UL 22

STANDARD FOR SAFETY

Amusement and Gaming Machines

UL Standard for Safety for Amusement and Gaming Machines, UL 22

Sixth Edition, Dated May 30, 2008

Summary of Topics

This revision to ANSI/UL 22 dated February 6, 2019, is being issued to reflect the reaffirmation of the ANSI approval of the Standard. No technical changes have been made to the document.

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 November 23, 2018.

No Text on This Page

MAY 30, 2008
(Title Page Reprinted: February 6, 2019)

UL 22

Standard for Amusement and Gaming Machines

The first and second editions were titled Standard for Amusement Machines.

First Edition – June, 1977
Second Edition – August, 1979
Third Edition – November, 1987
Fourth Edition – April, 1994
Fifth Edition – March, 1999

Sixth Edition

May 30, 2008

This ANSI/UL Standard for Safety consists of the Sixth Edition including revisions through February 6, 2019.

The most recent designation of ANSI/UL 22 as a Reaffirmed American National Standard (ANS) occurred on February 6, 2019. 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.

No Text on This Page

CONTENTS

INTRODUCTION

CONSTRUCTION

PERFORMANCE

MANUFACTURING AND PRODUCTION TESTS

MARKINGS

SUPPLEMENT SA - ACCESSORY EQUIPMENT AND CONVERSION KITS

APPENDIX A

INTRODUCTION

1 Scope

1.1 These requirements cover electrical, electronic, and electromechanical commercial amusement and gaming machines and accessories that are intended to be used in accordance with the National Electrical Code, NFPA 70.

1.2 Amusement and gaming machines as covered by this standard 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.

1.3 These requirements do not cover coin-operated sound-recording and -reproducing machines or carnival rides.

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 covering components generally used in the products covered by this standard.

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 Units of Measurement

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

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

4 Undated References

4.1 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.

5 Terminology

5.1 A requirement in this Standard that applies only to a specific type of amusement or gaming machine is so identified by a specific reference in that requirement to the type involved. Absence of such specific reference or use of the term ″appliance″ indicates that the requirement applies to all amusement and gaming machines covered by this standard.

6 Glossary

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

6.2 BARRIER – A part inside an enclosure that reduces the accessibility to a part that involves a risk of electric shock or injury to persons.

6.3 CABINET – A part outside the enclosure that houses or covers only portions of the appliance that do not involve a risk of fire, electric shock, or injury to persons.

6.4 CONTINUOUS DUTY MOTOR – A motor that is intended to operate unattended for a period of 3 hours or more while under load.

6.5 ENCLOSURE – A housing of an appliance that reduces the accessibility to a part that may involve a risk of fire or electric shock. An enclosure can also prevent access to a part that involves a risk of injury to persons when evaluated in accordance with Accessibility of Uninsulated Live Parts, Film-Coated Wire, and Moving Parts, Section 10.

6.6 FIELD-WIRING TERMINAL – A terminal to which a supply or other wire may be connected by service personnel in the field, unless the wire is provided as part of the appliance and a pressure terminal, connector, soldering lug, soldered loop, crimped eyelet, or other means for making the connection is factory-assembled to the wire.

6.7 GUARD – A part outside of the enclosure that reduces the accessibility to a component that involves a risk of injury to persons when evaluated in accordance with Accessibility of Uninsulated Live Parts, Film-Coated Wire, and Moving Parts, Section 10.

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

6.9 MAINTENANCE AREA – An area where access can only be gained by the use of a maintenance key.

6.10 MAINTENANCE KEY – Key or other means which provides access to the maintenance area but does not permit access to the service area.

6.11 MAINTENANCE PERSON – The person who performs routine maintenance such as the setting of controls and other minor adjustments. Some examples of maintenance are:

a) Replacement of lamps and fuses and resetting of circuit breakers located in a user-access area unless the lamps, fuses, or circuit breakers are marked to indicate replacement or resetting only by service personnel.

b) The making of routine operating adjustments including, but not limited to, cleaning the machine, clearing the coin mechanism of jams, removing coins or price changing.

6.12 NEON TUBE – A small diameter glass cylinder, evacuated of air and filled with an inert gas such as neon, which emits light when excited by a high voltage neon transformer or power supply.

6.13 OUTDOOR LOCATION – An area that is open and subjected to the full effects of weathering.

6.14 PRIMARY CIRCUIT – Wiring and components that are conductively connected to a branch circuit.

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

6.16 SAFETY CIRCUIT – Any primary or secondary circuit that is relied upon to reduce the risk of fire, electric shock, high current levels of electrical energy, or injury to persons. For example, in some applications, an interlock circuit is considered to be a safety circuit.

6.17 SECONDARY CIRCUIT – A circuit supplied from a secondary winding of an isolating transformer.

6.18 SERVICE AREA – An area where access cannot be gained by the use of a maintenance key alone.

6.19 SERVICE PERSON – An authorized person who may periodically open an appliance to repair or maintain electrical or mechanical components. Some examples of servicing are:

a) The installation of accessories or conversion kits by means of attachment plugs and receptacles or by means of other separable connectors, and

b) The replacement of tapes, discs, or program boards.

6.20 TOOL – A screwdriver, coin, dedicated key, or any other object that may be used to operate a screw, latch, or similar fastening means.

6.21 USER – The player or participant of the amusement or gaming machine.

6.22 USER AREA – All external surface areas, all internal areas that can be entered without the use of a maintenance key or tools, and all areas that the user is instructed to enter regardless of whether or not tools are needed to gain access.

CONSTRUCTION

7 General

7.1 Only materials that are intended for the particular use shall be used in amusement and gaming machines.

7.2 When 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 the strength to withstand the pressures involved.

8 Frame and Enclosure

8.1 General

8.1.1 An enclosure, guard, or barrier shall have the strength and rigidity to resist the abuses likely to be encountered during intended use of the appliance without increasing the risk of fire, electric shock, or injury to persons due to total or partial collapse with resulting reduction of spacings to less than required, or the loosening, displacement, or exposure of parts, or other serious defects.

8.1.2 An enclosure, guard, or barrier of an appliance shall be complete, or completion of the enclosure, guard, or barrier shall be attained when an appliance is installed for operation.

8.1.3 A required enclosure, guard, or barrier shall be capable of being removed and replaced with a minimum of effort when removal is necessary to service the protected parts.

8.1.4 The strength and rigidity is to be evaluated by the tests in:

a) 45.2.1– 45.2.3 and 45.4.1 for a nonmetallic enclosure or guard;

b) 45.3.1– 45.4.1 for a metal enclosure or guard; and

c) 45.4.1 for a barrier that is accessible to a maintenance person.

The enclosures, guards, and barriers of an appliance intended for outdoor use shall be tested for resistance to the atmospheric effects of rain and sunlight.

8.1.5 A handle or handles intended for lifting or carrying an appliance shall comply with the Handle Test, Section 40.

8.1.6 An enclosure may be provided with a door for maintenance access when:

a) The door is hinged or otherwise secured such that it is unlikely to be detached when opened for maintenance;

b) The door is intended to be closed and latched during normal operation; and

c) The appliance complies with the accessibility requirements in Accessibility of Uninsulated Live Parts, Film-Coated Wire, and Moving Parts, Section 10, when the door is open.

8.2 External materials

8.2.1 Materials such as steel, aluminum, wood, particle board, composite materials, glass, and other similar materials shall be used for the enclosure, guard, or cabinet of an appliance. Glass shall be heat-resistant, tempered, wired, or laminated. See 8.2.2 for small parts requirements.

Exception No. 1: Other materials may be used for part or all of an enclosure when they comply with the requirements in 8.1.4, 8.2.3, and the Standard for Polymeric Materials– Use in Electrical Equipment Evaluations, UL 746C.

Exception No. 2: Materials with a flammability rating of HB, V-2, V-1, V-0, or 5V in accordance with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94, or material determined to be equivalent may be used for part or all of a cabinet. See also 8.2.3.

Exception No. 3: Materials that are classed HB, V-2, V-1, V-0, or 5V in accordance with UL 94, or an equivalent material may be used as guards when they comply with 8.1.4, 8.2.3, and 45.1 – 45.3.

Exception No. 4: Ordinary glass may be used when the optical or flatness requirement precludes the use of heat-resistant, tempered, wired, or laminated glass.

8.2.2 The flammability requirements in Exception No. 1 to 8.2.1 does not apply to small parts. For the purpose of these requirements, a small part is defined as one that complies with both of the following items:

a) A small part shall not be part of the appliance enclosure, or enclose live parts or be used to reduce the likelihood of electric shock.

b) The location of a small part is such that it cannot propagate flame from one area to another or act as a bridge between a possible source of ignition and other ignitable parts.

8.2.3 An external surface of combustible material having an exposed area greater than 10 square feet (0.93 m^2) or a single dimension larger than 6 feet (1.83 m) shall have a flame spread index of 200 or less when tested in accordance with:

a) The Standard for Test for Surface Burning Characteristics of Building Materials, UL 723, or

b) The radiant-panel furnace method in the Standard Test Method for Surface Flammability of Materials Using a Radiant-Heat Energy Source, ASTM E162.

Exception: The materials described in (a) – (b) below are not required to be tested:

a) 1/2-inch (12.7-mm) or 3/4-inch (19.0-mm) thick plywood with no coating;

b) 1/2-inch (12.7-mm) or 3/4-inch (19.0-mm) thick plywood with a latex paint coating; and

c) 3/4-inch (19.0-mm) thick plywood, particle board or medium density fiberboard (MDF) covered with a melamine laminate using a melamine resin adhesive.

8.2.4 The flame-spread index in 8.2.3(b) is the average value based on tests on six specimens representative of the wall thickness used, with no single specimen value greater than 300.

8.2.5 A material with a flame-spread index higher than specified in 8.2.3 may be used as the exterior finish or covering on any portion of the enclosure, guard, or cabinet if the flame-spread index of the combination of the base material and finish or covering complies with 8.2.3.

8.2.6 The size limitations mentioned in 8.2.3 refer to the exposed surface area of a single unbroken section. If two sides of a single piece are exposed, only the larger side is to be considered in computing the area.

8.2.7 A conductive coating applied to a surface (such as the inside surface of a cover or an enclosure) shall comply with the appropriate requirements in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.

Exception: When flaking or peeling of the coating will not result in the reduction of spacings or the bridging of live parts that may present a risk of fire or electric shock, then the coating need not comply with UL 746C.

8.3 Enclosure bottom openings

8.3.1 The enclosure of an appliance shall prevent molten metal, burning insulation, flaming particles, or the like from falling on combustible materials, including the surface upon which the appliance is supported.

8.3.2 The requirement in 8.3.1 necessitates the use of a barrier or pan of noncombustible material:

a) Under a motor unless:

1) The structural parts of the motor or of the appliance provide a barrier that has been determined to be equivalent;

2) The overload protection provided with the motor is such that no burning insulation or molten material falls to the surface that supports the appliance when the motor is energized under each of the following fault conditions:

i) Open main winding,

ii) Open auxiliary winding, and

iii) Starting switch short-circuited; or

3) The motor is provided with a thermal motor protector – a protective device that is sensitive to temperature and current – that will prevent the temperature of the motor windings from exceeding:

i) 125°C (257°F) when the motor is running at the maximum load at which it can operate without causing the protector to cycle and

ii) 150°C (302°F) with the rotor of the motor locked.

b) Under wire, unless it is flame-retardant such as thermoplastic- or neoprene-insulated wires.

c) Under a switch, a relay, a solenoid, a transformer, or the like unless it can be shown that malfunction of the component would not result in a risk of fire.

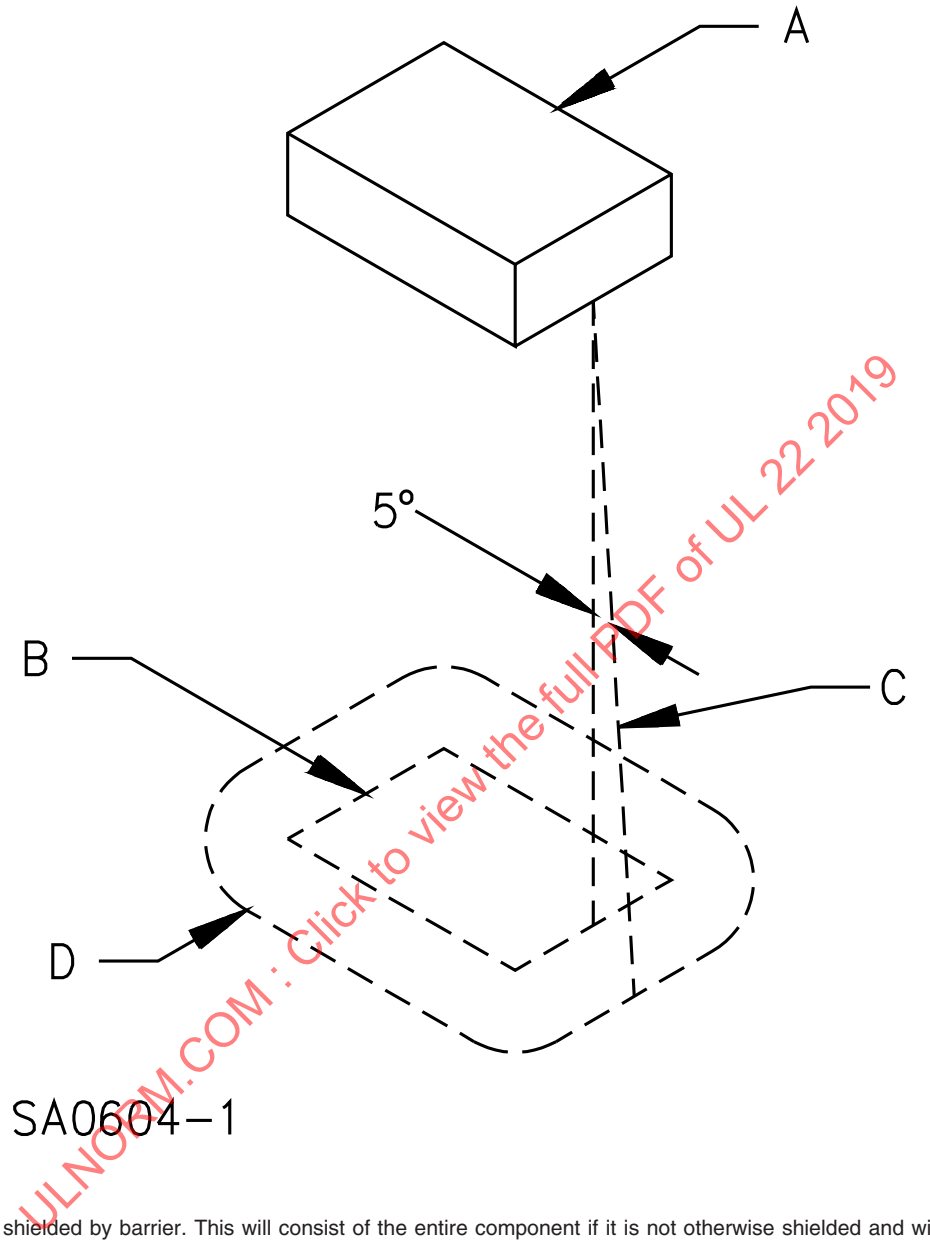
8.3.3 The barrier mentioned in 8.3.2 shall be:

a) Horizontal,

b) Located as illustrated in Figure 8.1, and

c) Have an area in accordance with that figure.

Figure 8.1
Location and extent of barrier



A – Region to be shielded by barrier. This will consist of the entire component if it is not otherwise shielded and will consist of the unshielded portion of a component that is partially shielded by the component enclosure or by a barrier that has been determined to be equivalent.

B – Projection of outline of component on horizontal plane.

C – Inclined line that traces out minimum area of barrier. The line is always tangent to the component, 5 degrees from the vertical, and oriented so that the area traced out on a horizontal plane is maximum.

D – Location (horizontal) and minimum area for barrier. The area is that included inside the line of intersection traced out by the inclined line C and the horizontal plane of the barrier.

8.3.4 Materials used for barriers have a flammability rating of V-2 or less in accordance with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94. Additionally, barriers that are accessible to a maintenance person shall comply with the requirements in 8.1.4 and 45.1– 45.3.

Exception: Barrier materials need not have a flammability rating of V-2 or less when they are one of the materials mentioned in 8.2.1 or comply with Exception Nos. 1 – 4 to 8.2.1.

8.4 Medium- and high-pressure lamps

8.4.1 A medium-pressure lamp shall be enclosed or guarded to protect against breakage due to external forces or impacts.

8.4.2 A high-pressure lamp shall be enclosed so that an explosion of the lamp will be contained. See 54.19 for high-pressure lamp caution marking.

8.4.3 High-pressure lamps may be exploded within the enclosure of the appliance to determine compliance with 8.4.2.

8.4.4 With reference to the requirements in 8.4.1 – 8.4.3, a medium-pressure lamp is considered to be one in which the contained atmospheric energy (CAE) is less than 5 joules and greater than 0.5 joules and a high-pressure lamp is considered to be one in which the CAE equals or exceeds 5 joules when defined as follows:

$$CAE = 0.15 (PC - PE) V$$

in which:

PC is the contained pressure in atmospheres, measured at 50°C or less;

PE is the external pressure in atmospheres, measured at 50°C or less; and

V is the volume in cubic centimeters.

8.5 Air filters

8.5.1 An air filter for use in a cooling system shall comply with the Standard for Air Filter Units, UL 900, or shall be constructed of materials with a flammability rating of V-2 or less in accordance with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.

Exception No. 1: Air filters used in a closed system need not comply with this requirement. A closed system is defined as that which, although not necessarily air-tight, is not intended to be vented outside the enclosure.

Exception No. 2: Air filters located external to the enclosure and constructed of materials classed HB or less flammable need not comply with this requirement.