



UL 1594

STANDARD FOR SAFETY

Sewing and Cutting Machines

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UL Standard for Safety for Sewing and Cutting Machines, UL 1594

Fourth Edition, Dated April 18, 2008

Summary of Topics

This revision to UL 1594 dated September 21, 2021 includes the following changes in requirements:

- Revisions to Paragraph [59.9](#) to clarify instructions provided in electronic format***
- Addition of Requirements for Appliances Incorporating Lasers, New Section [24A](#)***
- Addition of Requirements for Appliances Incorporating Button Batteries, New Section [24B](#)***
- Revisions to Relocate Component Standard References from Appendix [A](#) to the Body of the Standard; [2.1](#), [3.1.1](#) – [3.1.3](#), [3.2.1](#) – [3.2.7](#), Section [4A](#), [13.2.6](#), [13.4.1](#) – [13.4.3](#), Section [14](#), [17.3.1](#) – [17.3.10](#), Table [17.1](#), [18.1](#), Section [20](#), [21.2](#), [21.5](#), [29.5](#), [29.14](#), [44.2.1](#), Section [46](#), [58.1.2](#)***
- Revisions to Relocate Marking Requirements from Section [33](#) to Section [58](#); [58.1.6](#) – [58.1.9](#), [58.1A.1](#) – [58.1A.7](#), [59.3](#), [59.10](#)***

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 new and revised requirements are substantially in accordance with Proposal(s) on this subject dated January 29, 2021 and August 20, 2021.

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UL 1594

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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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APPENDIX A

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INTRODUCTION

1 Scope

1.1 These requirements cover both household and industrial sewing and cutting machines to be employed in accordance with the National Electrical Code.

1.2 These requirements also cover small utilization products, such as vibrator-powered scissors where motion of an operating part is produced by electrical means.

1.3 These requirements do not cover equipment rated more than 600 V; nor do they cover products involving universal motors rated more than 250 V.

1.4 These requirements also cover textile equipment for use in ordinary locations but do not cover equipment intended for use in hazardous locations such as certain textile processing equipment, and yarn handling equipment.

2 General

2.1 Components

2.1.1 Deleted

2.1.2 Deleted

2.1.3 Deleted

2.1.4 Deleted

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 otherwise indicated, all voltage and current values mentioned in this Standard are root-mean-square.

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.

3.1.1 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).

3.1.2 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.

3.1.3 APPLIANCE (FLATIRON) PLUG – An appliance coupler type of device having a cord guard and a slot configuration specified for use with heating or cooking appliances.

3.2 AUTOMATICALLY CONTROLLED PRODUCT – A product is determined to be automatically controlled if it complies with one or more of the following conditions:

a) The repeated starting of the product is independent of any manual control after one complete cycle of operation, after which some form of limit device opens the circuit.

b) During any single preset cycle of operation, the motor is caused to stop and restart.

c) When the product is energized, the initial starting of the motor may be intentionally delayed beyond intended, conventional starting.

d) For a product employing a motor with a separate starting winding, during any single predetermined cycle of operation, automatic changing of the mechanical load reduces the motor speed sufficiently to reestablish starting-winding connections to the supply circuit.

3.2.1 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.

3.2.2 CORD CONNECTOR – A female contact device wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection to an attachment plug or, as an appliance coupler, to an equipment inlet.

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

3.2.4 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.

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

3.2.6 CONTROL, OPERATING – A device or assembly of devices, the operation of which starts or regulates the appliance during normal operation. Operating controls are also referred to as "regulating controls".

3.2.7 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. Protective controls are also referred to as "limiting controls" and "safety controls".

3.3 DEAD METAL PART – A metal or other electrically conductive part, accessible or inaccessible, that is not conductively connected to a live part.

3.4 FIRMWARE – Computer program contained permanently in a hardware device as read-only memory.

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

3.6 HAND-SUPPORTED PRODUCT – A product such as an electric scissor, that is physically supported by any part of the user during the performance of its intended functions.

3.7 ISOLATING TRANSFORMER – A transformer having one or more output windings electrically insulated from all other windings.

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

3.9 LIVE PART – A part energized with respect to earth or energized with respect to some other part.

3.10 LOW-VOLTAGE CIRCUIT – A circuit involving a peak open-circuit potential of not more than 42.4 V supplied by a primary battery; a Class 2 transformer; or a combination of an isolation 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.

3.11 PORTABLE – Capable of being carried or conveyed.

3.12 REMOTELY CONTROLLED PRODUCT – A product that is out of view of the operator at the starting device.

3.13 SEWING MACHINE TRANSMITTER – A motor, provided with either a mechanically or electrically operated clutch assembly, used to provide rotary drive for an industrial sewing machine.

CONSTRUCTION

4 General

4.1 A product shall employ materials that are acceptable for the particular use, and shall be made and finished with the degree of uniformity and grade of workmanship practicable in a well-equipped factory.

4A Components

4A.1 General

4A.1.1 Except as indicated in [4A.1.2](#), a component of a product covered by this standard shall:

- a) Comply with the requirements for that component as indicated in [4A.2](#) – [4A.19](#);
- 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 standard; and
- e) Not contain mercury.

4A.1.2 A component 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 standard, or

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

4A.1.3 A component that complies with a UL component standard other than those specified in [4A.2](#) – [4A.19](#) is acceptable if:

a) The component also complies with the applicable component standard specified in [4A.2](#) – [4A.19](#); or

b) The component standard:

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

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 UL 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 complying with the relevant component standard may assume user expertise not common in household applications.

4A.1.4 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.

4A.1.5 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. However, 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 UL standard(s) need not be applied.

4A.1.6 A component not anticipated by the requirements of this standard, not specifically covered by the component standards in [4A.2](#) – [4A.19](#), 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 [4A.1.1](#) (b) – (e).

4A.1.7 With regard to a component being additionally investigated, reference to construction and performance requirements in another UL end product standard is appropriate where that standard anticipates normal and abnormal use conditions consistent with the application of UL 1594.

4A.1.8 Unless otherwise specified, components that do not present a risk of electric shock, fire or injury to persons, such as connectors in a low-voltage circuit, are not required to meet the specified component standards.

4A.2 Attachment plugs, receptacles, connectors, and terminals

4A.2.1 Except for attachment plugs and appliance couplers integral to cord sets or power supply cords investigated in accordance with the Standard for Cord Sets and Power-Supply Cords, UL 817, 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 or the Standard for Appliance Couplers for Household and Similar General Purposes – Part 1: General Requirements, UL 60320-1.

4A.2.2 Quick-connect terminals, both connectors and tabs, shall comply with the Standard for Electrical Quick-Connect Terminals, UL 310, and shall be suitable for the wire size, type (solid or stranded), conductor material (copper or aluminum) and the number of conductors terminated. If insulated, the rated voltage and temperature shall be suitable for the intended use. Quick-connect terminals shall be applied per the installation instructions of the quick-connect terminal manufacturer.

4A.2.3 Single and multipole connectors for use in data, signal, control and power applications within the appliance 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.

4A.2.4 Wire connectors shall comply with the Standard for Wiring Connectors, UL 486A-486B.

4A.2.5 Splicing wire connectors shall comply with the Standard for Splicing Wiring Connectors, UL 486C.

4A.2.6 Multipole 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 2549. See [4A.2.9](#).

4A.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.

4A.2.8 Terminal blocks shall comply with the Standard for Terminal Blocks, UL 1059, and if applicable, be suitably rated for field wiring.

4A.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.

4A.3 Batteries, battery chargers and power supplies

4A.3.1 Rechargeable lithium ion (Li-ion) batteries shall comply with the Standard for:

- a) Household and Commercial Batteries, UL 2054; or
- b) Secondary Cells and Batteries Containing Alkaline or Other Non-Acid Electrolytes – Safety Requirements for Portable Sealed Secondary Cells, and for Batteries Made From Them, for Use in Portable Applications – Part 2: Lithium Systems, UL 62133-2.

4A.3.2 A Class 2 or limited power source (LPS) battery charger or power supply shall comply with the Standard for:

- a) Class 2 Power Units, UL 1310;
- b) Household and Similar Electrical Appliances, Part 2-29: Particular Requirements for Battery Chargers, UL 60335-2-29;
- c) Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1; or
- d) Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1.

4A.3.3 A non-Class 2 battery charger or power supply shall comply with the Standard for:

- a) Power Units Other Than Class 2, UL 1012;
- b) Household and Similar Electrical Appliances, Part 2-29: Particular Requirements for Battery Chargers, UL 60335-2-29;
- c) Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1; or
- d) Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1.

4A.4 Boxes and raceways

4A.4.1 Electrical boxes and the associated bushings and fittings, and raceways, of the types specified in Chapter 3 of the National Electrical Code, ANSI/NFPA 70 and that comply with the relevant UL standard (such as the Standard for Metallic Outlet Boxes, UL 514A, the Standard for Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers, UL 514C, the Standard for Cover Plates for Flush-Mounted Wiring Devices, UL 514D) and [4A.1](#) are considered to comply with the requirements of this Standard.

4A.5 Capacitors and filters

4A.5.1 Capacitors connected between the ungrounded and grounded conductors (across the line) or from one of these conductors to accessible dead metal of the appliance shall comply with:

- a) The Standard for Electromagnetic Interference Filters, UL 1283; or
- b) The Standard for Safety Requirements for Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains, UL 60384-14.

4A.5.2 A capacitor provided as a part of a capacitor motor and a capacitor connected across the line, such as a capacitor for radio-interference elimination or power-factor correction, shall be housed within an overall enclosure or container, that will not permit the emission of flame or molten material resulting from malfunction or breakdown of the capacitor. The container shall be of metal providing strength and protection not less than that of uncoated steel having a thickness of 0.020 inch (0.51 mm).

Exception: The individual container of a capacitor may be of sheet metal less than 0.020 inch thick or may be of material other than metal if the capacitor is mounted in an enclosure that houses other parts of the product and provided that such housing is acceptable for the enclosure of live parts.

4A.5.3 Electromagnetic interference filters with integral enclosures that comply with the Standard for Electromagnetic Interference Filters, UL 1283, are considered to fulfill the requirements of [4A.5.2](#).

4A.5.4 If malfunction or breakdown of a capacitor that is not a part of a capacitor motor or a capacitor-start motor is connected in a product that is intended to be automatically or remotely controlled, would result in a risk of fire, electric shock, or injury to persons, thermal or overcurrent protection shall be provided in the product.

4A.5.5 A capacitor connected from either side of the line to the frame or enclosure of a product shall have a capacitance rating of not more than 0.10 mF.

4A.5.6 A product that is constructed to be controlled or operated in conjunction with a capacitor or a capacitor/transformer unit shall be supplied with such capacitor or unit.

4A.5.7 The materials and construction of a capacitor or its enclosure within a product, including a means for venting, shall be such that no hazardous pressures can develop in the capacitor as a result of a short circuit in the capacitor or the circuit in which it is connected.

4A.5.8 The voltage rating of a capacitor other than a motor-starting or motor-running capacitor shall be equal to or exceed the maximum steady-state potential to which the capacitor is subjected during operation at rated voltage or user servicing of the product.

4A.5.9 Under both normal and abnormal conditions of use, a capacitor employing a liquid dielectric medium more combustible than askarel shall not cause a risk of electric shock or fire and shall be protected against expulsion of the dielectric medium. A capacitor complying with the Standard for Capacitors, UL 810, is considered to fulfill this requirement.

4A.6 Controls

4A.6.1 Auxiliary controls

4A.6.1.1 Auxiliary controls shall be evaluated using the applicable requirements of this standard or the Standard for Automatic Electrical Controls; Part 1: General Requirements, UL 60730-1 and any applicable UL 60730 Part 2 standard.

4A.6.1.2 A control regulating the motor speed, stitch selection, stitch length or width, thread tension and any other control not relied upon for compliance with this standard shall be evaluated as an auxiliary control.

4A.6.2 Operating controls

4A.6.2.1 Operating (regulating) controls shall comply with this standard or the Standard for Automatic Electrical Controls; Part 1: General Requirements, UL 60730-1 and any applicable UL 60730 Part 2 standard, unless otherwise specified, as follows:

- a) Manual and automatic controls in a line voltage circuit making or breaking a load shall be tested for 6,000 cycles under maximum normal load conditions and 50 cycles under overload conditions, including locked rotor conditions if controlling a motor;
- b) The Overvoltage Category shall be as specified in [Table 23.2](#);
- c) The Pollution Degree is considered to be Pollution Degree 2 unless the control is located in an area protected against deposition of dirt (Pollution Degree 1) or in an area where conductive pollution is present (Pollution Degree 3) as specified in [Table 23.1](#).

4A.6.2.2 A control limiting the operating time during normal operation or starting or stopping the motor, except when serving as an interlock required for compliance with this standard, shall be evaluated as an operating control.

4A.6.3 Protective controls

4A.6.3.1 Protective (limiting) controls shall comply with the Standard for Automatic Electrical Controls; Part 1: General Requirements, UL 60730-1 and any applicable UL 60730 Part 2 standard, unless otherwise specified, as follows:

- a) Manual and automatic controls acting as an interlock or disconnecting the load when abnormal conditions are detected shall be tested for 100,000 cycles under maximum normal load conditions;
- b) The Overvoltage Category shall be as specified in [Table 23.2](#);