UL 561

STANDARD FOR SAFETY

Floor-Finishing Machines

UL Standard for Safety for Floor-Finishing Machines, UL 561

Seventh Edition, Dated October 31, 2011

SUMMARY OF TOPICS

This revision of ANSI/UL 561 dated June 29, 2021 includes the following changes in requirements:

– Replacing the References to the Standard For Power Conversion Equipment, UL 508C, With Reference to the Standard For Adjustable Speed Electrical Power Drive Systems – Part 5-1: Safety Requirements – Electrical, Thermal and Energy, UL 61800-5-1; 4.5.4.1 and 4.14.4.4

– Type SJ Power Supply Cords for Commercial Spray Extraction Machines; 10.8

– Addition of UL 969A into UL 561; 46.1

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 revised requirements are substantially in accordance with Proposal(s) on this subject dated January 15, 2021 and April 16, 2021.

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The Department of Defense (DoD) has adopted UL 561 on March 11, 1991. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

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 electrically powered floor-finishing machines to be used in accordance with the National Electrical Code, NFPA 70. This product category includes the following: a floor polisher, floor scrubber, floor sander, floor scraper, tile remover, rug shampooer, rug and floor washer, and a similar machine for commercial use. A machine such as a sander and wet scrubber with vacuum attachments is also covered.

1.2 These requirements do not cover vacuum cleaning machines, permanently connected machines, or cord-connected machines that are intended to be fastened in place or located in a dedicated space. These requirements do not cover machines rated more than 600 volts, nor do they cover machines involving universal motors rated more than 250 volts. These requirements do not cover floor finishing machines for household use, which are covered in the Standard for Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines, UL 1017/CSA-C22.2 No. 243.

1.3 A machine that uses some other source of energy (such as gas or steam) in addition to electrical energy will be investigated under these requirements and under such additional requirements as applicable to the machine under consideration.

2 General

2.1 Terminology

2.1.1 In the following text, a requirement that applies to one type of equipment (polisher, scrubber, or the like) is identified by a specific reference in that requirement to the type of equipment involved. In the absence of such specific reference, or if the term product or machine is used, it is understood that the requirement applies to all types of equipment covered by the standard.

2.2 Units of measurement

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

2.2.2 Unless indicated otherwise, all voltage and current values mentioned in this standard are root mean square (rms).

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.

3 Glossary

3.1 For the purpose of this standard, the following definitions apply.

3.2 APPLIANCE COUPLER – A single-outlet, female contact device for attachment to a flexible cord as part of a detachable power-supply cord to be connected to an appliance inlet (motor attachment plug).

3.3 APPLIANCE INLET (MOTOR ATTACHMENT PLUG) – A male contact device mounted on an end product appliance to provide an integral blade configuration for the connection of an appliance coupler or cord connector.

3.4 COMMERCIAL USE PRODUCT – A product not intended for use only in the home.

3.5 COMPONENT – A device or fabricated part of the appliance covered by the scope of a safety standard dedicated to the purpose. When incorporated in an appliance, equipment otherwise typically field installed (e.g. luminaire) is considered to be a component. Unless otherwise specified, materials that compose a device or fabricated part, such as thermoplastic or copper, are not considered components.

3.6 CONTROL, AUTOMATIC ACTION – A control in which at least one aspect is non-manual.

3.7 CONTROL, AUXILIARY – A device or assembly of devices that provides a functional utility, is not relied upon as an operational or protective control, and therefore is not relied upon for safety. For example, an efficiency control not relied upon to reduce the risk of electric shock, fire, or injury to persons during normal or abnormal operation of the end product is considered an auxiliary control.

3.8 CONTROL, MANUAL – A device that requires direct human interaction to activate or rest the control.

3.9 CONTROL, OPERATING – A device or assembly of devices, the operation of which starts or regulates the end product during normal operation. For example, a thermostat, the failure of which a thermal cutout/limiter or another layer of protection would reduce the risk of electric shock, fire, or injury to persons, is considered an operating control.

3.10 CONTROL, PROTECTIVE – A device or assembly of devices, the operation of which is intended to reduce the risk of electric shock, fire or injury to persons during normal and reasonably anticipated abnormal operation of the appliance. For example, a thermal cutout/limiter, or any other control/circuit relied upon for normal and abnormal conditions, is considered a protective control.

Note – During the evaluation of the protective control/circuit, the protective functions are verified under normal and single-fault conditions of the control.

3.11 CONTROL, TYPE 1 ACTION – The actuation of an automatic control for which the manufacturing deviation and the drift (tolerance before and after certain conditions) of its operating value, operating time, or operating sequence has not been declared and tested under this standard.

3.12 CONTROL, TYPE 2 ACTION – The actuation of an automatic control for which the manufacturing deviation and the drift (tolerance before and after certain conditions) of its operating value, operating time, or operating sequence have been declared and tested under this standard.

3.13 HAND-GUIDED PRODUCT – A portable product which during intended use is contacted by the hand of the user for purposes of electrical or physical control, but not for complete support.

3.14 HAND-SUPPORTED PRODUCT – A portable product that is completely supported by the user during the performance of its intended function. The hand of the user may also be used to exercise electrical or physical control of the operation of the product.

3.15 LINE-VOLTAGE CIRCUIT – A circuit involving a potential of not more than 600 volts and having circuit characteristics in excess of those of a low-voltage circuit.

3.16 LOW-VOLTAGE CIRCUIT – A circuit involving a peak open-circuit potential of not more than 42.4 volts supplied by a primary battery, by a Class 2 transformer, or by a combination of a transformer and a fixed impedance that, as a unit, complies with all performance requirements for a Class 2 transformer. A circuit derived from a line-voltage circuit by connecting a resistance in series with the supply circuit as a means of limiting the voltage and current is not considered to be a low-voltage circuit.

3.17 MEASUREMENT INDICATION UNIT (MIU) – The output voltage across the meter, in millivolts RMS, read from the measurement instrument in Figure 29.1, divided by 500 ohms. (The instrument indication is equal to the RMS value in milliamperes when the frequency is 60 Hz – sinusoidal current. The reading may not be a direct indication of the RMS or other common amplitude quantifier of leakage current when the leakage current is of a complex waveform or frequency other than 50 or 60 Hz).

4 Components

4.1 General

4.1.1 A component of a product covered by this standard shall:

a) Comply with the requirements for that component as indicated in 4.2 – 4.24;

b) Be used in accordance with its rating(s) established for the intended conditions of use;

c) Be used within its established use limitations or conditions of acceptability;

d) Additionally comply with the applicable requirements of this end product standard; and

e) Not contain mercury.

Note – 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.

Exception No. 1: A component of a product covered by this standard is not required to comply with a specific component requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product, or

b) Is superseded by a requirement in this end product standard,

c) Is separately investigated when forming part of another component, provided the component is used within its established ratings and limitations.

Exception No. 2: A component that complies with a UL component standard other than those specified in 4.2 – 4.24 is acceptable if:

a) The component also complies with the applicable component standard of 4.2 – 4.24; or

b) The component standard:

1) Is compatible with the ampacity and overcurrent protection requirements of the National Electrical Code, ANSI/NFPA 70, where applicable;

2) Considers long-term thermal properties of polymeric insulating materials in accordance with the Standard for Polymeric Materials – Long Term Property Evaluations, UL 746B, and

3) Any use limitations of the other component standard are identified and appropriately accommodated in the end use application. For example, a component used in a household application, but intended for industrial use and that complies with the relevant component standard may assume user expertise not common in household applications.

4.1.2 A component that is also intended to perform other functions, such as over current protection, ground-fault circuit-interruption, surge suppression, any other similar functions, or any combination

thereof, shall comply additionally with the requirements of the applicable UL standard(s) that cover devices that provide those functions.

Exception: Where these other functions are not required for the application and not identified as part of markings, instructions, or packaging for the appliance, the additional component standard(s) need not be applied.

4.1.3 A component not anticipated by the requirements of this end product standard, not specifically covered by the component standards in 4.2 – 4.24, and that involves a risk of electric shock, fire, or personal injury, shall be additionally investigated in accordance with the applicable UL standard, and shall comply with 4.1.1(b) – (e).

4.1.3.1 With regard to 4.1.3, reference to construction and performance requirements in another UL end product standard is applicable where that standard anticipates normal and abnormal use conditions consistent with the application of UL 561.

4.2 Attachment Plugs, receptacles, connectors, and terminals

4.2.1 Attachment plugs, receptacles, appliance couplers, appliance inlets (motor attachment plugs), and appliance (flatiron) plugs, shall comply with the Standard for Attachment Plugs and Receptacles, UL 498. See 4.2.9.

Exception No. 1: Attachment plugs and appliance couplers integral to cord sets or power supply cords are investigated in accordance with the requirements in the Standard for Cord Sets and Power-Supply Cords, UL 817 and need not comply with UL 498.

Exception No. 2: A fabricated pin terminal assembly(ies) need not comply with UL 498 if it complies with Accessibility of Uninsulated Live Parts, Film-Coated Wire, and Moving Parts, Section 6, Live Parts, Section 13, Insulating Material, Section 16, and Spacings, Section 26 of this end product standard, as well as the applicable performance requirements when tested in the end-product.

4.2.2 Quick-connect terminals, both connectors and tabs, for use with one or two 22 – 10 AWG copper conductors, having nominal widths of 2.8, 3.2, 4.8, 5.2, and 6.3 mm (0.110, 0.125, 0.187, 0.205, and 0.250 in), intended for internal wiring connections in appliances, or for the field termination of conductors to the appliance, shall comply with the Standard for Electrical Quick-Connect Terminals, UL 310.

Exception No. 1: Other sizes of quick-connect terminals shall be investigated with respect to crimp pull out, insertion-withdrawal, temperature rise, and all tests shall be conducted in accordance with UL 310.

Exception No. 2: A connector that complies with UL 310 may be used with an appropriately sized tab that complies with Tabs Used in Electrical Quick-Connect Terminals, Section 15. The connector is the part of a quick-connect terminal that is pushed onto the male tab, and the tab is the part that receives the female connector.

4.2.3 Single and multipole connectors for use in data, signal, control and power applications within and between electrical equipment, and that are intended for factory assembly to copper or copper alloy conductors, or for factory assembly to printed wiring boards, shall comply with the Standard for Component Connectors for Data, Signal, Control and Power Applications, UL 1977. See 4.2.9.

4.2.4 Wire connectors shall comply with the Standard for Wiring Connectors, UL 486A-UL486B.

4.2.5 Splicing wire connectors shall comply with the Standard for Splicing Wire Connectors, UL 486C.

4.2.6 Multi-pole splicing wire connectors that are intended to facilitate the connection of hard-wired utilization equipment to the branch-circuit conductors of buildings shall comply with the Standard for Multi-Pole Splicing Wire Connectors, UL 2459. See 4.2.9.

4.2.7 Equipment wiring terminals for use with all alloys of copper, aluminum, or copper-clad aluminum conductors, shall comply with the Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors, UL 486E.

4.2.8 Terminal blocks shall comply with the Standard for Terminal Blocks, UL 1059, and, if applicable, be suitably rated for field wiring.

Exception: A fabricated part performing the function of a terminal block need not comply with UL 1059 if the part complies with the requirements of Live Parts, Section 13, Internal Wiring, Section 14, Insulating Material, Section 16, and Spacings, Section 26 of this end product standard, as well as the applicable performance requirements when tested in the end-product. This exception does not apply to protective conductor terminal blocks.

4.2.9 Female devices (such as receptacles, appliance couplers, and connectors) that are intended, or that may be used, to interrupt current in the end product, shall be suitably rated for current interruption of the specific type of load, when evaluated with its mating plug or connector. For example, an appliance coupler that can be used to interrupt the current of a motor load shall have a suitable horsepower rating when tested with its mating plug.

4.3 Boxes, conduits, and raceways

4.3.1 Electrical boxes and the associated bushings, conduits, fittings, and raceways of the types specified in the National Electrical Code, ANSI/ NFPA 70, and that comply with the relevant UL standard (such as Flexible Metal Conduit, UL 1, Metallic Outlet Boxes, UL 514A, Conduit, Tubing, and Cable Fittings, UL 514B, Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers, UL 514C, Cover Plates for Flush-Mounted Wiring Devices, UL 514D, and Components, General, 4.1 are considered to comply with the requirements of this end product standard.

4.4 Capacitors and filters

4.4.1 The component requirements for capacitors are specified in Capacitors, Section 23.

4.4.2 Electromagnetic interference filters with integral enclosures that comply with one of the following standards are considered to comply with the requirements in 23.1.

a) The Standard for Electromagnetic Interference Filters, UL 1238; or

b) The Standard for Fixed Capacitors for Use in Electronic Equipment – Part 14, UL 60384-14.

4.5 Controls

4.5.1 General

4.5.1.1 Auxiliary controls shall be evaluated using the applicable requirements of this end product standard and the requirements in Auxiliary controls, 22.2, unless otherwise specified in this end product standard; see 4.5.1.4.

4.5.1.2 Operating (regulating) controls shall be evaluated using the applicable component standard requirements specified in 4.5.2 – 4.5.7, and if applicable, the parameters in Operating controls (regulating controls), 22.3, unless otherwise specified in this end product standard; see 4.5.1.4.

4.5.1.2.1 Operating controls that rely upon software for the normal operation of the end product where deviation or drift of the operating parameters of the control may result in an increased risk of electric shock, fire, or injury to persons, shall comply with:

a) The Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991; and the Standard for Software in Programmable Components, UL 1998; or

b) The Standard for Automatic Electrical Controls for Household and Similar Use; Part 1: General Requirements, UL 60730-1.

4.5.1.3 Solid-state protective (limiting) controls shall be evaluated using the applicable component standard requirements specified in 4.5.2 – 4.5.7, and if applicable, the parameters in Protective controls (limiting controls), 22.4, unless otherwise specified in this end product standard.

4.5.1.3.1 Solid-state protective controls that do not rely upon software as a protective component shall comply with:

a) The Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991; or

b) The Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1, except Controls Using Software.

4.5.1.3.2 Protective controls that rely upon software as a protective component shall comply with:

a) The Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991; and the Standard for Software in Programmable Components, UL 1998; or

b) The Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1.

4.5.1.4 An electronic, auxiliary, or operating control (e.g. a non-protective control), the failure of which would not increase the risk of electric shock, fire, or personal injury, need only be subjected to the applicable requirements of this end product standard.

4.5.2 Electromechanical and electronic controls

4.5.2.1 A control, other than as specified in 4.5.3 – 4.5.7, shall comply with:

a) The Standard for Solid-State Controls for Appliances, UL 244A;

b) The Standard for Temperature-Indicating and –Regulating Equipment, UL 873;

c) The Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1.

4.5.3 Liquid level controls

4.5.3.1 A liquid level control shall comply with the:

a) Standard for Solid-State Controls for Appliances, UL 244A;

b) Standard for Temperature-Indicating and –Regulating Equipment, UL 873;

c) Standard for Industrial Control Equipment, UL 508; or

d) Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1; and