Subject 558

March 16, 2007

SUMMARY OF TOPICS

The following topics are being recirculated:

1. Editorial revisions to 3.1, 5.8 and 11.3

2. Addition of new references to 3.1 and 5.8

3. Revision of wiring requirements in Sections 5 and 9

4. Revision to the fuel changeover requirements in Section 13

6. Revision to clarify requirement in 19.1.4

COMMENTS DUE: April 30, 2007

For your convenience in review, proposed additions to the previously proposed requirements are shown underlined and proposed deletions are shown ~~lined-out~~.

1. Editorial revisions to 3.1, 5.8 and 11.3

RATIONALE

Responses to comments have been posted within the Proposal Review Work Area.

The reference to ANSI/ASME B56.1 is proposed to be replaced with ANSI/ITSDF B56.1. Corrections to the referenced standard titles are also included.

PROPOSAL

3 Reference Standards

3.1 Other reference standards applying to power-operated industrial trucks are as follows:

a) ~~Powered Industrial~~ Low Lift and High Lift Trucks, Safety Standard for, ANSI/~~ASME~~ITSDF B56.1 (requirements relating to the elements of design, operation, and maintenance of powered-industrial trucks).

b) Powered Industrial Trucks~~,~~ Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations, ANSI/NFPA 505 (relates to a classification of industrial trucks as to areas of use, maintenance, and operation).

c) Electric-Battery-Powered Industrial Trucks, UL 583 (requirements relating to fire, electric shock, and explosion protection).

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2. Addition of new references to 3.1 and 5.8

Responses to comments have been posted within the Proposal Review Work Area. No changes have been made to the previously proposed revision.

3. Revision of wiring requirements in Sections 5 and 9

RATIONALE

Responses to comments have been posted within the Proposal Review Work Area.

The proposed revisions include removing the word ″internal″ from 5.1.1, replacing the reference to 8.1 in 5.1.2 with 5.1.1, adding cross linked polyolefin (XLPO) to 5.1.3, and adding a reference to 5.9 in paragraph 9.1.

PROPOSAL

5 Electrical Systems

5.1.1 The ~~internal~~ 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.

5.1.2 With respect to ~~8.1~~ 5.1.1, the effects of vibration, impact, and exposure are to be taken into account for wires smaller than No. 24 AWG (0.21 mm^2).

5.1.3 All wiring shall be polyvinyl chloride (PVC), polytetrafluoroethylene (PTFE), fluorinated ethylene propylene (FEP), cross linked polyolefin (XLPO), or neoprene insulated, or shall comply with the vertical wire flame test requirements in the Standard for Thermoplastic-Insulated Wires and Cables, UL 83 or the Standard for Appliance Wiring Material, UL 758.

9 Electrical Systems

9.1 The electrical system shall comply with 5.1.1 – 5.4, 5.7, 5.8, 5.9, and 9.3 – 9.9.

4. Revision to the fuel changeover requirements in Section 13

Responses to comments have been posted within the Proposal Review Work Area. No changes have been made to the previously proposed revision.

6. Revision to clarify requirement in 19.1.4

RATIONALE

Responses to comments have been posted within the Proposal Review Work Area.

The proposal has been modified for clarification. Also, the metric conversions for the ramp measurements have been modified.

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PROPOSAL

19.1.4 The test course for a truck other than as mentioned in 19.1.5 is to include a ramp. ~~The ramp is to have a minimum grade of 10 percent or for which the truck is designed to ascend. The total rise of the 10 percent ramp shall not be less than 4 feet (1 m). For trucks designed to ascend lesser grades of a minimum of 1 percent, the ramp length is to be a minimum of 40 feet (12 m) long.~~ The length of the ramp is to be a minimum of 40 ft (12.19 m) long. The grade of the ramp is to be 10 percent or a percentage for which the truck is designed to ascend. For trucks designed to ascend lesser grades, the minimum grade of the ramp is 1 percent. The total rise of a 10 percent ramp shall not be less than 4 ft (1.22 m).

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UL 558

ISBN 0-7629-0018-0

Industrial Trucks, Internal Combustion Engine–Powered

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

Ninth Edition, Dated June 28, 1996

Revisions: This Standard contains revisions through and including September 2, 1998.

A change is indicated by a note following the affected item. The note is preceded and followed by an asterisk.

The revised requirements are substantially in accordance with UL's Bulletin on this subject dated February 18, 1998. The bulletin is now obsolete and may be discarded.

The revisions dated September 2, 1998 include a reprinted title page (page 1) for this Standard.

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing, Recognition, Classification and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

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1	June 28, 1996 (Reprinted: September 2, 1998)
2	June 28, 1996
3	September 2, 1998
4 – 9	June 28, 1996
10	September 2, 1998
11 – 24	June 28, 1996
25	September 2, 1998
26 – 29	June 28, 1996
30, 30A, 30B	September 2, 1998
31 – 35	June 28, 1996
36, 36A, 36B	September 2, 1998
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JUNE 28, 1996
(Title Page Reprinted: September 2, 1998)

American National Standard
ANSI/UL 558-1998

1

UL 558

Standard for

Industrial Trucks, Internal Combustion Engine–Powered

The first edition was titled the Standard for LP-Gas Industrial Trucks.

First Edition – September, 1958
Second Edition – September, 1961
Third Edition – July, 1970
Fourth Edition – April, 1972
Fifth Edition – November, 1977
Sixth Edition – November, 1979
Seventh Edition – June, 1984
Eighth Edition – August, 1991

Ninth Edition

June 28, 1996

Approval as an American National Standard (ANSI) covers the numbered paragraphs on pages dated June 28, 1996 and September 2, 1998. These pages should not be discarded when revised or additional pages are issued if it is desired to retain the ANSI approved text.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Approved as ANSI/UL 558-1977, August 12, 1977
Approved as ANSI/UL 558-1984, March 12, 1984
Approved as ANSI/UL 558-1991, February 27, 1991
Approved as ANSI/UL 558-1998, May 28, 1998

Revisions of this Standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

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FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

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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 Internal-combustion engine-powered industrial trucks covered by these requirements are identified as follows:

Types G, D, LP, and G/LP – Trucks fueled with gasoline (G), diesel fuel (D), liquefied petroleum gas (LP), or either gasoline or liquefied petroleum gas (G/LP), having fuel, electrical, and exhaust systems provided with minimum acceptable fire safeguards.

Types GS, DS, LPS, and GS/LPS – Trucks fueled with gasoline (GS), diesel fuel (DS), or liquefied petroleum gas (LPS), or either gasoline or liquefied petroleum gas (GS/LPS), provided with safeguards in addition to those required for Types G, D, LP, and G/LP.

Type DY – Trucks fueled with diesel fuel (DY), provided with all safeguards required for Type DS, without any electrical equipment, including ignition equipment, and equipped with temperature limitation features.

1.4 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements as determined necessary to maintain the acceptable level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard cannot be judged to comply with this standard. Where considered appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

2 General

2.1 Components

2.1.1 Except as indicated in 2.1.2, 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.

2.1.2 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.

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

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2.1.4 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.

2.2 Units of measurement

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

2.3 Undated references

2.3.1 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.

2.4 Terminology

2.4.1 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.

3 Reference Standards

3.1 Other reference standards applying to power-operated industrial trucks are as follows:

a) Powered Industrial Trucks, Safety Standard for, ANSI/ASME B56.1 (requirements relating to the elements of design, operation, and maintenance of powered-industrial trucks).

b) Powered Industrial Trucks, Type Designations, Areas of Use, Maintenance, and Operation, ANSI/NPFA 505 (relates to a classification of industrial trucks as to areas of use, maintenance, and operation).

c) Electric-Battery-Powered Industrial Trucks, UL 583 (requirements relating to fire, electric shock, and explosion protection).

4 Samples

4.1 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, AND LP

5 Electrical Systems

5.1 Wires and cables shall be installed so as not to be subject to chafing of insulation. Acceptable provisions shall include the use of clamps, grommets, loom, sleeves, supplementary insulation, conduit, routing or equivalent means.

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5.2 Wiring mounted on a boom, lift, or similar part subject to motion relative to other parts to which the wiring is connected shall not be subject to damage or failure as the result of kinking, or abrasion.

5.3 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.

5.4 Wiring and cables shall not be exposed to drippage of fuel, oil, or grease and shall not be supported on oil- or grease-retaining surfaces.

5.5 Electrical wiring and cables shall be equivalent to material conforming with the Standard for Low-Tension Primary Cable, ANSI/SAE J1128-JUN88, Type GPT, having a minimum conductor size equivalent to No. 18 AWG (0.82 mm^2). See 5.6. An overcurrent device rated 15 amperes is to be used for protection of No. 18 AWG (0.82 mm^2) or No. 16 AWG (1.3 mm^2) conductor.

Exception: Lighting-devices, warning-devices and other auxiliary circuits may have wiring with a conductor size smaller than No. 18 AWG (0.82 mm^2). See 5.8 for overcurrent protection.

5.6 Integral wire leads of electrical components less than specified in 5.5 meets the intent of the requirement if the leads beyond the component enclosure are less than 10 inches (254 mm) long and have the ampacity for the components' rating.

5.7 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.

5.8 Each lighting-device, warning-device, or other auxiliary circuits shall be protected by a fuse or a circuit breaker 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-MAR88, the Standard for Fuses, UL 198, the Standard for Automotive Glass Tube Fuses, UL 275 or the Standard for Automotive Blade Type Fuses, UL 275A shall be considered acceptable. A circuit breaker conforming to the Standard for Circuit Breakers, ANSI/SAE J553-JUN88 or the Standard for Circuit Breaker-Internal Mounted-Automatic Reset, Recommended Practice, SAE J258-71, shall be considered acceptable.

5.9 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.

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6 Exhaust Systems

6.1 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 19.

6.2 A muffler shall be provided and shall conform with the test requirements of the Muffler Tests – Types G, D, LP, and G/LP, Section 22.

7 Fuel Systems – Gasoline and Diesel

7.1 Tanks and pumps

7.1.1 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.

7.1.2 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. Spillage tests are to be conducted if necessary to determine compliance with the intent of the foregoing requirements. See 19.1.1.

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

7.1.4 A fill fitting shall be located in an accessible area to permit filling of the fuel tank without need for gaining access to the engine compartment.

7.1.5 External fuel-confining parts of an electrically or mechanically operated fuel pump shall be of metal. Failure of operating parts shall not result in external leakage of fuel.

7.1.6 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.

7.2 Fuel lines and fittings

7.2.1 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 the length necessary to span between the fixed and moving parts.

7.2.2 Copper tubing shall have a nominal wall thickness of not less than 0.032 inch (0.0025 inch minus tolerance) [0.81 mm (0.06 mm minus tolerance)]. Copper tubing 1/4 inch (6.4 mm) OD shall have a nominal wall thickness of 0.030 inch (0.0025 inch minus tolerance) [0.76 mm (0.06 mm minus tolerance)]. Steel tubing shall have a nominal wall thickness of not less than 0.028 inch (0.003 inch minus tolerance) [0.71 mm (0.08 mm minus tolerance)] and shall have a corrosion-resistant exterior coating equivalent to that afforded by paint.

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