



UL 751

STANDARD FOR SAFETY

Vending Machines

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UL Standard for Safety for Vending Machines, UL 751

Ninth Edition, Dated July 18, 2016

Summary Of Topics

The revisions to ANSI/UL 751 dated December 18, 2024 reflects the latest ANSI affirmation date and includes the following changes in requirements:

- Clarify Requirements for Large Nonmetallic Exterior Surface Materials; [Table 74.1](#)
- Addition of UV Requirements with Clarifications to Scope and Barrier Requirements; [1.1 – 1.4](#), [3.1](#), [5.2](#), [5.33A](#), [9.1](#), [11.0 – 11.4](#), [12.5](#), [12.6](#), [14.8](#), [14.9](#), [19.1.2](#), [19.1.4](#), [20.1.1](#), [20.1.9](#), [20.3.3](#), [22.1](#), [22.3](#), [22.4](#), Section [44A](#), [46.1.8](#), [47.4](#), [50.1.6](#), [Table 74.1](#), Section [76A](#), [80.2.20](#), [80.3.5](#), [81.10](#), Appendix [A](#)
- Alternate Compliance Option to Include UL 62368-1; [3.1](#), [39.1](#), and [41.1](#)
- Clarifications to Controls Requirements; [3.1](#), [5.6A](#), [5.7](#), [5.30A](#), [5.30B](#), [24.3.3](#), [24.3.4](#), [26.10](#), [26.10A](#), [26.15](#), [26.19](#), [79.1](#), and Section [79A](#)
- Clarifications to Cabinet and Enclosure Requirements; [12.2](#), [12.4](#), [14.2](#), [14.4](#), [14.5](#), [15.1](#), [15.1A](#), [15.3](#), [15.4](#), [Table 15.1](#), [15.5 – 15.8](#), [16.1.12](#), [25.1.11](#), [25.1.11A](#), [46.1.7](#), [46.1.10](#), [46.3.2](#), [47.2](#), [47.7](#), [47.14](#), [49.5](#), [50.1.3](#), [50.1.4](#), [56.4](#), [64.8](#), [66.4](#), and [SA2.1](#)
- Clarifications to Glass Requirements; [12.7 – 12.10A](#), [12.12](#), [12.13](#), [70.1.1](#), [70.2.1](#), [70.2.2](#), and Section [71](#)
- Clarifying Alternate Compliance Methods; [6.3 – 6.6](#), [13.3 – 13.5](#), [14.1](#), [14.1A](#), [14.1B](#), [14.6](#), [14.7](#), [17.3.1.4](#), [17.3.2.6](#), [20.1.1A](#), [20.1.2](#), [20.1.6](#), [20.2.3](#), [24.2.1](#), [24.2.5](#), [36.2.5](#), [46.1.9](#), [49.1](#), [53.7](#), [53.8](#), [57.1](#), [58.1.7](#), [59.1](#), [59.1A](#), [59.5](#), Section [69](#), [73.1.1](#), [77.5](#), [77.5A](#), [77.11](#), [77.12](#), [80.2.2](#), [80.2.4](#), [80.2.4A – 80.2.4C](#), [80.2.5](#), [80.2.19](#), and [81.1](#)
- Clarifications to Nonmetallic Fastener Requirements; [10.2](#), [10.3](#), [Table 74.1](#), [75.1](#), and [75.2](#)
- Clarifications to Temperature Test Vend Requirements; [58.2.3](#)
- Alternate Compliance Options for Transformers and Low Voltage Circuits; [5.13A](#), [5.21](#), [5.28A](#), [6.0](#), [43.2 – 43.6](#), [Table 43.1](#), Section [45](#), [46.2.2](#), Section [66B](#), [80.2.9](#), and [81.6](#)
- Editorial Corrections; [80.1.1](#)

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The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated May 31, 2024 and November 1, 2024.

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1

UL 751

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CONTENTS

INTRODUCTION

1 Scope7
 2 Units of Measurement8
 3 References8
 4 Terminology13
 5 Glossary13

CONSTRUCTION

6 General17
 7 Nonmetallic Parts18
 8 Nonmetallic Materials18
 9 Nonmetallic Material Ignition Sources Separation18
 10 Nonmetallic Material Application and Location19
 11 Barriers20
 12 Frame, Cabinet, and Enclosure20
 13 Mechanical Assembly25
 14 Accessibility of Live Parts26
 15 Protection Against Corrosion30
 16 Supply Connections For Cord Connected Vending Machines32
 16.1 Cords and plugs32
 16.2 Strain relief33
 17 Supply Connections for Permanently Connected Vending Machines34
 17.1 General34
 17.2 Field-wiring compartments34
 17.3 Field-wiring terminals and leads34
 17.4 Equipment grounding36
 18 Current-Carrying Parts36
 19 Insulating Material37
 19.1 Electrical insulation37
 19.2 Thermal insulation37
 20 Internal Wiring37
 20.1 General37
 20.2 Wires39
 20.3 Routing40
 21 Splices and Connections40
 22 Separation of Circuits41
 23 Heating Elements41
 24 Motors41
 24.1 General41
 24.2 Overload protection41
 24.3 Protective electronic circuits42
 25 Overcurrent Protection44
 25.1 General44
 25.2 Motors and power transformers44
 26 Switches and Controllers45
 27 Remotely Operated Vending Machines48
 28 Capacitors49
 29 Receptacles50
 30 Batteries and Battery Chargers51
 31 Connectors51
 32 Cooking Equipment51

33	Electrical Cable, Conduit and Tubing	51
34	Electromagnetic Interference Filters.....	51
35	Fuseholders.....	52
36	Lighting Systems.....	52
	36.1 General.....	52
	36.2 Electric-discharge lighting systems	52
37	Optical Isolators and Semiconductor Devices	53
38	Outlet Boxes, Fittings and Cover Plates	53
39	Power Supplies	53
40	Solar Photovoltaic (PV) Systems	54
41	Information Technology Equipment.....	55
42	Terminal Blocks.....	55
43	Transformers and Low Voltage Circuits	55
44	Wireways, Auxiliary Gutters and Associated Fittings	56
44A	Ultraviolet (UV) Radiation Systems.....	56
45	Secondary Circuits	57
46	Spacings	57
	46.1 High-voltage circuits.....	57
	46.2 Low-voltage circuits	59
	46.3 Alternate spacings – clearances and creepage distances.....	59
47	Grounding	60
48	Accessories.....	62
49	Coin and Credit Mechanisms.....	63

PROTECTION AGAINST INJURY TO PERSONS

50	General	64
	50.1 General.....	64
	50.2 Switches and controllers	64
	50.3 Lids	64
51	Stability Test	65
52	Risk of Injury to Servicemen.....	65
53	Pressure Vessels and Parts Subject to Pressure.....	66
54	Pressure-Relief Devices.....	67

PERFORMANCE

55	General	68
56	Leakage Current Test	68
57	Input Test.....	72
58	Temperature Test	72
	58.1 General.....	72
	58.2 Maximum normal load.....	75
59	Dielectric Voltage-Withstand Test	75
60	Abnormal Operation Test	76
61	Resistance to Moisture Tests.....	77
	61.1 Humidity	77
	61.2 Water spray.....	77
62	Thermostat Tests.....	81
63	Bonding Connection Test.....	82
64	Metallic Coating Thickness Test.....	82
65	Overload of Motor Switches or Controllers Test.....	83
66	Overload and Endurance Test – Switching Devices.....	83
66A	Switch Mode Power Supply Units – Overload Test.....	85
66B	Current Limiting Tests	85

67	Flexing of Internal Wiring	86
68	Strain Relief Test	86
69	Push-Back Strain-Relief Test.....	86
70	Glass Strength Test	87
	70.1 Impact test	87
	70.2 Mechanical pressure test.....	87
71	Glass Component Impact Test	87
72	Accelerated Aging Test of Gaskets	87
73	Permanence of Marking Test.....	88
	73.1 General.....	88
	73.2 Oven-aging test.....	88
	73.3 Immersion test.....	89
	73.4 Standard-atmosphere test	89
74	Tests on Nonmetallic Materials	89
75	Fastener Strength Test	91
76	Protective Electronic Circuit Tests	91
	76.1 General.....	91
	76.2 Fault conditions abnormal test	91
	76.3 Electromagnetic compatibility (EMC) tests	93
	76.4 Programmable component reduced supply voltage test	94
	76.5 Fuse-link test.....	94
76A	Ultraviolet Irradiance Test	95

MANUFACTURING AND PRODUCTION TESTS

77	Dielectric Voltage-Withstand Test	96
78	Grounding Continuity Test.....	98
79	Protective Electronic Circuit Test.....	98
79A	Protective Quality Control Management Program and Functional Testing	98

MARKING

80	General	99
	80.1 Permanence.....	99
	80.2 Identification.....	99
	80.3 Installation instructions.....	102
	80.4 Accessories	102
	80.5 Temperature markings	103
81	Cautionary.....	103

SUPPLEMENT SA – REQUIREMENTS FOR VENDING MACHINES INTENDED FOR INSTALLATION WITHIN MOTOR FUEL DISPENSING FACILITIES

SA1	Scope	107
SA2	Definitions	107
SA3	General.....	107
SA4	Marking.....	107
SA5	Installation and Operating Instructions.....	108

APPENDIX A – OPERATING AND PROTECTIVE ("SAFETY CRITICAL") CONTROL FUNCTIONS (Normative)

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INTRODUCTION

1 Scope

1.1 These requirements cover self-contained, payment-accepting, vending machines. Vending machines covered by these requirements are intended for connection to alternating- or direct-current circuits rated 600 V or less in accordance with NFPA 70 and:

- a) Are intended for indoor use only, except that they will be investigated for outdoor use or use in a protected location if so designated by the manufacturer;
- b) Are intended for vending only non-refrigerated or heated products except that they may vend:
 - 1) Refrigerated products in addition to vending non-refrigerated or heated products; or
 - 2) Products that are intended to be heated or warmed before being refrigerated and then dispensed (e.g., iced coffee).
- c) Are intended for installation within motor fuel dispensing facilities in accordance with Supplement [SA](#), Requirements for Vending Machines Intended for Installation within Motor Fuel Dispensing Facilities, and as defined by NFPA 30A;
- d) May be provided with ultraviolet (UV) radiation lamp systems in which the UV wavelengths are 200 nm or greater; however, the effectiveness of the water treatment by the UV radiation is not covered by these requirements;
- e) May be battery operated;
- f) May be provided with a solar photovoltaic (PV) system; and
- g) Vend a tangible, consumable product (not a service, such as a product “rental” in which the product is intended to be returned).

1.2 Deleted

1.2A In reference to [1.1\(b\)](#), if a vending machine is provided with a refrigerated section, the refrigerated section shall be evaluated to the relevant requirements in the Standard for Refrigerated Vending Machines, UL 541.

1.3 These requirements do not cover:

- a) Sound-recording and reproducing machines;
- b) Vending machines intended to vend only refrigerated products. Such products are covered by UL 541;
- c) Gaming or amusement machines. Such machines are covered by the Standard for Amusement and Gaming Machines, UL 22;
- d) Waste disposal and/or recycling machines in which the machine provides payment (cash, credit, etc.) in exchange for disposed and/or recycled product(s) that may be inserted into the machine;
- e) Display, inventory control or similar machines that do not have a payment accepting means but from which a product may be obtained;
- f) Machines that rent product(s) intended to be returned (e.g., airport luggage carts);

- g) Machines in which a service is being purchased (e.g., shoe polishing machines);
- h) Products that would otherwise be considered for household (non-commercial) use if no payment means were provided; or
- i) Automated freestanding stationary building structures.

1.4 Deleted

2 Units of Measurement

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

3 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.

ANSI Standards

ANSI Z97.1, *Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test*

ASME Standards

ASME B94.11, *Twist Drills*

ASTM Standards

ASTM A90/A90M, *Test Method of the Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings*

ASTM A653/A653M, *Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*

ASTM E162, *Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source*

IEC Standards

IEC 60127-1, *Miniature Fuses: Part 1, Definitions for Miniature Fuses and General Requirements for Miniature Fuse-Links*

IEC 60335-1, *Safety of Household and Similar Electrical Appliances, Part 1: General Requirements*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and Measurement Techniques – Radiated, Radio-Frequency, Electromagnetic Field Immunity Test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and Measurement Techniques – Electrical Fast Transient/Burst Immunity Test*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and Measurement Techniques – Surge Immunity Test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and Measurement Techniques – Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields*

IEC 61000-4-11, *Electromagnetic Compatibility (EMC) – Part 4-11: Testing and Measurement Techniques – Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests*

IEC 61000-4-13, *Electromagnetic compatibility (EMC) – Part 4-13: Testing and Measurement Techniques – Harmonics and Interharmonics Including Mains Signalling at a.c. Power Port, Low Frequency Immunity Tests*

IEC 61000-4-34, *Electromagnetic Compatibility (EMC) – Part 4-34: Testing and Measurement Techniques – Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests for Equipment with Input Current More Than 16 A Per Phase*

IEC 62471, *Photobiological Safety of Lamps and Lamp Systems*

NEMA Standards

NEMA WD6, *Wiring Devices – Dimensional Requirements*

NFPA Standards

NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*

ANSI/NFPA 70, *National Electrical Code*

UL Standards

UL 1, *Flexible Metal Conduit*

UL 4, *Armored Cable*

UL 6, *Electrical Rigid Metal Conduit – Steel*

UL 20, *General-Use Snap Switches*

UL 44, *Thermoset-Insulated Wires and Cables*

UL 62, *Flexible Cords and Cables*

UL 83, *Thermoplastic-Insulated Wires and Cables*

UL 94, *Tests for Flammability of Plastic Materials for Parts in Devices and Appliances*

UL 101, *Leakage Current for Appliances*

UL 157, *Gasket and Seals*

UL 197, *Commercial Electric Cooking Appliances*

UL 224, *Extruded Insulating Tubing*

UL 248-1, *Low-Voltage Fuses – Part 1: General Requirements*

UL 248-4, *Low-Voltage Fuses – Part 4: Class CC Fuses*

UL 248-5, *Low-Voltage Fuses – Part 5: Class CC Fuses*

UL 248-8, *Low-Voltage Fuses – Part 8: Class J Fuses*

UL 248-9, *Low-Voltage Fuses – Part 9: Class K Fuses*

UL 248-10, *Low-Voltage Fuses – Part 10: Class L Fuses*

UL 248-11, *Low-Voltage Fuses – Part 11: Plug Fuses*

UL 248-12, *Low-Voltage Fuses – Part 12: Class R Fuses*

UL 248-14, *Low-Voltage Fuses – Part 14: Supplemental Fuses*

UL 310, *Electrical Quick-Connect Terminals*

UL 486A-486B, *Wire Connectors*

UL 486C, *Splicing Wire Connectors*

UL 486E, *Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors*

UL 489, *Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures*

UL 489A, *Circuit Breakers For Use in Communications Equipment*

UL 496, *Lampholders*

UL 498, *Attachment Plugs and Receptacles*

UL 499, *Electric Heating Appliances*

UL 508, *Industrial Control Equipment*

UL 510, *Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape*

UL 514A, *Metallic Outlet Boxes*

UL 514B, *Conduit, Tubing, and Cable Fittings*

UL 514C, *Nonmetallic Outlet Boxes, Flush Device Boxes, and Covers*

UL 514D, *Cover Plates for Flush-Mounted Wiring Devices*

UL 541, *Refrigerated Vending Machines*

UL 542, *Fluorescent Lamp Starters*

UL 635, *Insulating Bushings*

UL 710B, *Recirculating Systems*

UL 719, *Nonmetallic Sheathed Cables*

UL 723, *Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source*

UL 746C, *Polymeric Materials – Use in Electrical Equipment Evaluations*

UL 746E, *Polymeric Materials – Industrial Laminates, Filament Wound Tubing, Vulcanized Fibre, and Materials Used in Printed Wiring Boards*

UL 758, *Appliance Wiring Material*

UL 797, *Electrical Metallic Tubing – Steel*

UL 810, *Capacitors*

UL 817, *Cord Sets and Power Supply Cords*

UL 840, *Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment*

UL 870, *Wireways, Auxiliary Gutters and Associated Fittings*

UL 917, *Clock-Operated Switches*

UL 923, *Microwave Cooking Appliances*

UL 935, *Fluorescent-Lamp Ballasts*

UL 943, *Ground Fault Circuit Interrupters*

UL 969, *Marking and Labeling Systems*

UL 1004-2, *Impedance Protected Motors*

UL 1004-3, *Thermally Protected Motors*

UL 1004-7, *Electronically Protected Motors*

UL 1012, *Power Units Other Than Class 2*

UL 1029, *High-Intensity-Discharge Lamp Ballasts*

UL 1030, *Sheathed Heating Elements*

UL 1059, *Terminal Blocks*

UL 1077, *Supplementary Protectors for Use in Electrical Equipment*

UL 1283, *Electromagnetic Interference Filters*

UL 1310, *Class 2 Power Units*

UL 1412, *Fusing Resistors and Temperature-Limited Resistors for Radio- and Television-Type Appliances*

UL 1434, *Thermistor-Type Devices*

UL 1441, *Coated Electrical Sleeving*

UL 1446, *Insulating Materials – General*

UL 1449, *Surge Protective Devices*

UL 1557, *Electrically Isolated Semiconductor Devices*

UL 1565, *Positioning Devices*

UL 1577, *Optical Isolators*

UL 1642, *Lithium Batteries*

UL 1703, *Flat-Plate Photovoltaic Modules and Panels*

UL 1741, *Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources*

UL 1977, *Component Connectors for Data, Signal, Control and Power Applications*

UL 2054, *Household and Commercial Batteries*

UL 4248-1, *Fuseholders – Part 1: General Requirements*

UL 4248-4, *Fuseholders – Part 4: Class CC*

UL 4248-5, *Fuseholders – Part 5: Class G*

UL 4248-8, *Fuseholders – Part 8: Class J*

UL 4248-9, *Fuseholders – Part 9: Class K*

UL 4248-11, *Fuseholders – Part 11: Type C (Edison Base) and Type S Plug Fuse*

UL 4248-12, *Fuseholders – Part 12: Class R*

UL 4248-15, *Fuseholders – Part 15: Class T*

UL 5085-1, *Low Voltage Transformers – Part 1: General Requirements*

UL 5085-2, *Low Voltage Transformers – Part 2: General Purpose Transformers*

UL 5058-3, *Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers*

UL 8750, *Light Emitting Diode (LED) Equipment For Use in Lighting Products*

UL 60065, *Audio, Video and Similar Electronic Apparatus – Safety Requirements*

UL 60335-1, *Household and Similar Electrical Appliances, Part 1: General Requirements*

UL 60384-14, *Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains*

UL 60691, *Thermal-Links – Requirements and Application Guide*

UL 60730-1, *Automatic Electrical Controls – Part 1: General Requirements*

UL 60730-2-6, *Automatic Electrical Controls – Part 2-6: Particular Requirements for Automatic Electrical Pressure Sensing Controls Including Mechanical Requirements*

UL 60730-2-9, *Automatic Electrical Controls – Part 2-9: Particular Requirements for Temperature Sensing Controls*

UL 60939-3, *Passive Filter Units for Electromagnetic Interference Suppression – Part 3: Passive Filter Units for Which Safety Tests are Appropriate*

UL 60950-1, *Information Technology Equipment – Safety – Part 1: General Requirements*

UL 61058-1, *Switches for Appliances – Part 1 General Requirements*

UL 61800-5-1, *Adjustable Speed Electrical Power Drive Systems – Part 5-2: Safety Requirements – Electrical, Thermal and Energy*

UL 62368-1, *Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements*

4 Terminology

4.1 In the following text, a requirement that does not apply to all of the types of vending machines covered by this standard is identified by a specific reference in that requirement to the type or types of vending machine involved. Absence of such specific reference or use of the term vending machine indicates that the requirement applies to all types of vending machines unless the context indicates otherwise.

4.2 Unless otherwise specified, values of voltage and current referred to are rms values.

5 Glossary

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

5.1.1 ACCESSORY – A device or component intended for installation in or connection to a vending machine for the purpose of modifying or supplementing the functions of the vender. It is intended for installation by the serviceman or another equally qualified person in the field. An accessory may be dependent upon the vending machine for electrical power, signaling, switching, or the like.

5.2 BARRIER:

- a) Insulating – A partition for isolating high-voltage electrical components or circuits.
- b) Mechanical – A rigid partition for the isolation of ignition sources, moving parts, ultraviolet radiation or protection of wiring.

5.3 CABINET – The part of the equipment that provides physical protection to insulated wiring, enclosures, moving parts, motors, enclosed electrical parts, tubing or other parts that may cause injury to persons.

5.3.1 CAPACITOR, CLASS Y – Capacitor or resistor-capacitor unit of a type suitable for use in situations where failure of the capacitor could lead to danger of electric shock. (Examples would include capacitors connected across the primary and secondary circuits where electrical isolation is required to prevent an electric shock or between hazardous live parts and accessible parts.)

5.4 CELL – The basic photovoltaic device that generates electricity when exposed to sunlight.

5.5 CHARGE CONTROLLER – Equipment that controls dc voltage or dc current, or both, used to charge a battery.

5.6 COMPONENT – A device or fabricated part of the vending machine covered by the scope of a safety standard dedicated to that purpose. If incorporated in a vending machine, a product that is 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 aluminum or copper, are not considered components. Generally, components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under specific, limited conditions, such as certain temperatures not exceeding specified limits.

5.6A CONTROL FUNCTION (CLASS A, B or C) – Actuation of an electrical or electronic device (or devices) that are part of the vending machine. Software may be used in the actuation of the device(s).

- a) Class A is not intended to be relied upon to reduce the risk of electric shock, fire or injury to persons. A device with Class A actuation is considered to be an operating control.
- b) Class B is intended to reduce the risk of electric shock, fire or injury to persons. A device with Class B actuation is considered to be a protective control.
- c) Class C is intended to further reduce the risks involving special hazards, such as explosion. A device with Class C actuation is considered to be a protective control.

5.7 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 mitigate the potential risk of fire, electric shock, or injury to persons is considered an operating control. Operating controls are also referred to as "regulating controls". Operating controls can also include other controlling devices such as switches, contactors, relays, and similar devices. Appendix A specifies control functions that are not considered to result in a risk of fire, electric shock, or injury to persons.

5.8 CONTROL, PROTECTIVE – A device or assembly of devices, the operation of which is intended to reduce the risk of fire, electric shock, 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. Protective controls are also referred to as "limiting controls" or "safety controls" and are investigated under normal and single-fault conditions. Appendix A specifies control functions that are considered to result in a risk of fire, electric shock, or injury to persons. Such functions may also be defined as "safety critical".

5.9 CONVERTER – A device that accepts ac or dc power input and converts it to another form of ac or dc power.

5.10 ELECTRONIC COMPONENT – A part in which electrical conduction is achieved principally by electrons moving through a vacuum, gas or semiconductor. A metal oxide varistor (MOV) is considered to be an electronic component, but neon indicators are not.

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5.11 ELECTRONIC DISCONNECTION – The de-energizing of a load within an appliance by an electronic device of a circuit. No electro-mechanical component having an air gap, such as a switch, contactor or relay is used to de-energize the load.

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5.12 ENCLOSURE – The part of the equipment that does one or more of the following:

- a) Isolates ignition sources;
- b) Renders inaccessible all or any part(s) of the equipment that may otherwise present a risk of electric shock; or
- c) Retards propagation of flame initiated by electrical disturbances occurring within.

5.13 FIELD-WIRING TERMINAL – Any terminal to which a supply or other wire can be connected by an installer in the field, unless the wire is provided as part of the vending machine and a pressure terminal connector, soldering lug, soldered loop, crimped eyelet, or other means for making the connection is factory-assembled to the wire.

5.13A FIXED IMPEDANCE – A component or group of components within a circuit intended to limit the current within the circuit.

5.14 FUNCTIONAL PART – A part other than an enclosure or cabinet used to maintain the intended relative physical position of fixed or moving parts, or maintain the integrity of the structure.

5.15 GROUNDING, FUNCTIONAL – Grounding of a point in an appliance which is necessary for a purpose other than safety.

5.16 HIGH-VOLTAGE CIRCUIT – A high-voltage circuit is one involving a potential of not more than 600 volts and having circuit characteristics in excess of those of a low-voltage circuit as defined in [5.21](#).

5.17 IGNITION SOURCE – Any high-voltage electrical component not located within an enclosure.

5.18 INTERACTIVE SYSTEM – A solar photovoltaic system providing power to a vending machine and operating in parallel with and may deliver power to an electrical production and distribution network.

5.19 INVERTER – Equipment that is used to change voltage level or waveform, or both, of electrical energy and typically changes dc input to an ac output.

5.20 INDOOR LOCATION – Inside a building where not normally subjected to the effects of weathering.

5.21 LOW-VOLTAGE CIRCUIT – A low-voltage circuit is one that is isolated from any high voltage circuit and involves a potential of not more than 30 V alternating current, 42.4 V peak or direct current, and

supplied by a standard Class 2 transformer or by a suitable combination of transformer and fixed impedance having output characteristics in compliance with those required for a Class 2 transformer. A circuit in which resistance is connected in series with a high voltage circuit for the purpose of limiting the voltage and current is not considered a low voltage circuit.

5.22 MODULE – A complete, environmentally protected unit consisting of solar cells, optics, and other components, exclusive of the tracker, designed to generate dc power when exposed to sunlight.

5.23 MOTOR CONTROLLER – Any device normally used to start and stop a motor, such as a switch, thermostat, pressure limiting control, or the like.

5.24 NONFUNCTIONAL PART – A part of the equipment that does not perform a specific function.

5.25 NONFUNCTIONAL PART, SMALL – A nonfunctional part having an area of less than 1 ft² (0.093 m²) located so it cannot propagate flame from one area to another, and does not connect a possible source of ignition to the other ignitable parts.

5.26 OUTDOOR LOCATION – In the open and subjected to the full effects of weathering.

5.26.1 POTENTIALLY HAZARDOUS FOOD – A natural or synthetic substance intended for internal human consumption and which requires temperature control since it is capable of supporting growth of toxic microorganisms.

5.27 PROTECTED LOCATION – In an area that is partially protected from the effects of weathering through the use of a roof, canopy, marquee, or the like.

5.28 PROTECTIVE ELECTRONIC CIRCUIT (PEC) – An electronic circuit that prevents a risk of fire, electric shock or injury to persons under abnormal operating conditions.

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5.28A REGULATING NETWORK – A circuit intended to supply and maintain a stable voltage and/or current within certain limits. A switch mode power supply is an example of this type of network.

5.29 ROUTE PERSON – A person who regularly opens a vending machine for such purposes as cleaning, removing coins, making minor adjustments, price changing, and replenishing the product supply.

5.30 SERVICE PERSON – A person who may periodically open a vending machine to repair or maintain electrical or mechanical components.

5.30A SOFTWARE – Pre-loaded data which creates, affects, and/or modifies the functionality of the vending machine except that this does not include any pre-loaded data programmed into an integrated circuit chip that requires physical access and removal of the chip for reprogramming.

5.30B SOFTWARE UPDATE – Occurs if a version of data (software) replaces or modifies the previous version of data. This could include replacing or re-installing a version of data with an identical version of data.

5.31 SOLAR PHOTOVOLTAIC (PV) SYSTEM – The total components and subsystems that, in combination, convert solar energy into electric energy suitable for connection to a load such as a vending machine.

5.32 STAND-ALONE SYSTEM – A solar photovoltaic system that supplies power independently of an electrical production and distribution network. Such a system is not intended to be connected to an electrical production and distribution network.

5.32.1 SWITCH MODE POWER SUPPLY UNIT – Electronic device incorporating transformer(s) and electronic circuitry(ies), that converts electrical power into single or multiple power outputs by rapidly switching a solid-state device on and off. It may also isolate the input circuit from the output circuit and regulate and/or convert the output voltage and current. The device may consist of one or more individual units with identical or different waveforms and frequencies including dc output.

5.33 THERMISTOR – A thermally sensitive semiconductor resistor, which shows over at least part of its resistance/temperature characteristic a significant non-linear change in its electrical resistance with a change in temperature. A thermistor may be either of the positive temperature coefficient (PTC) type or of the negative temperature coefficient (NTC) type.

5.33A ULTRAVIOLET (UV) RADIATION SYSTEM – Equipment that directly generates UV radiation and generally used to enhance purification of drinking water. The system typically consists of a lamp assembly with UV bulb(s) producing ultraviolet radiation in wavelengths of 200 nm or greater.

5.34 VENDING MACHINE – Any self-service device that dispenses products or merchandise without the necessity of replenishing the device between each vending operation and designed to require insertion of a coin, paper currency, token, card, key or receipt of payment by other means.

5.35 VOLTAGE FOLDBACK – A circuit design feature intended to protect the power supply output transistors. When overcurrent is drawn by the load, the supply reduces the output voltage and current to within the safe power dissipation limit of the output transistors.

CONSTRUCTION

6 General

6.0 Throughout this Standard and unless otherwise specified, if live parts or uninsulated live parts are referenced, high voltage circuit requirements shall be applied if the circuit is:

- a) Relied upon to reduce the risk of fire, electric shock or injury;
- b) Not separated from high voltage circuits in accordance with Section [22](#), Separation of Circuits;
- c) Not supplied by an isolated Class 2 transformer; or
- d) In which the available power is not limited as specified in [43.2](#).

6.1 If the deterioration or breakage of any part that contains, conducts, or otherwise contacts a liquid could result in a risk of fire, electric shock, or injury to persons, the part shall be of a material resistant to corrosion by the liquid to be used therein and shall have sufficient strength for the pressures involved.

6.2 If a liquid, powder, or other material that must be replenished, removed, or replaced is present, spilled material shall be prevented from contacting live parts, and any other risk of fire, electric shock, or injury to persons that could result from filling, emptying, storing, normal movement of the vending machine, or the like, shall be prevented from occurring.

6.3 Deleted

6.4 A component shall:

- a) Comply with the safety standard covering that component;
- 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) Comply with the applicable requirements of this end product standard; and
- e) Not be exposed to UV radiation.

6.5 In reference to [6.4](#)(d), a component not complying with a specific component requirement within this standard shall:

- a) Involve a feature or characteristic not required in the application of the component within the product;
- b) Comply with a different requirement within this standard that supersedes the component requirement; or
- c) Be part of and be separately investigated as part of another component.

6.6 A component that is also required to perform other necessary functions, such as overcurrent protection, ground-fault circuit interruption, surge suppression, any other similar functions, or any combination thereof, shall comply additionally with the requirements of the applicable standard(s) covering products that provide those functions.

7 Nonmetallic Parts

7.1 All nonmetallic parts, other than small nonfunctional parts, shall comply with Sections [8](#) – [10](#) and [Table 74.1](#).

7.2 In addition to the requirement in [7.1](#), nonmetallic materials that serve as electrical insulation or that directly support live parts shall comply with the requirements for electric insulation in UL 746C.

8 Nonmetallic Materials

8.1 Materials shall be classified with respect to flammability characteristics that are established by the tests specified in UL 94.

8.2 Materials shall be assigned flammability ratings based on greatest to least resistance to flame and are identified as: 5VA, 5VB, V-0, V-1, V-2, HF-1, HF-2, HB, and HBF.

8.3 In reference to [8.2](#), the assigned flammability rating shall be appropriate for the material-use application in accordance with Nonmetallic Material Ignition Sources Separation, Section [9](#) and [Table 74.1](#).

9 Nonmetallic Material Ignition Sources Separation

9.1 Parts formed from nonmetallic materials that are rated HB or HBF and positioned as shown in [Figure 9.1](#) shall be separated from ignition sources by means of a mechanical barrier, extending at least to the boundary surface of the space if such parts are located:

- a) Below an ignition source and within Space A;
- b) Above an ignition source and within Space B; and