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INDUSTRIAL TRUCKS 1963

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National Fire Protection Association

International

The National Fire Protection Association was organized in 1896 to promote the science and improve the methods of fire protection. Its membership includes national and regional societies and associations (list on outside back cover) and twenty-one thousand individuals, corporations, and organizations. Anyone interested may become an Associate Member; the annual dues are $20.00. Full membership information is available on request.

This is one of a large number of publications on fire safety issued by the Association. All NFPA standards and recommended practices, including this text, are prepared by the technical committees of the NFPA and adopted at an Annual Meeting of the Association. They are intended to prescribe reasonable measures for minimizing losses of life and property by fire.

This text and most other NFPA standards and recommended practices are published in the **National Fire Codes,** a compilation of NFPA's official technical material. Full information on the availability of these Codes and other NFPA publications can be secured from the Association.

Official NFPA Definitions

SHALL is intended to indicate requirements.

SHOULD is intended to indicate recommendations, or that which is advised but not required.

APPROVED refers to approval by the authority having jurisdiction.

Units of measurements used here are U. S. standard. 1 U. S. gallon = 0.83 Imperial gallons = 3.785 liters. One foot = 0.3048 meters. One inch = 25.40 millimeters. One pound per square inch = 0.06805 atmospheres = 2.307 feet of water.

Approved Equipment

The National Fire Protection Association does not "approve" individual items of fire protection equipment, materials or services. The suitability of devices and materials for installation under NFPA standards is indicated by the listing of nationally recognized testing laboratories, whose findings are customarily used as a guide to approval by agencies applying these standards. Underwriters' Laboratories, Inc., Underwriters' Laboratories of Canada, the Factory Mutual Laboratories and the American Gas Association (gas equipment) test devices and materials for use in accordance with the appropriate standards, and publish lists which are available on request.

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Standard for the Use, Maintenance and Operation of Industrial Trucks

NFPA No. 505 — 1963

1963 Edition of No. 505

This 1963 Edition of the Standard for the Use, Maintenance and Operation of Industrial Trucks is published in accordance with action taken at the 1963 Annual Meeting of the National Fire Protection Association, May 13-17. This text replaces the previous edition of this Standard adopted in 1957. The 1963 changes involve only the recognition of the type DY truck.

Origin and Development of No. 505

Part A covering "Use of Industrial Trucks in Various Locations" was originally designated as NFPA No. 505A and was first adopted by the Association in 1951. The 1951 text was revised in 1955 after four years of deliberation by the sponsoring committee. The 1955 text has now been replaced by the current text.

Parts B and C covering "Maintenance of Industrial Trucks" and "Operation of Industrial Trucks" were originally adopted in 1952 and published by the NFPA under the designation NFPA No. 505 B, C. Revised editions of Parts B and C were submitted for approval in 1955 and adopted by the Association at the NFPA Annual Meeting held that year. In 1957 revisions were authorized affecting Paragraphs 310 and 314 of Part B.

NFPA Committee on Industrial Trucks

Standard for the Use, Maintenance and Operation of Industrial Trucks

NFPA No. 505 — 1963

PART A

Use of Industrial Trucks in Various Locations

100. General:

101. This Standard applies to fork trucks, tractors, platform lift trucks and other specialized industrial trucks.

102. Approved industrial trucks are those trucks that are listed for the use intended by some nationally recognized testing laboratory such as Underwriters' Laboratories, Inc., Factory Mutual Laboratories and Underwriters' Laboratories of Canada and shall bear a label or some other identifying mark to that effect authorized by such laboratory. The word listed herein shall mean compliance with the above.

103. For the purpose of this standard there are ten different designations of industrial trucks or tractors as follows: — D, DS, DY, E, EE, EX, G, GS, LP and LPS.

a. The E designated units are electrically powered units that have minimum acceptable safeguards against inherent fire hazards.

b. The EE designated units are electrically powered units that have, in addition to all of the requirements for the E units, the electric motors and all other electrical equipment completely enclosed. In certain locations the EE unit may be used where the use of an E unit may not be considered safe.

c. The EX designated units are electrically powered units that differ from the E or EE units in that the electrical fittings and equipment are so designed, constructed and assembled that the units may be used in certain atmospheres containing flammable vapors or dusts.

d. The G designated units are gasoline powered units having minimum acceptable safeguards against inherent fire hazards.

e. The GS designated units are gasoline powered units that are provided with additional safeguards to the exhaust, fuel and electrical systems. They may be used in some locations where the use of a G unit may not be considered safe.

f. The LP and LPS designated units are units similar to the G and GS units respectively except that liquefied petroleum gas is used for fuel instead of gasoline.

g. The D designated units are units similar to the G units except that they are diesel engine powered instead of gasoline engine powered.

h. The DS designated units are diesel powered units that are provided with additional safeguards to the exhaust, fuel and electrical systems. They may be used in some locations where a D unit may not be considered safe.

i. The DY units are diesel powered units that have all the safeguards of the DS units and in addition do not have any electrical equipment including the ignition and are equipped with temperature limitation features.

NOTE: In order to prevent confusion it is intended that all testing laboratories should use the same designations to identify the various type industrial trucks.

104. The Authority having jurisdiction shall determine the hazard classification of any particular atmosphere or location. The atmosphere or location shall have been classified as to whether it is hazardous or non-hazardous prior to the consideration of industrial trucks being used therein and the type of industrial truck required shall be as provided in Article 200 of this standard for such location.

105. Any one plant or building may have several areas of different hazard classification. The authority having jurisdiction may limit the use of industrial trucks in certain hazardous areas in a plant or building in accordance with the hazard classification of such areas. The responsibility for enforcement of restricted use in such areas will rest on management.

106. The industrial truck specified under Article 200 is the minimum type required but an industrial truck having greater safeguards may be used if desired.

200. Locations Where Trucks May or May Not Be Used.

NOTE: References in parenthesis are to the corresponding classification as used in the National Electrical Code (NFPA No. 70)* for the convenience of people familiar with those classifications.

201. Areas Containing Certain Flammable Gases or Vapors Where Power Operated Industrial Trucks Shall Not Be Used (Class 1, Division 1, Groups A, B and C).

a. Power operated industrial trucks shall not be used in atmospheres containing hazardous concentrations of acetylene gas, hydrogen gas or gases or vapors of similar hazard such as manufactured gas or ethyl ether vapors, ethylene gas and cyclopropane gas.

202. Atmospheres Containing Metal Dusts, Carbon Black, Coke or Coal Dust (Class 2, Division 1, Groups E and F).

a. Power operated industrial trucks shall not be used in atmospheres containing hazardous concentrations of metal dust including aluminum, magnesium or their alloys or in atmospheres containing carbon black, coal or coke dust except approved power operated industrial trucks designated as EX may be used in such atmospheres subject to special investigation by the authority having jurisdiction. In atmospheres where dust of magnesium, aluminum or aluminum bronze may be present, fuses, switches, motor controllers and circuit breakers of trucks shall have enclosures specifically approved for such locations.

203. Atmospheres Where Vapors of Flammable Liquids and Some Gases Exist Under Normal Operating Conditions (Class 1, Division 1, Group D).

a. Only approved power operated industrial trucks designated as EX may be used in atmospheres containing gasoline, hexane, naphtha, benzine, alcohol, acetone, benzol or lacquer solvent vapors, butane, propane or natural gas in quantities sufficient to produce explosive or ignitible mixtures and where such concentrations of these gases or vapors exist continuously, intermittently or periodically

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under normal operating conditions or may exist frequently because of repair, maintenance operations, leakage, breakdown or faulty operation of equipment.

NOTE: This category includes locations where flammable volatile liquids or liquefied flammable gases are transferred from one container to another; areas in the vicinity of spraying and painting operations where volatile flammable solvents are used; locations containing open tanks or vats of volatile flammable liquids; drying rooms or compartments for the evaporation of flammable solvents; locations containing fat and oil extraction equipment using volatile flammable solvents; portions of cleaning and dyeing plants where hazardous liquids are used; gas generator rooms and other portions of gas manufacturing plants where flammable gas may escape; pump rooms for flammable gas or for volatile flammable liquids; and all other locations where hazardous concentrations of flammable vapors or gases are likely to occur in the course of normal operations.

204. Atmospheres Where Volatile Flammable Liquids and their Vapors or Flammable Gases Are Normally Confined (Class 1, Division 2, Group D).

a. When permitted by the authority having jurisdiction only approved power operated industrial trucks designated as EE, DY or EX may be used in locations where flammable volatile liquids or flammable gases are handled, processed or used, but where the hazardous liquids, vapors or gases will normally be confined within closed systems or containers from which they can escape only in the event of accidental rupture or breakdown of such containers or systems or in cases of possible abnormal operation of equipment; also in locations in which hazardous concentrations of gases or vapors are prevented by positive mechanical ventilation provided with effective safeguards against ventilation failure.

b. In locations used for the storage of hazardous liquids in sealed containers or liquefied or compressed gases in containers, approved power operated industrial trucks designated as GS, LPS or DS may be used if permitted for such location by the authority having jurisdiction.

NOTE: This category includes locations where flammable volatile liquids or flammable gases or vapors are used, but which in the judgment of the authority having jurisdiction would become hazardous only in case of accident or of some unusual operating condition. The quantity of hazardous material that may escape in the event of accident, the adequacy of ventilating equipment, the total area involved and the experience of the industry or

business with respect to explosions or fires are all factors that should receive consideration in determining whether or not the EE, GS, LPS or DS designated truck possesses sufficient safeguards for the location. Piping without valves, checks, meters and similar devices would not ordinarily be deemed to introduce a hazardous condition even though used for hazardous liquids or gases. Locations used for the storage of hazardous liquids or of liquefied or compressed gases in sealed containers would not normally be considered hazardous unless subject to other hazardous conditions also.

205. Atmospheres Containing Combustible Dusts in Suspension Other Than Those Specified in Paragraph 202 (Class 2, Division 1, Group G).

a. Only approved power operated industrial trucks designated as EX may be used in atmospheres in which combustible dust is or may be in suspension continuously, intermittently or periodically under normal operating conditions, in quantities sufficient to produce explosive or ignitible mixtures, or where mechanical failure or abnormal operation of machinery or equipment may cause such mixtures to be produced.

NOTE: This category includes the working areas of grain handling and storage plants, rooms containing grinders or pulverizers, cleaners, graders, scalpers, open conveyors or spouts, open bins or hoppers, mixers or blenders, automatic or hopper scales, packing machinery, elevator heads and boots, stock distributors, dust and stock collectors and all similar dust producing machinery and equipment in grain processing plants, starch plants, sugar pulverizing plants, malting plants, hay grinding plants, pulverized spice and cocoa plants and other occupancies of similar nature where combustible dust may, under normal operating conditions, be present in the air in quantities sufficient to produce explosive or ignitible mixtures.

206. Locations Where Combustible Dusts are Present But Not Normally in Suspension in the Atmosphere (Class 2, Division 2, Group G).

a. Only approved power operated industrial trucks designated as EE, DY or EX may be used in atmospheres in which combustible dust will not normally be in suspension in the air or will not be likely to be thrown into suspension in the air by the normal operation of equipment or apparatus in quantities sufficient to produce explosive or ignitible mixtures but where deposits or accumulations of such dust may be ignited by arcs or sparks originating in the truck.

b. Approved power operated industrial trucks designated as GS, LPS or DS may be used in locations as indicated in the above paragraph if permitted by the authority having jurisdiction.

NOTE: Locations where dangerous concentrations of suspended dust would not be likely, but where dust accumulations might form on, in or in the vicinity of electrical equipment, would include rooms and areas containing only closed spouts and conveyors, closed bins or hoppers, or machines and equipment from which appreciable quantities of dust would escape only under abnormal operating conditions; rooms or areas into which explosive or ignitible concentrations of suspended dust might be communicated only under abnormal operating conditions; rooms or areas where the formation of explosive or ignitible concentrations of suspended dust is prevented by the operation of effective dust control equipment; warehouses and shipping rooms where dust producing materials are stored or handled only in bags or containers; and other similar locations.

207. Locations Where Ignitible Fibers Are Processed (Class 3, Division 1).

a. Only approved power operated industrial trucks designated as EE, DY or EX may be used in locations which are hazardous because of the presence of easily ignitible fibers or flyings but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitible mixtures.

NOTE: Locations where easily ignitible fibers or materials producing combustible flyings are handled, manufactured or used would include some sections of cotton, rayon and other textile mills, combustible fiber manufacturing and processing plants, cotton gins and cotton-seed mills, flax processing plants, clothing manufacturing plants, and establishments and industries processing similar hazardous materials. Woodworking plants (except wood flour mills) shall not be considered as being in the type of locations defined in Paragraph 207.

208. Locations Where Ignitible Fibers Are Stored (Class 3, Division 2).

a. Only approved power operated industrial trucks designated as DS, DY, EE, EX, GS or LPS may be used in locations where easily ignitible fibers are stored or handled, including outside storage, but are not being processed or manufactured. Industrial trucks designated as E may be used in locations indicated above subject to approval of the authority having jurisdiction in consideration of a relatively less degree of fire hazard.

NOTE: Easily ignitible fibers and flyings include cotton, cotton linters and cotton waste, rayon, sisal or henequen, istle, jute, hemp, tow, cocoa fiber, oakum, baled waste, kapok, Spanish moss, excelsior and other materials of similar nature.

209. Piers and Wharves.

a. On piers and wharves handling general cargo, any approved power operated industrial truck may be used unless such locations are classified by the authority having jurisdiction as falling within the scope of any of the preceding paragraphs when only the industrial truck designated by such paragraph may be used.

210. General Inside and Outside Storage.

a. The authority having jurisdiction shall determine the classification of hazard for storage warehouses and outside storage locations. If classified as hazardous only the approved power operated industrial truck specified for such locations in the preceding paragraphs may be used.

211. Converted Industrial Trucks.

a. Power operated industrial trucks that have been originally approved for the use of gasoline for fuel, when converted to the use of liquefied petroleum gas fuel in accordance with Part B, may be used in those locations where G, GS or LP and LPS designated trucks have been specified in the preceding paragraphs (See Paragraph 314 and Appendix).

PART B

Recommendations For Maintenance of Industrial Trucks

300. Maintenance Recommendations:

301. It is essential that the safety built into power operated industrial trucks be maintained. Deterioration due to usage should be compensated for properly and as frequently as may be indicated.

302. Any power operated industrial truck that shows any wear or part failure that may affect the safe operation of the vehicle shall be immediately withdrawn from service and not again used until proper repairs have been completed.

303. Industrial trucks requiring repairs to fuel or electrical systems shall be removed to a location designated as safe for their storage and repair. For gasoline, diesel fuel and liquefied petroleum gas-powered equipment, such location should preferably be a separate garage building, otherwise it shall be in a section cut off from the balance of the building in accordance with NFPA Standard on Garages (NFPA No. 88)*.

304. All parts of any such industrial truck requiring replacement shall be replaced only by parts equivalent as to safety with those used in the original design.

305. Except as approved by the authority having jurisdiction, industrial trucks shall not be altered so that the relative positions of the various parts are different from what they were when originally received from the manufacturer, nor shall they be altered either by the addition of extra parts not provided by the manufacturer or by the elimination of any parts, except as provided in Paragraph 314. Additional counterweighing of fork trucks shall not be done unless approved by the truck manufacturer.

306. Industrial trucks shall be examined thoroughly before being placed in service, and shall not be placed in service if the examination shows any condition adversely affecting the safety of the vehicle. Such examination shall be

* Published in National Fire Codes and in separate pamphlet form.

made at least daily and preferably before the day's work has started. Where industrial trucks are used on a round-the-clock basis they shall be examined after each shift. Defects when found shall be immediately reported and corrected.

307. Water mufflers shall be filled daily or as frequently as is necessary to prevent depletion of the supply of water below 75 per cent of the filled capacity. Vehicles with mufflers having screens or other parts that may become clogged shall not be operated while such screens or parts are clogged. Any vehicle that emits sparks or flames from the exhaust system shall immediately be removed from service, and not returned to service until the cause for the emission of such sparks and flames has been eliminated.

308. When the temperature of any part of any truck is found to be in excess of its normal operating temperature, the vehicle shall be removed from service and not returned to service until the cause for such overheating has been eliminated.

309. Industrial trucks shall be kept free of lint, excess oil and grease and should be thoroughly cleaned, preferably with steam. When possible trucks should be cleaned once weekly and more frequently if necessary. Flammable liquids shall not be used for cleaning.

310. At no time shall the gasoline or diesel fuel supply of vehicles be replenished inside of buildings or the vehicles otherwise serviced, unless a special area for such work is provided. Engines must definitely be stopped during any refueling operation. It is suggested that lock type gas tank caps be provided for all gasoline fueled vehicles not so equipped, with key to cap in possession of responsible party. Exchange of removable liquefied petroleum gas fuel containers should preferably be done outdoors but may be done indoors. When removable fuel containers are used, means shall be provided in the fuel system to minimize the escape of fuel when the containers are exchanged. This may be accomplished by using a listed automatic quick closing coupling, of a type that closes in both directions when uncoupled, in the fuel line and by closing the valve at the fuel container and allowing the engine to run until the fuel in the line is exhausted.

311. Battery charging installation shall be located in areas designated for that purpose. When a room is required as specified in the National Electrical Code (NFPA No. 70)*, it shall conform to the requirements of that Code. Battery charging shall be under the supervision of a competent attendant.

312. Trucks should be equipped with a fire extinguisher approved for use on Class B and C fires,† maintained in operable condition and located where it will be accessible at all times.

313. Where it is necessary to use anti-freeze during winter months, only those products having a glycol base shall be used.

314. Industrial trucks originally approved for the use of gasoline for fuel may be converted to liquefied petroleum gas fuel provided the complete conversion results in a truck which in the judgment of the authority having jurisdiction embodies the features specified for LP or LPS designated trucks. The authority having jurisdiction shall require that the conversion equipment is "Listed by Report" by a recognized testing laboratory. The description of the component parts of this conversion system and the recommended method of installation on specific trucks are contained in the "Listing by Report" available for the use of the authority having jurisdiction.

* Published in National Fire Codes and in separate pamphlet form.

† See NFPA Standard for Portable Fire Extinguishers (NFPA No. 10) published in National Fire Codes and in separate pamphlet form.

PART C

Recommendations for Operation of Industrial Trucks

400. General:

410. Experience indicates that a large percentage of the fires involving gasoline-powered industrial trucks occur during refueling. This shows the need for particular caution in carrying out all refueling operations of internal combustion engine-powered trucks.

420. For the safe operation of industrial trucks, measures must be taken to minimize the chances of overturning or involving them in collisions with fire protective equipment or other building fixtures and with commodities. Fuel may escape from an overturned truck and become involved in a fire. Wide-spread damage is likely if water is released from sprinkler pipes or fittings broken by careless truck operation. Fire doors intended to limit the spread of fire may be made inoperative if struck by a truck. Guards or curbs to prevent too close an approach, or tell-tales to warn operators, shall be provided to protect building features, such as sprinkler piping, if prominently exposed to injury by projecting into or being located over trucking aisles.

500. Driver Qualifications and Training:

510. Only trained and authorized operators shall be permitted to operate power operated industrial trucks. Training methods should be developed to instruct operators in safe and efficient operating procedures.

600. Fuel Handling and Storage:

610. Gasoline and diesel fuel shall be stored and handled as outlined in the NFPA Flammable Liquids Code (NFPA No. 30).* Liquefied petroleum gas fuel shall be stored and handled as recommended by the NFPA Standard for the Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58)*.

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620. Gasoline and diesel fuel-powered trucks shall be refueled only at locations specially designated for that purpose. Safe outdoor locations are preferable to those indoors. The NFPA Flammable Liquids Code (No. 30),* Paragraph 6311 outlines recommendations for arranging safe indoor fueling facilities. Liquefied Petroleum gas-powered trucks shall be refueled only as provided in the NFPA Standards for the Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58)*.

630. Exchange of removable liquefied petroleum gas truck fuel containers, recharging non-removable containers and storage of extra containers shall be done only in accordance with the NFPA Standards for Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58)*.

700. **Hazardous Areas:**

710. Industrial trucks shall not be used in hazardous areas except as specified in Part A of this Standard.

800. **Safety Operating Rules:** Industrial trucks shall be operated in accordance with the following rules:

801. Lighting of adequate intensity should be provided in operating areas.

802. Operators or authorized personnel shall return trucks for refueling to locations designated for that purpose. Vehicles that run out of fuel elsewhere shall be towed to a designated safe area for refueling.

803. Engines shall be stopped before refueling.

804. Reasonable care shall be exercised to prevent the spillage of fuel. Spilled fuel shall be dissipated before an attempt is made to start the engine.

805. Metal contact shall be maintained between the side of the fill opening of the tank and the refueling can or hose nozzle to prevent the accumulation of a hazardous charge of static electricity.

806. Operators shall avoid striking sprinkler heads, pipes, fire doors, elevator gates, walls, columns and other

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obstructions. Accidents shall be reported to a foreman or supervisor.

807. Operators shall exercise particular care while high tiering loads in storage to avoid breaking sprinkler piping or fittings. Fire aisles and access space to fire equipment and exit doors shall be kept clear.

808. Operators shall report leaky containers or broken packages to a foreman or supervisor.

809. Operators shall not make any truck repairs or adjustments unless specifically authorized to do so.

810. When leaving an industrial truck unattended, controls shall be neutralized, power shut off, brake set, key or battery connector removed, and the forks of a fork truck left flat on the floor.

811. Trucks shall be garaged only in a location acceptable to the authority having jurisdiction.

812. Fork trucks shall be driven at all times with the fork as low as local conditions permit.

813. The authorized speed limit shall not be exceeded and dangerous intersections or slippery floors shall be negotiated at a safely lower speed. Operators shall also slow down at cross aisles and when vision is obstructed by doors, corners, elevators or loads.

814. Operators shall keep trucks under control at all times so that a quick stop can be made in the event of an emergency.

815. The operator of a moving truck should always look in the direction of travel.

816. Bridge plates shall be properly secured and negotiated carefully and slowly.

817. Parking on an incline shall be avoided whenever possible. Otherwise, the brake shall be set and chocks placed under the drive wheels.

818. Operators shall avoid stunt driving and horseplay.

819. It should always be ascertained that positive protection has been provided to prevent railroad cars from