



UL 558

STANDARD FOR SAFETY

Industrial Trucks, Internal Combustion
Engine-Powered

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

Tenth Edition, Dated January 10, 2012

Summary of Topics

This revision to ANSI/UL 558 dated May 2, 2024 includes the deletion of [44.2](#) to align with UL 583.

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated March 22, 2024.

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Standard for Industrial Trucks, Internal Combustion Engine-Powered

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INTRODUCTION

1 Scope

1.1 These requirements cover the fire safety aspects of industrial trucks with internal-combustion engines, such as tractors, platform-lift trucks, fork-lift trucks, and other specialized vehicles for industrial use. These requirements do not cover other possible safety aspects of such equipment.

1.2 These requirements do not cover farm or road vehicles or automotive vehicles for highway use.

1.3 The Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations, NFPA 505, identifies internal combustion engine powered industrial trucks as follows:

Types G, D, LP, CN, G/CN, and G/LP – A unit powered by gasoline (G), diesel (D), LP-gas (LP), compressed natural gas (CN), either gasoline or compressed natural gas (G/CN), or either gasoline or liquefied petroleum gas (G/LP), that has minimum acceptable safeguards against inherent fire hazards.

Types GS, DS, LPS, CNS, GS/CNS, and GS/LPS – A unit powered by gasoline (GS), diesel (DS), LP-gas (LPS), compressed natural gas (CNS), either gasoline or compressed natural gas (GS/CNS), or either gasoline or liquefied petroleum gas (GS/LPS) that, in addition to meeting all the requirements for Types G, D, LP, CN, G/CN, and G/LP, is provided with additional safeguards to the exhaust, fuel and electric systems.

Type 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.

2 Components

2.1 Except as indicated in [2.2](#), a component of a product covered by this standard shall comply with the requirements for that component. See Appendix [A](#) for a list of standards covering components generally used in the products covered by this standard.

2.2 A component need not comply with a specific requirement that:

- a) Involves a feature or characteristic not needed in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

2.3 A component shall be used in accordance with its recognized rating established for the intended conditions of use.

2.4 Specific components are recognized as being incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits and shall be used only under those specific conditions for which they have been recognized.

3 Units of Measurement

3.1 If a value for measurement is followed by a value in other units in parentheses, the first stated value is the requirement.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

5 Terminology

5.1 In the following text, the term truck is used to mean an industrial combustion engine-powered industrial truck. The type or types of truck(s) to which a specific requirement applies is identified by the heading under which the requirement is located and by specific references in the text to the applicable requirements.

5.2 Diesel Exhaust Fluid (DEF) – As a liquid with 67.5 percent deionized water and 32.5 percent urea.

6 Reference Standards

6.1 The reference standard that applies to power-operated industrial trucks is the Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance and Operations, NFPA 505, which relates to a classification of industrial trucks as to areas of use, maintenance, and operation.

7 Samples

7.1 Unless otherwise expressly stated herein, the performance of an industrial truck shall be satisfied by the testing of a representative model or a new vehicle.

CONSTRUCTION

TYPES G, D, LP, AND CN

8 Electrical Systems

8.1 All wiring shall comply with one of the following, as applicable to the intended use which include, but not limited to, temperature, voltage, and current ratings for the wire:

- a) The Standard for Appliance Wiring Material, UL 758;
- b) The Standard for Thermoplastic-Insulated Wires and Cables, UL 83;
- c) The Standard for Flexible Cords and Cables, UL 62;
- d) The Standard for Low Voltage Primary Cable, SAE J1128
- e) Outline for Battery Lead Wire, UL 2726;
- f) The Standard for Low Voltage Battery Cable, SAE J1127;
- g) Outline for Welding Cable, UL 1276;
- h) The Standard for Electrical Cables for Boats, UL 1426;
- i) The Standard for Machine-Tool Wires and Cables, UL 1063; or
- j) The Standard for Fixture Wire, UL 66.

8.2 The wiring of a truck shall be rated for the particular application with respect to the temperature and voltage, exposure to oil or grease, and other conditions of service to which the wiring is subjected.

8.3 Wiring shall be protected against mechanical damage by:

- a) Enclosing it in the body of the truck; or when mounted on masts, booms, lifts or similar parts, the wiring shall be installed so as to reduce the likelihood of mechanical damage and kinking;
- b) Enclosing it in metal raceway, such as armored cable, rigid metal conduit, or electrical metallic and nonmetallic tubing, flexible nonmetallic conduit or nonmetallic insulated tubing; or
- c) Other suitable method in which the wiring is protected sufficiently against mechanical damage.

8.4 Wiring and cables shall be installed with means for maintaining clearance from moving parts, hot engine parts, exhaust systems and fuel systems, and shall not be supported on surfaces that are subjected to accumulation of oil or grease as a result of servicing.

8.5 Wiring and cables shall not be located such to allow exposure to drippage of gasoline, diesel, oil, or grease, and shall not be supported on oil- or grease-retaining surfaces.

8.6 If an audible electrical warning device is employed, its coil and other electrical parts shall be enclosed in metal or an equivalent material. Among the factors that are to be taken into consideration when judging the equivalency of a nonmetallic enclosure are:

- a) The mechanical strength,
- b) Resistance to impact,
- c) Moisture-absorptive properties,
- d) Flammability, and
- f) Resistance to distortion at temperatures to which the material is subjected under conditions of normal or abnormal usage.

8.7 Each lighting-device, warning-device, or other auxiliary circuits shall be protected by a fuse or a circuit breaker, or a supplementary protector, of the size necessary to reduce the likelihood of overheating of the smallest conductor in the circuit. A fuse conforming with the Standard for Electric Fuses, ANSI/SAE J554, the applicable parts of the UL 248 series of standards, the Standard for Automotive Glass Tube Fuses, UL 275 or the Outline of Investigation for Automotive Blade Type Fuses, UL 275A shall be considered acceptable. A circuit breaker conforming to the Standard for Circuit Breakers, ANSI/SAE J553 or the Standard for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures, UL 489, shall be considered acceptable. A supplementary protector conforming to the Standard for Supplementary Protectors for Use in Electrical Equipment, UL 1077, shall be considered acceptable.

8.8 Electrical components located near foot-operated controls shall be located or protected so as to prevent damage to these components from the operator's feet during operation of the controls.

9 Exhaust Systems

9.1 The exhaust system beyond the manifold shall be supported at least 3 inches (76.2 mm) clear of flammable materials, excluding flexible mountings, and at least 2 inches (50.8 mm) clear of fuel- and electrical-system parts and shall not subject to drippage of fuel, oil, or grease. See also Temperature Tests, Section [23](#).

Exception: Lesser clearances shall be allowed when the maximum temperatures obtained during the Temperature Test, Section [23](#), do not exceed the established rating of the component.

9.2 The exhaust system shall conform with the test requirements of the Exhaust System Test, Section [25](#).

9.3 A muffler, catalytic converter, diesel particulate filter, or other after-treatment device, shall be provided on each truck.

10 Fuel Systems – Gasoline and Diesel

10.1 Tanks and pumps

10.1.1 A fuel tank shall be constructed of painted mild steel having a minimum thickness of 0.032 inch (0.81 mm) or material equivalent in strength, rigidity, and resistance to fire and corrosion. The joints shall be welded, brazed, soldered, or bonded. If soldered or bonded, the joints shall be of a construction that will retain the heads if the solder or bonding melts. Fittings and fill pipe, if soldered or bonded, shall be mechanically secured to the tank in addition to soldering or bonding.

10.1.2 A fuel tank shall not be located directly over the engine. If a tank is within or contiguous to the engine compartment, the tank or fill arrangement, or both, shall be isolated from the electrical and exhaust systems by a separate enclosure or by baffles. The tank location and the facilities for filling shall be such that spillage or leakage will drain to the ground and not into the engine compartment or onto electrical- or exhaust-system parts.

10.1.3 A fuel tank and fill fitting shall be so located as to minimize the possibility of damage to the tank or its fittings.

10.1.4 A shut-off valve shall be provided in an accessible location near the tank on gravity-feed systems or on systems where the fuel in the tank is subject to discharge by siphon action if the fuel line breaks.

10.2 Fuel lines, tubing, and fittings

10.2.1 Metallic fuel lines, except those used in a high-pressure injection system, shall be of seamless annealed copper or steel tubing. Flexible tubing, hose, or a vibration loop shall be used where necessary to absorb vibration. Flexible tubing or hose shall be of the length necessary to span between the fixed and moving parts.

10.2.2 Nonmetallic fuel tubing or hoses shall be provided with appropriate traceability to validate conformance with the Standard for Nonmetallic Fuel System Tubing with One or More Layers, SAE J2260 or the Standard for Fuel and Oil Hoses, SAE J30.

10.2.3 Fuel system assemblies (eg. each fuel line and fitting configuration) shall be provided with appropriate traceability to validate conformance with the Standard for Fuel System Tubing Assemblies, SAE J2045.

Exception: Fuel system assembly (e.g. each fuel line and fitting configuration) shall not pull off fittings or fail when subjected to a 20 pound-force (89 N) axial pull test applied over a 1 minute period. The test shall be conducted at ambient conditions of $21 \pm 5^{\circ}\text{C}$ ($70 \pm 9^{\circ}\text{F}$) with tubing or hose wetted with fuel. Hose shall also be subjected to 70 hours at 100°C (212°F) aging and 48 hours of 0.125 inch amplitude vibration at 17 HZ before the pull test.

10.2.4 Fuel system assemblies that utilize quick connect fittings shall conform and be provided with appropriate traceability to validate conformance with the Standard for Quick Connect Coupling Specification For Liquid Fuel and Vapor/Emissions Systems, SAE J2044.

Exception: Fuel system assembly (e.g. each fuel line and fitting configuration) shall not pull off fittings or fail when subjected to a 20 pound-force (89 N) axial pull test applied over a 1 minute period. The test shall be conducted at ambient conditions of $21 \pm 5^{\circ}\text{C}$ ($70 \pm 9^{\circ}\text{F}$) with tubing or hose wetted with fuel. Hose shall also be subjected to 70 hours at 100°C (212°F) aging and 48 hours of 0.125 inch amplitude vibration at 17 HZ before the pull test.

10.2.5 A body or fitting provided with tapered threads shall be threaded in accordance with the Standard for Pipe Threads, General Purpose, (Inch), ANSI/ASME B1.20.1.

10.2.6 A fuel filter shall conform with the requirements in [31.3](#). When the fuel confining parts are constructed of nonmetallic material, the assembly shall also conform with the requirements in [10.3](#).

10.2.7 Fuel lines shall be supported to minimize chafing and to maintain at least a 2 inch (50.8 mm) clearance from exhaust- and electrical-system parts.

Exception: If it can be demonstrated that the fuel lines and wiring are sufficiently supported to prevent the clearance from being reduced to less than 1/2 inch (12.7 mm), the clearance between fuel lines and electrical-system parts may be reduced.

10.2.8 Fuel feed lines, valves, and fittings shall be located so that any leakage will not run off or drip on electrical- or exhaust-system parts.

10.3 Nonmetallic parts

10.3.1 A nonmetallic part in contact with non-ethanol blended gasoline, diesel fuel or diesel exhaust fluid (DEF) shall not show excessive volume change or loss of weight, when considered on the basis of its intended function, following immersion for 70 hours at a temperature of $23 \pm 2^{\circ}\text{C}$ ($73.4 \pm 3.6^{\circ}\text{F}$) in the test liquid specified in [Table 10.1](#).

Exception No. 1: This requirement does not apply to fuel lines that conform with [10.2.3](#).

Exception No. 2: This requirement does not apply to fuel system assemblies that conform with [10.2.4](#).

Exception No. 3: This requirement does not apply to quick connect fittings that conform with [10.2.5](#).

Exception No. 4: This requirement does not apply to gasketing and seals that have been investigated to the Standard for Gaskets and Seals, UL 157.

Table 10.1
Test liquids for nonmetallic materials

Liquid in contact with part	Test liquid
Gasoline	A and C Reference Fuels (ASTM D471)
Diesel Oil	IRM 903 Oil
Urea	DEF (Diesel Exhaust Fluid) ¹
¹ DEF test fluid shall be in accordance with Supplement SA of the Outline of Investigation for Power Operated Dispensing Devices for Diesel Exhaust Fluid, UL 87C.	