.1 Approved power-operated industrial trucks designated as Type DX or Type EX (classified for Class II, Group F locations) shall be used in either of the following locations:

(1) Where Group F dust is in suspension or can be in suspension under normal operating conditions in quantities sufficient to produce explosive or ignitible mixtures
(2) Where mechanical failure or abnormal operation of machinery or equipment can cause explosive or ignitible mixtures to be produced

4.2.5.2 Class II, Division 1, Group F areas shall include locations containing either of the following:

(1) Carbon black, charcoal, coal, and coke dusts that have more than 8 percent total volatile material (coal and coke dust in accordance with ASTM D 3175) and that are present in quantities sufficient to produce explosive or ignitible mixtures
(2) Atmospheres containing the dusts described in (1) that are sensitized by other materials so that they present an explosion hazard

4.2.6* Class II, Division 1, Group G. Approved power-operated industrial trucks designated as Type DX or Type EX shall be used in either of the following locations:

(1) Where Group G combustible dust is in suspension or can be in suspension under normal operating conditions in quantities sufficient to produce explosive or ignitible mixtures
(2) Where mechanical failure or abnormal operation of machinery or equipment can cause explosive or ignitible mixtures to be produced

4.2.7 Class II, Division 2, Groups F and G.

4.2.7.1 Approved power-operated industrial trucks designated as Type DX, Type DY, Type EE, or Type EX shall be permitted to be used in Class II, Division 2, Group F or Class II, Division 2, Group G hazardous (classified) locations.

4.2.7.2* Type CNS, Type DS, Type ES, Type GS, Type LPS, Type GS/CNS, or Type GS/LPS industrial trucks shall be permitted to be used if approved.

4.2.8* Class III, Division 1. Approved power-operated industrial trucks designated as Type DX, Type DY, Type EE, or Type EX shall be permitted to be used in locations where easily ignitible fibers or materials producing combustible flyings exist but in which such fibers or flyings can be in suspension in the air in quantities sufficient to produce ignitible mixtures.

4.2.9 Class III, Division 2. Power-operated industrial trucks designated as Type CNS, Type DS, Type DX, Type DY, Type ES, Type EE, Type EX, Type GS, Type LPS, Type GS/CNS, or Type GS/LPS shall be used in locations where easily ignitible fibers are stored or handled, including outside storage, but where such fibers are not processed or manufactured.

4.2.9.1 Industrial trucks designated as Type E that have been used previously in the locations described in 4.2.9, other than in manufacturing or processing, shall be permitted to be continued in use with the approval of the authority having jurisdiction.

4.2.10 Hazardous Areas Not Otherwise Classified. The authority having jurisdiction shall determine which types of approved power-operated industrial trucks shall be used following an engineering survey of the property and an evaluation of the fire and explosion hazards.

4.2.11 Piers and Wharves.

4.2.11.1 Where it is determined that the location on piers and wharves used for handling general cargo is not hazardous, approved power-operated industrial trucks designated as Type CN, Type D, Type E, Type G, Type LP, Type G/CN, or Type G/LP or trucks that conform to the requirements for these types shall be permitted to be used.

4.2.11.2 Where an area of a pier or wharf is determined to be hazardous, only approved power-operated industrial trucks as specified for such locations in 4.2.1 through 4.2.9 shall be permitted to be used.

4.2.12 General Inside and Outside Storage. Where it is determined that the location for general storage in warehouses or general outside storage is not hazardous, any power-operated industrial truck designated as Type CN, Type D, Type E, Type G, Type LP, Type G/CN, or Type G/LP shall be permitted to be used, or trucks that conform to the requirements for the specified types shall be permitted to be used.

4.2.13 General Industrial or Commercial Properties.

4.2.13.1 Where it is determined that the location on a general industrial or commercial property used for handling or processing materials (with storage being incidental to handling and processing), or for both, is not hazardous, any approved power-operated industrial truck designated as Type CN, Type D, Type E, Type G, Type LP, Type G/CN, or Type G/LP shall be permitted to be used, or trucks that conform to the requirements for the specified types shall be permitted to be used.

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4.2.13.2 Where the location on a general industrial or commercial property used for handling or processing materials, or both, is determined to be hazardous, only approved power-operated industrial trucks as specified for such a location in 4.2.1 through 4.2.9 shall be permitted to be used.

4.2.14 Converted Industrial Trucks.

4.2.14.1 Power-operated industrial trucks for ordinary (nonhazardous) locations shall be permitted to be converted to an alternative fuel in accordance with the requirements in Chapter 6.

4.2.14.2 The conversion of trucks approved for, or that conform to the requirements for, hazardous locations shall be in accordance with the requirements of UL 558 and shall be certified by a nationally recognized testing laboratory (NRTL).

4.2.14.3 Power-operated industrial trucks that previously have been approved for, or that conform to the requirements for, Type CN, Type G, Type LP, Type G/CN, or Type G/LP shall not be converted to a type designation for use in hazardous (classified) locations, such as conversion of LP to LPS, G to GS, or CN to CNS.

Chapter 5 Dual-Fuel Trucks

5.1 General. A dual-fuel truck shall be a truck that is equipped to be operated using either gasoline or LP-Gas or to be operated using either gasoline or CNG without further modification.

5.2 Requirements.

5.2.1 Fuel system parts that come into contact with gasoline shall meet the requirements for liquid fuel in UL 558.

5.2.2 Fuel system parts that come into contact with CNG fuel shall meet the requirements for CNG fuel in NFPA 52.

5.2.3 Fuel system parts that come into contact with LPG fuel shall meet the requirements for LPG fuel in UL 558.

5.2.4 Fuel system parts that come into contact with gasoline and LPG fuel or with gasoline and CNG fuel shall be compatible with both fuels.

Chapter 6 Conversion of Trucks

6.1* Conversion Requirements.

6.1.1 A truck designated as Type G, Type LP, or Type G/LP that is converted to another of those designations shall conform to the requirements for the new designation in accordance with UL 558.

6.1.2 Conversion kits for use on trucks designated as Type CN, Type G, Type LP, Type G/CN, or Type G/LP shall conform to the requirements for the type designation in accordance with UL 558.

6.1.2.1 The conversion kit shall include the items specified in 6.1.5.

6.1.2.2 The installation of the kit shall be in accordance with 6.1.5.

6.1.2.3 A copy of the listing report shall be supplied to the authority having jurisdiction upon request.

6.1.3 Conversion kits shall be approved by a testing laboratory.

6.1.4 When a conversion kit is installed, all original identification of approval or listing and type designation shall not be removed, and the plate specified in 6.1.5(3) shall be installed.

6.1.5 Kits for the conversion of Types CN, G, LP, G/CN, and G/LP trucks shall include the following:

(1) Step-by-step installation instructions with illustrations, if necessary
(2) All parts necessary to complete the installation, including the following:
  (a) Functional components
  (b) Mounting brackets and hardware
  (c) Connecting wires, hose, and fittings
  (d) Sealants, if required
(3) A durable, corrosion-resistant plate, indicating the converted type designation of the truck, for permanent mounting adjacent to the manufacturer's nameplate on the truck
(4) A metal nameplate attached to the LPG-tank mounting that identifies the fuel container assembly to be used in situations where the conversion is to LPG and a removable fuel tank is to be used
(5) A gasoline fuel tank with necessary mounting and connection hardware and installation instructions where the conversion is from CNG or LPG to gasoline or a dual fuel
(6) Instructions for removal or deactivation of the existing components, including the gasoline tank(s), where the conversion is from gasoline or a dual fuel to CNG or LPG
(7) A tank or tanks, as appropriate, with the necessary mounting and connection hardware and installation instructions where the conversion is from LPG to CNG or a dual fuel, or where conversion is from gasoline to CNG or a dual fuel and the truck is not equipped with a CNG or gasoline fuel tank, or both
(8) Instructions covering checks and tests to be performed after the conversion and prior to putting the truck into service

Chapter 7 Maintenance of Industrial Trucks

7.1 General.

7.1.1 The fire safety built into power-operated industrial trucks shall be maintained in accordance with the instructions and training material provided by the manufacturer.

7.1.2 Any power-operated industrial truck that is not in safe operating condition shall be removed from service.

7.2 Precautions.

7.2.1 Repairs shall not be made in Class I, Class II, and Class III locations.

7.2.2 Repairs to the fuel and ignition systems of industrial trucks that involve fire hazards shall be conducted only in locations designated for such repairs.

7.2.3 Repairs to the electrical system of battery-powered industrial trucks shall be performed only after the battery has been disconnected.

7.3* Replacement Parts. All parts of any industrial truck that need replacement shall be replaced only with parts that provide the same degree of fire safety as those used in the original design.

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7.4 Mufflers.

7.4.1 Water mufflers shall be filled and maintained to prevent depletion of the supply of water below 75 percent of filled capacity.

7.4.2 Vehicles with mufflers having screens or other parts that can become clogged shall not be operated while such screens or parts are clogged.

7.4.3 Any vehicle that emits hazardous sparks or flames from the exhaust system shall be removed from service immediately and shall not be returned to service until the cause for the emission of such sparks and flames has been eliminated.

7.5 Operating Temperature. Where the temperature of any part of any truck is found to be in excess of its normal operating temperature and creates a hazardous condition, the vehicle shall be removed from service and shall not be returned to service until the cause for such overheating has been eliminated.

7.6 Fire Prevention.

7.6.1 Industrial trucks shall be kept clean and reasonably free of lint, excess oil, and grease.

7.6.2 Noncombustible agents shall be used for cleaning trucks.

7.6.3 Flammable liquids [those having flash points below 37.8°C (100°F)] shall not be used.

7.6.4 Combustible liquids [those having flash points at or above 37.8°C (100°F)] shall be permitted to be used.

7.6.5 Precautions regarding toxicity, ventilation, and fire hazard shall be appropriate for the agent or solvent used.

7.7 Antifreeze. Where antifreeze is used in the engine-cooling system, only glycol-based material shall be used.

7.8 Nameplate Visibility. The truck type designations *(see 3.3.2)*, as shown on the nameplate and the type marker *(see 8.4.1)*, shall not be obscured.

Chapter 8 Fuel Recharging, Marking, and Operation of Industrial Trucks

8.1 Fuel Handling and Storage.

8.1.1 Liquid Fuels.

8.1.1.1 The storage and handling of liquid fuels shall be in accordance with NFPA 30 or NFPA 30A, as applicable.

8.1.1.2* Trucks using liquid fuels shall be refueled only at locations designated for such purpose and shall be refueled from approved dispensing pumps.

8.1.1.3 The engine shall be stopped and the operator shall not be on or inside the truck during refueling.

8.1.1.4 Emergency refueling shall be from approved safety cans. Safety cans shall be inspected regularly for leaks and for damage to closures.

8.1.1.5 Faulty cans shall be replaced.

8.1.1.6 Smoking or open flames shall be prohibited in the refueling area.

8.1.2 Liquefied Petroleum Gas Fuel.

8.1.2.1 The storage and handling of liquefied petroleum gas (LP-Gas) shall be in accordance with NFPA 58.

8.1.2.2 Fuel containers that are permanently mounted on trucks and removable U.S. Department of Transportation (DOT)–type LP-Gas containers shall be filled at locations designated for such purpose and in accordance with NFPA 58.

8.1.2.3 LP-Gas containers shall not be dropped, thrown, rolled, or dragged.

8.1.2.4 LP-Gas containers shall not be overfilled.

8.1.2.5 The engine shall be stopped and the operator shall not be on or inside the truck during refueling.

8.1.2.6 Trained and designated personnel shall refill or exchange LP-Gas containers.

8.1.2.7 A soap solution shall be used to check for leaks.

8.1.2.7.1 A match or open flame shall not be used.

8.1.2.8 Removable LP-Gas containers shall not be exchanged near, and LP-Gas-powered vehicles shall not be parked near, sources of heat or open flame or similar sources of ignition or near open pits, underground entrances, elevator shafts, or other similar areas unless ventilated in accordance with NFPA 30.

8.1.2.9 Refueling of trucks with permanently mounted LP-Gas containers shall be done in accordance with NFPA 58.

8.1.2.10 Removable LP-Gas containers shall be mounted securely to prevent them from jarring loose, slipping, or rotating and shall be positioned so that the safety pressure relief valve opening is always in contact with the vapor space (top) of the container.

8.1.2.10.1 Proper mounting shall be accomplished by using a positioning pin that engages the cylinder, or an equivalent means, and a container clamp(s) that positions the container where the container is properly installed.

8.1.2.10.2 A container and its fittings shall not extend beyond the plan form of the industrial truck.

8.1.2.11 All reserve LP-Gas containers shall be stored and transported with the service valve closed. Safety relief valves shall have direct communication with the vapor space of the container at all times.

8.1.2.12 All LP-Gas containers shall be examined before refilling for the following defects or damage:

(1) Dents, scrapes, and gouges of the pressure vessel
(2) Damage to the various valves and liquid level gauge
(3) Debris in the relief valve
(4) Damage to or loss of the relief valve cap
(5) Indications of leakage at the valves or threaded connections
(6) Deterioration, damage, or loss of flexible seals in the filling or servicing connections

8.1.2.12.1 Where examination reveals physical damage, such as dents, scrapes, or gouges *[see 8.1.2.12(1)]*, that materially weaken the structure of the LP-Gas container and render it unsafe for use, it shall be removed from service.

8.1.2.12.2 Where examination reveals damage as specified in 8.1.2.12(2) through (6), other than physical damage to the container, appropriate repairs shall be made before the container is refilled.

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8.1.2.13 Smoking shall be prohibited in the container refilling area for either portable or permanently mounted containers and in the exchange area during the exchange of LP-Gas containers.

8.1.2.14 The service valve of the fuel container shall be closed whenever vehicles are parked overnight or stored indoors for a protracted time.

8.1.3 Compressed Natural Gas Fuel.

8.1.3.1 The compression, storage, handling, and dispensing of compressed natural gas (CNG) shall be located and conducted in accordance with NFPA 52.

8.1.3.2 The engine shall be stopped and the operator shall not be on or inside the truck during refueling.

8.1.3.3 Smoking and open flames shall be prohibited in the refueling area.

8.1.3.4 Each fuel supply container shall be mounted in a location that minimizes damage from collision.

8.1.3.4.1 A container and its fittings shall not extend beyond the plan form of the industrial truck.

8.1.3.4.2 Containers, valves, and hose and fittings shall be protected from physical damage using the vehicle structure, valve protectors, or suitable guards in accordance with NFPA 52.

8.1.3.5 The refueling receptacle on a truck shall be supported firmly and shall incorporate a means to prevent the entry of dust, water, and other foreign material.

8.1.3.5.1 Where the means of protection used seals the system pressure, the system shall be capable of being depressurized before removal.

8.1.3.6 A CNG cylinder shall not be charged in excess of its maximum allowable working pressure at the normal temperature for the cylinder.

8.1.3.7 The transfer of CNG into the fuel supply container of a truck shall be performed by a person who has performed the transfer operation for at least three full cycles under supervision and who has competence in initiating emergency procedures.

8.1.3.7.1 The individual shall be responsible for verifying the working pressure and for ensuring that the container is retested according to the required schedule.

8.1.3.8 A match or open flame shall not be used to check for leaks in CNG fuel systems.

8.1.3.9 Containers and their appurtenances, piping systems, compression equipment, controls, devices, and pressure relief valves shall be maintained in proper operating condition.

8.1.3.9.1 Pressure relief devices shall be maintained in operating condition.

8.1.3.9.2* Pressure relief devices shall not be plugged.

8.1.3.9.3 Only qualified personnel shall be permitted to service pressure relief devices.

8.1.3.9.4 Only assemblies or original manufacturer's parts shall be used in the repair of pressure relief devices.

8.1.3.9.5 Assemblies or parts that have been proved by suitable testing shall be permitted to be used in the repair of pressure relief devices.

8.1.3.10 CNG-powered vehicles shall not be parked near sources of heat or open flame or similar sources of ignition.

8.1.3.11 The service valve of the fuel container shall be closed whenever vehicles are parked overnight or stored indoors for a protracted time.

8.2 Dual Fuel.

8.2.1* Where operating a dual-fuel truck on CNG or LP-Gas, the gasoline level in the liquid fuel tank shall be checked daily.

8.2.1.1 The truck shall not be operated unless the gasoline fuel tank is at least one-quarter full.

8.2.2 Where operating a dual-fuel truck on CNG fuel, the provisions of 8.1.3 shall apply.

8.2.3 Where operating a dual-fuel truck on LP-Gas, the provisions of 8.1.2 shall apply.

8.2.4 Where operating a dual-fuel truck on liquid fuels, the provisions of 8.1.1 shall apply.

8.3 Changing and Charging Storage Batteries.

8.3.1* Section 8.3 shall apply to batteries used on electric trucks.

8.3.2 Battery-charging installations shall be located in areas designated for such purpose. The areas shall be kept free of extraneous combustible materials.

8.3.2.1 Facilities shall be provided for the following:

(1) Flushing spilled electrolyte
(2) Fire protection
(3) Protection of charging apparatus against damage by trucks
(4) Adequate ventilation for dispersal of fumes from gassing batteries

8.3.2.2 Where onboard chargers are used, charging shall be accomplished at locations designated for such purpose, taking into account the electrical requirements of the charger and facilities for fire protection.

8.3.2.3 Flushing facilities shall not be required if charging is accomplished without removing the battery from the vehicle.

8.3.3 Where handling acid concentrates that contain greater than 50 percent acid (above 1.400 specific gravity), an eyewash fountain shall be provided.

8.3.4 A conveyor, an overhead hoist, or equivalent material-handling equipment shall be provided for handling batteries.

8.3.5 Chain hoists shall be equipped with load-chain containers.

8.3.5.1 Where a hand hoist is used, uncovered batteries shall be covered with a sheet of plywood or other nonconducting material to prevent the hand chain from shorting on cell connectors or terminals.

8.3.5.2 A properly insulated spreader bar shall be used with any overhead hoist.

8.3.6 Reinstalled batteries or new batteries shall be equivalent to or shall be rated higher than the battery type marked on the truck. Reinstalled batteries shall be positioned properly and secured in the truck.

8.3.7 A carboy tilter or siphon shall be provided where acid in carboys is used.

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8.3.7.1 Where concentrated sulfuric acid is diluted to make up electrolyte, the acid shall always be added to the water.

8.3.7.2 Water shall never be added to acid.

8.3.7.3 Battery maintenance personnel shall wear protective clothing such as eye protection, long sleeves, and gloves.

8.3.7.4 Removal and replacement of batteries shall not require the use of protective clothing.

8.3.8 Electric installations shall be in accordance with NFPA 70 and any local ordinances.

8.3.9 Trained and authorized personnel shall change or charge batteries.

8.3.10 Trucks shall be positioned properly and brakes shall be applied before personnel attempt to change or charge batteries.

8.3.11 When batteries are being charged, the vent caps shall be kept in place to avoid electrolyte spray.

8.3.11.1 Care shall be taken to ensure that vent caps are functioning.

8.3.11.2 The battery or compartment cover(s) shall be open to dissipate heat and gas.

8.3.12 Smoking shall be prohibited in the charging area.

8.3.13 Precautions shall be taken to prevent open flames, sparks, or electric arcs in battery-charging areas.

8.3.14 Tools and other metal objects shall be kept away from the tops of uncovered batteries.

8.4 Marking and Labeling.

8.4.1 Types CNS, DS, DY, DX, ES, EE, EX, GS, LPS, GS/CNS, and GS/LPS Industrial Trucks.

8.4.1.1 Proper equipment shall be used in classified areas for the safety and protection of employees and property.

8.4.1.1.1 Approved trucks that are listed by a testing laboratory for use in such areas shall be clearly identified.

8.4.1.1.2 To facilitate identification by operators and supervisory personnel, a uniform system of marking as described in 8.4.1.2 and 8.4.2.1 shall be used.

8.4.1.2 Durable markers indicating the type designation of trucks used in classified areas shall be applied to each side of the vehicle in a visible but protected location.

8.4.1.2.1 The markers shall be distinctive in shape as shown in Figure 8.4.1.2.1.

8.4.1.2.2 The markers for Types LPS, GS, DS, ES, CNS, GS/LPS, and GS/CNS shall be 4 in. (102 mm) squares.

8.4.1.2.3 The width of markers for other type designations shall be 5 in. (127 mm).

8.4.1.2.4 The markers shall consist of black borders and lettering on a yellow background.

8.4.2 Marking Areas of Use.

8.4.2.1 Entrances to classified areas where industrial trucks are to be used shall be posted with durable markers as shown in Figure 8.4.2.1.

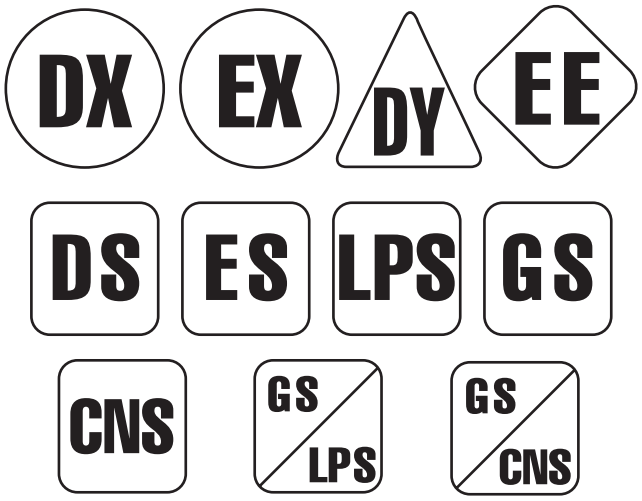


FIGURE 8.4.1.2.1 Markers Used to Identify Types of Industrial Trucks.

8.4.2.2 The minimum width of the sign shall be 11 in. (279 mm).

8.4.2.3 The minimum height of the sign shall be 16 in. (406 mm).

8.4.2.4 The word "Caution" shall be printed on the sign in yellow letters on a black background.

8.4.2.5 The body of the sign shall consist of black letters on a yellow background.

8.4.2.6 A marker(s) identical to that used on the side of the truck shall be installed on the sign. *(See Figure 8.4.1.2.1.)*

8.5 Safe Operating Rules.

8.5.1 Powered industrial truck operation shall be in accordance with applicable sections of ASME/ANSI B56.1.

8.5.2 Prior to each shift of operations, the operator of an industrial truck shall perform an inspection for safe operation, including a visual check of the general condition of the truck and a check for the presence of easily ignited combustible materials such as accumulated debris and oily rags.

8.6 Operating Procedures and Training.

8.6.1 There shall be a written operating procedure plan and operator training relevant to the location of use and type of truck.

8.6.2 The procedure shall include, as a minimum, the following:

(1) Operation limited to trained personnel
(2) Cautions where checking or filling tank
(3) Action for suspected leak
(4) Refueling instructions
(5) Emergency items
    (a) Shutoff fuel valve
    (b) Correct battery type and position
    (c) Fire emergency procedures
(6) Hazardous location classifications and markings
(7) Industrial truck designations and markings

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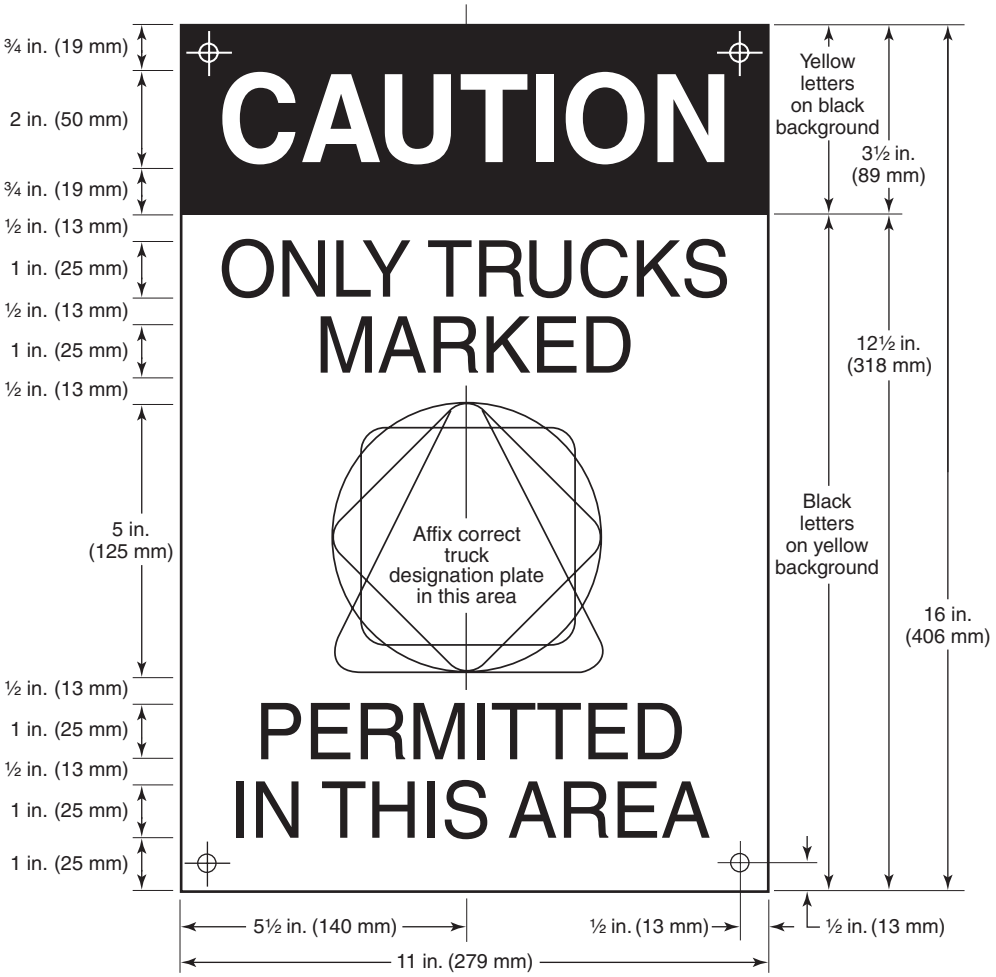


FIGURE 8.4.2.1 Building Sign for Posting at Entrance to Hazardous Areas.

Chapter 9 Portable Fire Extinguishers

9.1* General Requirements.

9.1.1 Where the authority having jurisdiction or end user requires an industrial truck to be equipped with a portable extinguisher, the location of the extinguisher on the truck shall be in accordance with the truck manufacturer's recommendations.

9.1.2 Industrial trucks shall be equipped with portable extinguishers only if truck operators have been trained in the safe operation and use of portable extinguishers.

9.1.3 The type of extinguisher used on a truck shall be in accordance with the hazard classification guidance provided in NFPA 10.

9.2 Maintenance.

9.2.1 Extinguishers shall be maintained in accordance with NFPA 10, and records shall be kept in accordance with such requirements.

9.2.2 Recharging procedures shall follow the requirements of NFPA 10.

9.2.3 Extinguishers that are out of service for maintenance or recharge shall be replaced with extinguishers that have the same agent, rating, and operating procedure.

9.3 Hydrostatic Testing. Extinguisher shells and appurtenant devices, such as nozzles, hose, and pressure cartridges, shall be hydrostatically tested in accordance with NFPA 10.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to

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the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.4 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.2 Type Designation. Specific standards that cover the types of industrial trucks defined in Section 3.3 have been published by Underwriters Laboratories Inc. and are identified as UL 558 and UL 583. UL 558 covers Types D, DS, DY, G, GS, LP, LPS, G/LP, and GS/LPS; UL 583 covers Types E, EE, ES, and EX.

Standards for Types CN, CNS, G/CN, and GS/CNS trucks are not in published form; however, information regarding the requirements for these type designations is available from Underwriters Laboratories Inc.

The examination of powered industrial trucks by Underwriters Laboratories Inc. relates to fire hazards only for Types D, DS, DY, G, GS, LP, LPS, G/LP, and GS/LPS industrial trucks that are powered by internal combustion engines; to fire and electrical shock hazards only for Types E, ES, and EE battery-powered industrial trucks; and to fire, electric shock, and explosion hazards for Type EX trucks that are suitable for use in Class I, Group D, or Class II, Group G, hazardous locations. Trucks that have been examined and classified as meeting the respective Underwriters Laboratories standards for a particular area of use are identified in the UL *Automotive Burglary Protection Mechanical Equipment Directory,* except for Type EX trucks, which can be found in the UL *Hazardous Locations Equipment Directory*.

A.3.3.2.5 Type Designation DX. Such units are specifically tested and classified for use in Class I, Group D locations or for Class II, Group F or Group G locations as defined in NFPA 70.

A.3.3.2.10 Type Designation EX. Such units are specifically tested and classified for use in Class I, Group D locations or for Class II, Group F or Group G locations as defined in NFPA 70.

A.4.1.1 Recent developments in the classification of hazardous areas have led to the class/zone criteria that are identified in NFPA 70. The Technical Committee on Industrial Trucks is endeavoring to incorporate the developments into the next revision of NFPA 505. In the interim, NFPA 497 and NFPA 499 should be referenced to determine the classification established by NFPA 70.

A.4.2.1 For additional information on Class I, Groups A, B, and C materials, see NFPA 497.

Some examples of Class I, Groups A, B, and C chemicals are shown in Table A.4.2.1.

Table A.4.2.1 Examples of Class I, Groups A, B, and C Chemicals

Acetaldehyde	Ethylenimine
Acetylene	Hydrogen
Acrolein (inhibited)	Hydrogen cyanide
Allyl alcohol	Hydrogen sulfide
Arsine	Manufactured gases containing more than 30 percent hydrogen (by volume)
Butadiene	Morpholine
n-Butyraldehyde	2-nitropropane
Carbon monoxide	Propylene oxide
Crotonaldehyde	Propyl nitrate
Cyclopropane	Tetrahydrofuran
Diethyl ether	Unsymmetrical dimethyl hydrazine (UDMH, 1,1-dimethylhydrazine)
Diethylamine	
Epichlorohydrin	
Ethyl mercaptan	
Ethyl sulfide	
Ethylene	
Ethylene oxide	

A.4.2.2 For examples of chemicals whose vapors, when mixed in air, are classified as Class I, Group D, see Section 500.5 of NFPA 70. Some examples of Class I, Group D chemicals are shown in Table A.4.2.2.

Table A.4.2.2 Examples of Class I, Group D Chemicals

Acetic acid (glacial)	Mesityl oxide
Acetone	Methane (natural gas)
Acrylonitrile	Methanol (methyl alcohol)
Ammonia	3-methyl-1-butanol (isoamyl alcohol)
Benzene	Methyl ethyl ketone
Butane	Methyl isobutyl ketone
1-butanol	2-methyl-1-propanol (isobutyl alcohol)
2-butanol (secondary butyl alcohol)	2-methyl-2-propanol (tertiary butyl alcohol)
n-Butyl acetate	Octanes
Isobutyl acetate	Pentanes
sec-Butyl alcohol	1-pentanol (amyl alcohol)
Di-isobutylene	Petroleum naphtha
Ethane	Propane
Ethanol (ethyl alcohol)	1-propanol (propyl alcohol)
Ethyl acetate	2-propanol (isopropyl alcohol)
Ethyl acrylate	Propylene
Ethylene diamine (anhydrous)	Pyridine
Ethylene dichloride	Styrene
Ethylene glycol monomethyl ether	Toluene
Gasoline	Vinyl acetate
Heptanes	Vinyl chloride
Hexanes	Xylenes
Isoprene	
Isopropyl ether	

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A.4.2.6 Class II, Division 1, Group G areas include locations such as the following:

(1) Working areas of the following locations:
  (a) Grain-handling and storage plants
  (b) Wood flour plants
(2) Rooms containing the following:
  (a) Grinders or pulverizers
  (b) Cleaners
  (c) Graders
  (d) Scalpers
  (e) Open conveyors or spouts
  (f) Open bins or hoppers
  (g) Mixers or blenders
  (h) Automatic or hopper scales
  (i) Packing machinery
  (j) Elevator heads and boots
  (k) Stock distributors
  (l) Dust and stock collectors (except all-metal collectors vented to the outside)
(3) All similar dust-producing machinery and equipment in the following:
  (a) Grain-processing plants
  (b) Starch plants
  (c) Sugar-pulverizing plants
  (d) Malting plants
  (e) Wood flour plants
  (f) Hay-grinding plants
  (g) Other occupancies of similar nature where combustible dust can, under normal operating conditions, be present in the air in quantities sufficient to produce explosive or ignitible mixtures

A.4.2.7.2 The requirements of 4.2.7.2 apply to locations that include but are not limited to the following:

(1) Rooms and areas that contain only closed spouting and conveyors
(2) Closed bins or hoppers, or machines and equipment from which appreciable quantities of dust can escape only under abnormal operating conditions
(3) Rooms or areas into which explosive or ignitible concentrations of suspended dust can be communicated only under abnormal operating conditions
(4) Rooms or areas where the formation of explosive or ignitible concentrations of suspended dust is prevented by the operation of effective dust-control equipment
(5) Warehouses and shipping rooms where dust-producing materials are stored or handled only in bags or containers
(6) Other similar locations

A.4.2.8 Where such easily ignitible materials are in enclosed systems or where flyings in air are minimized through the use of ventilation controls, the use of Types CNS, DS, ES, GS, LPS, GS/CNS, and GS/LPS trucks can be considered.

Locations where easily ignitible fibers or flyings are found include some portions of the following locations:

(1) Rayon, cotton, and other textile mills
(2) Combustible fiber manufacturing and processing plants
(3) Cotton gins and cottonseed mills
(4) Flax-processing plants
(5) Clothing-manufacturing plants
(6) Woodworking plants (except wood flour plants, see A.4.2.6)
(7) Establishments and industries involving similar processes or conditions

Easily ignitible fibers and flyings include the following:

(1) Rayon
(2) Cotton (including cotton linters and cotton waste)
(3) Sisal or henequen
(4) Istle
(5) Jute
(6) Hemp
(7) Tow
(8) Cocoa fiber
(9) Oakum
(10) Baled waste kapok
(11) Spanish moss
(12) Excelsior
(13) Sawdust
(14) Wood chips
(15) Other similar materials

A.6.1 Section 6.1 provides that responsibility for the acceptance of an industrial truck that has been converted rests entirely with the inspection authority having jurisdiction. The responsibility for determining whether a truck has been properly converted is that of the authority having jurisdiction because it is impractical to ship each converted truck back to the testing laboratory to be reexamined or retested. It is also impractical for the laboratory to send a representative into the field to examine or test every converted truck.

Authorities having jurisdiction are not always expert in recognizing the criteria that constitute a proper conversion. Installation directions furnished with conversion equipment, "Listed by Report," specify in detail how to perform the conversion so that it meets the requirements of NFPA 58. The detailed instructions supply the authority having jurisdiction with the necessary information to determine whether a truck has been properly converted.

A.7.3 The requirement of Section 7.3 applies particularly to trucks approved for use in hazardous (classified) locations.

A.8.1.1.2 Safe outdoor locations for refueling are recommended over indoor locations. NFPA 30 includes requirements for arranging indoor fueling facilities. NFPA 30A includes requirements for arranging outdoor fueling facilities.

Spillage of fuel or overfilling of the vehicle fuel tank should be avoided.

A.8.1.3.9.2 Care should be exercised to avoid plugging caused by paint or other dirt accumulation in pressure relief device channels or other parts of the container that can interfere with the functioning of the device.

A.8.2.1 The liquid fuel tank is required to be at least one-quarter full of gasoline at all times to provide a sufficient quantity of liquid fuel to maintain a vapor saturation in the tank above the normally explosive level. The quantity of fuel in the tank can be determined using the fuel gauge provided on the vehicle.

A.8.3.1 The two types of batteries commonly used are lead and nickel–iron. They contain corrosive chemical solutions, either acid or alkali, and, therefore, present a chemical hazard. While being charged, they give off hydrogen and oxygen, which, in certain concentrations, are explosive.

A.9.1 Situations exist where portable extinguishers, mounted safely and accessibly on industrial trucks, are recommended or required by local or state agencies or the end user. However, it should be noted that it is possible to encounter opposition to the provision of an extinguisher on an industrial

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truck. Opposition can be associated with factors such as operator training issues, size and rating of the extinguisher, access and visibility of the extinguisher(s) on the truck, and protection from damage to the extinguisher itself (mounting).

Space allowance for only small extinguishers (1-A:10-B:C) can provide a false sense of security, because such extinguishers have limited capability. NFPA 10 does not provide specific guidance for the installation of portable extinguishers for all industrial trucks specified in the scope of NFPA 505.

Annex B Informational References

B.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

B.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 10, *Standard for Portable Fire Extinguishers*, 2002 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2003 edition.

NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*, 2003 edition.

NFPA 58, *Liquefied Petroleum Gas Code*, 2004 edition.

NFPA 70, *National Electrical Code®*, 2005 edition.

NFPA 497, *Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*, 2004 edition.

NFPA 499, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*, 2004 edition.

B.1.2 Other Publications.

B.1.2.1 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062–2096.

UL 558, *Standard for Safety Industrial Trucks, Internal Combustion Engine-Powered*, 1991.

UL 583, *Standard for Safety Electric-Battery-Powered Industrial Trucks*, 1991.

Automotive Burglary Protection Mechanical Equipment Directory, 1994.

Hazardous Locations Equipment Directory, 1995.

B.2 Informational References. (Reserved)

B.3 References for Extracts in Informational Sections. (Reserved)

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▼

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▼

Report — *Report on Proposals* (ROP) — is published for public review and comment.

▼

Committee meets to act on each public comment received.

▼

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▼

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▼

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2. **Proposal Recommends:** *(check one)* ☐ **new text** ☐ **revised text** ☒ **deleted text**
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4. **Statement of Problem and Substantiation for Proposal.** Note: State the problem that will be resolved by your recommendation. Give the specific reason for your proposal including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication. A properly installed and maintained system should be free of ground faults. The occurrence of one or more ground faults should be required to cause a "trouble" signal because it indicates a condition that could contribute to future malfunction of the system. Ground fault protection has been widely available on these systems for years and its cost is negligible. Requiring it on all systems will promote better installations, maintenance and reliability.
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