UL 2344

STANDARD FOR SAFETY

Material Lifts

UL Standard for Safety for Material Lifts, UL 2344

Second Edition, Dated April 14, 2010

SUMMARY OF TOPICS

This revision of ANSI/UL 2344 dated April 19, 2022 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

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

The requirements are substantially in accordance with Proposal(s) on this subject dated February 18, 2022.

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UL 2344

Standard for Material Lifts

First Edition – May, 2005

Second Edition

April 14, 2010

This ANSI/UL Standard for Safety consists of the Second Edition including revisions through April 19, 2022.

The most recent designation of ANSI/UL 2344 as a Reaffirmed American National Standard (ANS) occurred on April 19, 2022. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover manually, electrically and pneumatically powered lifts. They are intended for the lifting and transport of materials and not for the movement or support of people. They are rated 250 volts or less, to be employed in nonhazardous environmental locations in accordance with the National Electrical Code, NFPA 70.

1.2 This standard does not apply to the following equipment:

a) Permanently installed material lifts, serving specific levels of a building and/or fitted with a car;

b) Power operated lifting platforms for persons with impaired mobility;

c) Mobile elevating work platforms;

d) Vehicle lifts (for maintenance); and

e) Powered forklift trucks.

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 under which components are evaluated.

2.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required 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 rating established for the intended conditions of use.

2.4 Specific components are 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.

3 Undated References

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.

4 Units of Measurement

4.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

5 Glossary

5.1 For the purpose of this standard the following definitions apply.

5.2 CIRCUITS, ELECTRICAL:

a) High-Voltage – A circuit with a potential of not more than 600 volts having circuit characteristics greater than those of a low-voltage power-limited circuit.

b) Low-Voltage – A circuit with a potential of not more than 30 volts AC rms, 42.4 volts DC or AC peak, and supplied by:

1) A primary battery;

2) A Class 2 transformer; or

3) A combination of transformer and fixed impedance that, as a unit, complies with all of the performance requirements for a Class 2 transformer.

5.3 DRUM, TRACTION – A type of drum that does not accumulate the suspension rope, but ascends or descends the rope as a result of friction between the rope and the drum.

5.4 DRUM, TRANSFER – A drum used to transfer the suspension wire rope from one groove to another groove on the traction drum of a traction lift.

5.5 DRUM, WINDING – A drum that accumulates the suspension rope in one or more layers.

5.6 ELECTRIC SHOCK – A risk of electric shock is considered to exist at any exposed part when the available open-circuit potential is more than 42.4 volts peak, 30 volts rms, and the available current through a 1500-ohm resistor is more than 5 milliamperes.

5.7 LIFT, ELECTRICALLY POWERED – A lift in which the prime mover is powered by electricity.

5.8 LIFT, MANUALLY POWERED – A lift in which the lifting power is derived directly from the operator.

5.9 LIFT, PNEUMATICALLY POWERED – A lift in which the prime mover is powered by compressed gases.

5.10 LIFT, POWER-OPERATED – An electrically powered lift or a pneumatically powered lift.

5.11 PRIME MOVER – The source of power for the lift, exclusive of any speed reducer.

5.12 RATED WORKING LOAD – The manufacturer's specified maximum load to be lifted by the lift. The maximum load includes the weight of all materials, and all dead loads lifted by the lift. Dead loads include the weight of:

a) The lift;

b) Wire rope (winding drum and tail line);

c) Platform and platform supports;

d) Guard rails;

e) Building ties;

f) Rollers, standoffs, and wire winder;

g) Electrical cords or air supply hoses; and

h) Other related equipment as applicable that may be included on a stage or otherwise lifted by a lift.

5.13 SHEAVE, DEFLECTION – A sheave used for small directional changes or deflections of the wire rope.

5.14 SHEAVE, DIRECTIONAL – A sheave used to transfer or change the direction of the wire rope.

5.15 SHEAVE, TRACTION – A single-wrap sheave that does not accumulate the suspension rope, but ascends or descends the rope as a result of friction between the rope and the sheave.

5.16 SPEED REDUCER – A device used to reduce the output speed of the prime mover to the desired speed of the lift.

6 Lubrication

6.1 Each separate enclosure of a material lift shall be provided with a means to maintain lubrication of all moving parts requiring lubrication at all times, unless self-sealed, self-lubricating, and dry bearings are used.

CONSTRUCTION

7 General

7.1 A material lift shall include all of the components necessary for its normal function and installation, and shall be furnished as a single unit or assembly.

7.2 A product shall be constructed so that it will have the strength and durability to withstand normal usage and to comply with the performance requirements.

7.3 An exposed metal surface shall be free from sharp edges, burrs, and other features that constitute a risk of injury to persons.

7.4 Bolt and rivet holes shall be accurately made and burrs shall be removed.

7.5 Each rivet shall be of proper size for the rivet hole, without major visible cracks or splits, concentric with the rivet hole, and in contact with the surface of the member so that a 0.005 inch (0.13 mm) feeler gauge cannot be fully inserted between the rivet head and the surface of the member or between two members attached together by a rivet.

7.6 All welds shall be free from undercuts, cracks, and closely spaced in-line surface porosity.

7.7 Based on the intended use of the material lift, installation instructions, and product markings, the stability will need to be evaluated including the following end-use considerations: location on uneven ground or inclines, type of ground surface, non-centered loads, and sliding loads off or unto the platform representing loading and unloading during actual use in raised and lowered conditions.

8 Materials and Assembly

8.1 All metal parts and fittings shall be made of aluminum or steel alloys, wrought iron, malleable iron, or other metal that is of equivalent strength for the intended purpose and shall be securely attached by means of rivets, bolts, screws, or other means determined to be the equivalent. Cast gray iron shall not be used for load-carrying parts.

8.2 Nuts shall be lock nuts or provided with lock washers.

9 Protection Against Corrosion

9.1 Different metals shall not be used in combination such as to cause galvanic action that will adversely affect the strength of the product.

9.2 When corrosion of a part interferes with the proper function of a material lift, the part shall be of a corrosion resistant material (aluminum, brass, copper, stainless steel, or other metal inherently resistant to corrosion) or be provided with corrosion protection.

9.3 Corrosion protection shall be by metallic or nonmetallic coatings, such as galvanizing, sherardizing, plating, or painting.

9.4 A part made of drawn brass or machined from brass rod incorporating internal threads made of a copper alloy containing more than 15 percent zinc shall be capable of withstanding, without cracking, the 10-Day Moist Ammonia Test, Section 21.

10 Shafts, Fillets, Keys, and Splines

10.1 A fillet shall be provided at any point of change in the diameter of the hoist shafts and the sheave shafts to reduce stress concentration in the shafts. Fitted keys, splines, bolts, or machine screws shall be used in all connections subject to torque.

11 Drums and Sheaves

11.1 Winding drums

11.1.1 The minimum pitch diameter of a multiple-wrap winding drum shall not be less than ten times the diameter of the wire rope used.

Exception: For a manually-operated lift, the minimum pitch diameter of a multiple-wrap winding drum may be less than ten times the diameter of the wire rope used, but shall not be less than eight times the diameter of the wire rope used.

11.1.2 A winding drum shall be provided with a positive means for attaching the wire rope. The attachment shall comply with the requirement specified in 18.3.

11.1.3 To provide level winding of the wire rope, a winding drum on a powered lift shall be constructed so that during operation, the suspension wire will wrap without cross-wrapping, improper spooling, or loss of winding.

11.2 Traction drums and traction sheaves

11.2.1 The pitch diameter of a traction drum or traction sheave shall not be less than 18 times the diameter of the wire rope.

11.3 Deflection sheaves

11.3.1 A deflection sheave or roller shall have a minimum pitch diameter of three times the diameter of the wire rope, and shall only be used for wire directional changes of less than 10 degrees.

11.4 Transfer drums and directional sheaves

11.4.1 A transfer drum or directional sheave shall have a minimum pitch diameter of ten times the diameter of the wire rope.

12 Gears

12.1 Gear material shall be one of the following:

a) Cast or forged alloy steel,

b) Cast or forged ductile or malleable iron, or

c) Cast, forged or wrought bronze.

Cast grey iron shall not be used for load-carrying gears.

13 Manually Powered Lifts

13.1 A winding-drum shall be equipped with a driving pawl and a locking pawl that will automatically engage when the driving pawl is released during operation of the lift.

13.2 A manually-operated lift shall be provided with a means to prevent rapid handle movement, fast unspooling, or uncontrolled descent.

13.3 A positive cranking force shall be required to raise or lower a manually-operated lift. The means of manual operation provided shall permit operation by one person. See 19.2.1.

14 Pneumatically Powered Lifts

14.1 Exterior pressure confining parts of air system components shall be constructed of metal, except for gaskets, hoses, and filters that are protected by a metal guard.

14.2 Cast iron shall not be used for pressurized fittings or tubing.

14.3 The operating control used for the lifting function may not be provided with a means for locking in the run position.

PERFORMANCE

ALL LIFTS

15 Normal-Operation Test

15.1 A material lift shall operate as intended for five complete cycles in each direction while carrying its rated working load. There shall be no signs of jerking.

15.2 During the final lift, the winch clutch shall be released and the load permitted to fall. The winch clutch shall stop and hold the load before traveling a vertical distance of 4 inches.

16 Endurance Test

16.1 A material lift shall operate as intended for 1,000 cycles in each direction while carrying its rated working load.

16.2 For lifts using wire ropes, the endurance test is to be conducted in accordance with the Endurance Test specified in the Standard for Scaffold Hoists, UL 1323. For lifts without wire ropes, each cycle of operation is to consist of one ascent and one descent over a minimum vertical travel distance necessary to cause all moving parts to cycle through at least one complete turn. There shall be no signs of jerking, breakage, wear or malfunction. No repairs or adjustments are necessary.

17 Strength Test

17.1 A material lift, while at its maximum height, is to be loaded for 5 minutes to four times its rated working load. No load-bearing component shall give way, permanently deform, or weaken. After the test load is released, the material lift shall operate as intended.

17.2 The material lift is to be prepared for test by securing the shaft or other means of travel from moving.

18 Wire-Rope Test

18.1 After being subjected to the Endurance Test, Section 55, of the Standard for Scaffold Hoists, UL 1323, a wire rope shall not break when pulled with a force of five times the rated working load of the lift.

Exception: The wire rope from a traction lift is to be investigated after 500 cycles of the Endurance Test.

18.2 A wire rope used during the Endurance Test, Section 16, shall not show:

a) Internal damage to the strands or individual wires,

b) Bird-caging or breakage of any wire rope strands or individual wires, or

c) Kinks or cuts.

18.3 An attachment to the wire drum shall not break when pulled with a force equal to four times the rated working load of the lift. The load is to be applied as a direct pull on the cable in a direction tangential to the drum at the cable connection and with no turns of cable on the drum.

19 Load-Limiting Test

19.1 Power-operated lifts

19.1.1 The prime mover of a power-operated lift shall stall or the power shall be automatically disconnected when attempts are made to lift, from a static condition, and carry three or more times its rated working load.

19.1.2 A load-limiting device of a power-operated lift shall disconnect power to the prime mover for an ascending (and a descending if so designed) lift when a test load of 300 percent of the rated working load is applied to the lift. Testing of the control switch is to be conducted in conjunction with the Endurance Test specified in the Standard for Scaffold Hoists, UL 1323.

19.1.3 When a shear pin is used to further limit the lifting capacity of a lift, the shear pin is to be removed and replaced by a steel pin before the load-limiting test is conducted. The lift shall comply with the

requirements without use of a shear pin. The test is to be repeated with the factory supplied shear pin in place and the lifting capacity noted. The pin shall shear at a load equal to or less than that recorded without the shear pin, but greater than 125 percent of rated load.

19.2 Manually-operated lifts

19.2.1 The mechanical advantage offered by the gear reduction system and manual crank or lever operator shall not permit lifting of a load in excess of three times the rated working load of the lift. For a lever-operated lift, a force of 200 pounds (890 N) is to be applied to the end of the lever at 90 degrees and in the direction to raise the lift. For a crank-operated lift, a force of 75 pounds (337 N) is to be used.

20 Speed

20.1 The maximum average lowering speed of a material lift shall be 20 ft/minute when it is loaded to its rated load capacity and fully extended. In case of power or other lifting failure a device shall be mounted on or integral to the lifting mechanism to limit the average lowering speed to 20 ft/minute. The average is to be determined from three trials.

21 10-Day Moist Ammonia Test

21.1 After being tested as described in 21.2 – 21.4, a brass part containing more than 15 percent zinc shall show no evidence of cracking when examined using 25x magnification.

21.2 Each test sample is to be subjected to the physical stresses normally imposed on or within a part as the result of assembly with other components. Such stresses are to be applied to the sample prior to and be affective during the test.

21.3 Three samples are to be degreased and then continuously exposed in a set position for ten days to a moist ammonia-air mixture maintained in a glass chamber approximately 12 by 12 by 12 inches (305 by 305 by 305 mm) having a glass cover.

21.4 Approximately 600 ml of aqueous ammonia having a specific gravity of 0.94 is to be maintained at the bottom of the glass chamber below the samples. The samples are to be positioned 1-1/2 inches (38.1 mm) above the aqueous ammonia solution and supported by an inert tray. The moist ammonia air mixture in the chamber is to be maintained at atmospheric pressure with the temperature constant at approximately 93°F (34°C).

ELECTRICALLY POWERED LIFTS

22 Electrically Powered Lifts

22.1 Electrically powered material lifts shall comply with Sections 15 through 32, and 49 through 62 of the Standard for Scaffold Hoists, UL 1323. Lifts marked for indoor use only are not subjected to the rain test.

PNEUMATICALLY POWERED LIFTS

23 Pneumatically Powered Lifts

23.1 Input-pressure test

23.1.1 A pneumatically powered lift shall operate at the rated working load when the inlet pressure is adjusted to ±10 percent of the rated operating pressure.