



# UL 2044

## STANDARD FOR SAFETY

### Commercial Closed-Circuit Television Equipment



UL Standard for Safety for Commercial Closed-Circuit Television Equipment, UL 2044

Fourth Edition, Dated June 28, 2019

### ***Summary of Topics***

***This new edition of ANSI/UL 2044 dated June 28, 2019, includes the addition of the reference to UL 62368-1 as an alternative to UL 60950-1.***

The revised requirements are substantially in accordance with Proposal(s) on this subject dated March 8, 2019.

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

**JUNE 28, 2019**



**ANSI/UL 2044-2019**

1

## **UL 2044**

### **Standard for Commercial Closed-Circuit Television Equipment**

First Edition – June, 1993  
Second Edition – June, 1997  
Third Edition – September, 2008

#### **Fourth Edition**

**June 28, 2019**

This ANSI/UL Standard for Safety consists of the Fourth Edition.

The most recent designation of ANSI/UL 2044 as an American National Standard (ANSI) occurred on June 28, 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 .....	7
2	General .....	7
2.1	Components .....	7
2.2	Undated references .....	8
2.3	Terminology .....	8
3	Glossary .....	8

### CONSTRUCTION

4	General .....	11
5	Corrosion Protection .....	12
6	Outdoor-Use Products .....	12
7	Multiple-Supply-Circuit-Voltage Products .....	12
8	Material Flammability Classifications .....	13
9	Spacings .....	14
10	Product and Accessory Assembly .....	15
11	Adhesive-Backed Conductive Parts and Labels .....	16
12	Injury to Persons .....	16
13	Fire .....	16
14	Low-Voltage, Limited-Energy Circuits .....	16
15	Electric Shock .....	17
15.1	General .....	17
15.2	Transient and stored energy electric shock .....	20
16	Enclosures .....	21
17	User-Servicing and Replacement of Parts .....	26
18	Power-Supply Connections .....	27
19	Supply Connections – Permanently Connected Products .....	29
19.1	General .....	29
19.2	Separation of circuits .....	30
19.3	Wiring terminals .....	30
20	Polarization .....	31
21	Grounding .....	32
21.1	Continuity .....	32
21.2	Basic insulation .....	32
21.3	Supplementary insulation .....	32
21.4	Reinforced insulation .....	33
21.5	Grounding .....	33
21.6	Optional grounding .....	34
21.7	Permanently connected products .....	34
22	Auxiliary Power Connections .....	34
23	Devices and Applications .....	35
24	Protective Devices .....	38
25	Lasers .....	38
26	Transformers .....	39
27	Capacitors .....	39
27.1	Isolating capacitor .....	39
27.2	Across-the-line capacitor .....	40
27.3	Electrolytic capacitors .....	40
28	Batteries .....	40
29	Sleeving, Tape, Tubing, and Wire Insulation .....	41
30	Insulation Material .....	43

31	Electrical Connections .....	43
32	Connectors, Components, and Leads .....	44
33	Current-Carrying Parts .....	45
34	Captive Parts .....	45
35	Interlocks.....	45
36	Accessories .....	46

## PERFORMANCE

37	General .....	47
38	Power Input Test .....	49
39	Peak Inrush-Current Test .....	51
40	Grounding Impedance Test .....	54
41	Product Leakage and Shock Current Test .....	55
41.1	General .....	55
41.2	Leakage-current .....	55
41.3	Leakage current after humidity conditioning .....	58
41.4	Shock-current .....	58
41.5	Stored-energy electric shock.....	58
41.6	Component electric shock.....	58
42	Temperature Test .....	58
43	Maximum-Voltage Measurement .....	61
44	Dielectric Voltage-Withstand Test .....	61
45	Production-Line Dielectric Potential Stability Test.....	63
46	Operation Tests – General .....	63
47	Part Disconnection and Component-Handling Arcing Test .....	64
48	Cable Arcing Test .....	64
49	Strain Relief Tests .....	65
49.1	Power-supply cord .....	65
49.2	Audio-input, connection cord for separately enclosed loudspeakers .....	65
50	Separable-Connector Cycling Test .....	65
51	Battery and Battery-Circuit Tests – Electrical .....	66
52	Battery Tests – Mechanical .....	66
53	Battery Supply Test .....	66
54	Vacuum Tube Filament Short-Circuit Test.....	67
55	Low-Voltage, Limited-Energy Circuit Test .....	67
56	Component Abnormal-Operation Test.....	68
57	Multiple-Voltage Equipment Test .....	68
58	Voltage Surge Test .....	68
59	Injury to Persons Tests .....	70
59.1	General .....	70
59.2	Product, cart, or stand .....	70
59.3	Handle strength .....	71
59.4	Wall- or ceiling-mounting means.....	72
60	Strength of Enclosure Tests .....	72
60.1	General .....	72
60.2	Enclosure loading .....	72
60.3	Pressure .....	73
60.4	Impact.....	73
60.5	Enclosure temperature stability .....	74
60.6	Captive knob pull .....	74
60.7	Portable power supply and battery charger drop test.....	75
60.8	Alternate enclosure material evaluation .....	75
61	Gasket Test .....	76
62	Adhesive Securement Test .....	77
63	Adhesive-Backed-Parts Peel Test.....	77



64	Outdoor-Use Wetting Test.....	77
64.1	General.....	77
64.2	Water shield .....	80
65	Relay Endurance Test .....	82
66	Tablet Flammability Test .....	82
67	Transformer Short-Circuit and Overload Tests .....	82
68	Power Supply Test .....	83

## MANUFACTURING AND PRODUCTION-LINE TESTS

69	Tests by the Manufacturer.....	84
69.1	Production-line dielectric voltage-withstand test.....	84
69.2	AC production-line test .....	85
69.3	DC production-line test <sup>a</sup> .....	85
69.4	Continuity .....	85

## MARKINGS

70	General .....	86
71	Identifying and Rating Information .....	86
72	Cautionary and Warning Marking.....	88
73	Graphical Symbols .....	90
74	Installation, Operation, and Other Instructions .....	92

## PRODUCTS INTENDED FOR USE IN HEALTH CARE FACILITIES

75	General .....	93
----	---------------	----

## CONSTRUCTION

76	Cords and Plugs .....	93
77	Separation of Circuits .....	94
78	Switches.....	94
79	Grounding .....	94
80	Wheels and Casters .....	95
81	Products Having Signaling and Nurse-Call Feature.....	95
82	Cleaning and Disinfecting .....	95

## PERFORMANCE

83	Leakage Current Test .....	96
84	Dielectric Voltage-Withstand Test .....	96
85	Burnout Test .....	97
86	Cleaning, Impact, and Drop Tests .....	97

## MARKINGS

87	General .....	98
88	Cautionary and Warning .....	98
89	Installation and Operating Instructions .....	98

## APPENDIX A STANDARDS FOR COMPONENTS

**APPENDIX B VARIABLE RESISTANCE LOAD FOR THE VOLTAGE OUTPUT CHECK DESCRIBED IN THE TRANSFORMER SHORT-CIRCUIT AND OVERLOAD TESTS, SECTION [67](#)**

B1	Purpose .....	100
B2	General.....	100

**APPENDIX C A 0.02-OHM SHUNT FOR USE IN THE PEAK INRUSH-CURRENT MEASUREMENT DESCRIBED IN THE PEAK INPUT-CURRENT TEST, SECTION [39](#)**

C1	Purpose .....	102
C2	General .....	102

## INTRODUCTION

### 1 Scope

1.1 These requirements cover closed-circuit television equipment that:

- a) Are intended for commercial use on supply circuits as defined in the National Electrical Code, NFPA 70; and
- b) Receive their signals from a video-recorded medium or image-producing devices in a closed-circuit television system.

1.2 These requirements cover closed-circuit television equipment – such as video tape recorders; video-receiving, -processing, -recording, -producing, and -amplification equipment; video cameras; and the like.

1.3 These requirements also cover auxiliary equipment and accessories intended for use with closed-circuit television systems.

1.4 These requirements also cover portable closed-circuit television equipment of the types described in [1.2](#) that are intended for use with a vehicular, marine, or any other battery circuit as the power supply means.

1.5 These requirements do not cover video monitors, as these products are covered by the Standard for Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1 or the Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1.

1.6 These requirements do not cover video cameras with integral electronic viewfinders.

1.7 These requirements do not cover tape-head demagnetizers or bulk tape erasers intended for use with video products and do not cover general-purpose tape-head demagnetizers or bulk tape erasers, as those products are covered by the requirements for household and commercial tape recorders in the Standard for Commercial Audio Equipment, UL 813.

1.8 Commercial video products provided with a means for receiving commercially broadcasted video signals and household video products are covered by the Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1.

1.9 A cart or stand that is not intended to be used with a specific product is covered by the Standard for Household, Commercial, and Professional-Use Carts and Stands for Use with Audio/Video Equipment, UL 1678.

### 2 General

#### 2.1 Components

2.1.1 Except as indicated in [2.1.2](#), 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 used in the products covered by this standard.

2.1.2 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