



---

# 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.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical photocopying, recording, or otherwise without prior permission of UL.

UL provides this Standard "as is" without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability or fitness for any purpose.

In no event will UL be liable for any special, incidental, consequential, indirect or similar damages, including loss of profits, lost savings, loss of data, or any other damages arising out of the use of or the inability to use this Standard, even if UL or an authorized UL representative has been advised of the possibility of such damage. In no event shall UL's liability for any damage ever exceed the price paid for this Standard, regardless of the form of the claim.

Users of the electronic versions of UL's Standards for Safety agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgment (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing an electronic Standard on the purchaser's computer system.

No Text on This Page

**MAY 30, 2008**

(Title Page Reprinted: February 6, 2019)



**ANSI/UL 22-2010 (R2019)**

**1**

## **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>.

UL's Standards for Safety are copyrighted by UL. Neither a printed nor electronic copy of a Standard should be altered in any way. All of UL's Standards and all copyrights, ownerships, and rights regarding those Standards shall remain the sole and exclusive property of UL.

**COPYRIGHT © 2019 UNDERWRITERS LABORATORIES INC.**

No Text on This Page

## CONTENTS

### INTRODUCTION

1 Scope .....	6
2 Components .....	6
3 Units of Measurement .....	7
4 Undated References .....	7
5 Terminology .....	7
6 Glossary .....	7

### CONSTRUCTION

7 General .....	9
8 Frame and Enclosure .....	9
8.1 General .....	9
8.2 External materials .....	10
8.3 Enclosure bottom openings .....	11
8.4 Medium- and high-pressure lamps .....	14
8.5 Air filters .....	14
9 Mechanical Assembly .....	15
10 Accessibility of Uninsulated Live Parts, Film-Coated Wire, and Moving Parts .....	16
11 Protection Against Corrosion .....	21
12 Insulating Material .....	23
13 Current-Carrying Parts .....	24
14 Supply Connections .....	24
14.1 Cord-connected appliances .....	24
14.2 Permanently-connected appliances .....	26
14.3 Identification .....	28
15 Grounding and Bonding .....	29
15.1 General .....	29
15.2 Bonding .....	30
16 Internal Wiring .....	32
16.1 General .....	32
16.2 Wires .....	33
16.3 Protection of wiring .....	33
16.4 High-voltage wiring .....	34
17 Splices and Connections .....	34
18 Separation of Circuits .....	35
19 Transformers .....	36
20 Motors .....	36
21 Overcurrent Protection .....	36
22 Motor-Overload Protection .....	37
23 Capacitors .....	37
24 Receptacles .....	38
25 Switches and Controllers .....	39
26 Secondary Circuits .....	39
27 Printed-Wiring Boards .....	41
28 Spacings .....	41
29 Coin, Currency, and Credit Mechanisms .....	43
30 Protection Against Risk of Fire, Electric Shock, or Injury to Persons .....	44
30.1 General .....	44

30.2 Sharp edges .....	44
30.3 Interlocks and protective devices .....	45
30.4 Protection of maintenance and service personnel .....	45
30.5 Electric shock .....	46
30.6 Injury to persons .....	46
30.7 Switches and controllers .....	47
31 Covers and Guards .....	47

## PERFORMANCE

32 General .....	47
33 Starting Current Test .....	48
34 Leakage Current Test .....	48
35 Input Test .....	52
36 Temperature Test .....	52
37 Dielectric Voltage-Withstand Test .....	56
37.1 Primary circuits .....	56
37.2 Maximum-voltage measurements .....	57
37.3 Secondary circuits .....	58
37.4 Induced potential .....	58
38 Spill Test .....	59
39 Physical Stability Test .....	59
40 Handle Test .....	60
41 Abnormal Operation Tests .....	60
42 Internal Wiring Flexing Test .....	63
43 Strain Relief Test .....	63
44 Grounding Impedance Test .....	63
45 Tests for Enclosures, Guards, and Maintenance Area Barriers .....	63
45.1 Elevated temperature test for nonmetallic guards and maintenance area barriers ...	63
45.2 Impact test for nonmetallic enclosures and guards .....	64
45.3 Mechanical strength tests for metal enclosures and guards .....	65
45.4 Mechanical strength test for enclosures, guards, and maintenance area barriers ...	65
46 Secondary Circuit Motor Test .....	66
47 Resistance to Moisture .....	66
47.1 Humidity conditioning .....	66
47.2 Rain conditioning .....	66
48 Metallic Coating Thickness Test .....	70
49 Overload Test of Switches and Controllers .....	71
50 Accelerated Aging of Gaskets .....	72
51 Permanence of Marking .....	73

## MANUFACTURING AND PRODUCTION TESTS

52 Production-Line Dielectric Voltage-Withstand Test .....	74
53 Production-Line, Grounding-Continuity Test .....	76

## MARKINGS

54 Details .....	77
------------------	----



**SUPPLEMENT SA - ACCESSORY EQUIPMENT AND CONVERSION KITS**

SA1 Scope .....	SA1
SA2 Construction Details .....	SA1
SA3 Installation Test .....	SA2
SA4 Marking Details .....	SA2

**APPENDIX A**

Standards for Components.....	A1
-------------------------------	----

## 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.