



UL 1431

STANDARD FOR SAFETY

Personal Hygiene and Health Care Appliances

UL Standard for Safety for Personal Hygiene and Health Care Appliances, UL 1431

Third Edition, Dated March 23, 2011

SUMMARY OF TOPICS

This revision of UL 1431 dated April 22, 2020 includes replacing all references to UL 508C, with UL 61800-5-1, the Standard for Adjustable Speed Electrical Power Drive Systems – Part 5-1: Safety Requirements – Electrical, Thermal and Energy; [3.6.4.1](#), [3.16.4.4](#)

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 revised requirements are substantially in accordance with Proposal(s) on this subject dated February 14, 2020.

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

MARCH 23, 2011

(Title Page Reprinted: April 22, 2020)

1

UL 1431

Standard for Personal Hygiene and Health Care Appliances

First Edition – August, 1984

Second Edition – November, 1996

Third Edition

March 23, 2011

| This UL Standard for Safety consists of the Third Edition including revisions through April 22, 2020.

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 © 2020 UNDERWRITERS LABORATORIES INC.**

No Text on This Page

CONTENTS

INTRODUCTION

1	Scope	7
2	Glossary.....	7
3	Components.....	9
3.1	General.....	9
3.2	Attachment Plugs, Receptacles, Connectors, and Terminals	11
3.3	Batteries and Battery Chargers	11
3.4	Boxes and Raceways.....	12
3.5	Capacitors and Filters	12
3.6	Controls	12
3.7	Cords, Cables, and Internal Wiring	15
3.8	Cord Reels	15
3.9	Film-Coated Wire (Magnet Wire)	16
3.10	Gaskets and Seals	16
3.11	Ground-Fault, Arc-Fault, and Leakage Current Detectors / Interrupters	16
3.12	Heaters, Heating Elements and Pads	16
3.13	Insulation Systems.....	17
3.14	Light Sources and Associated Components	17
3.15	Marking and Labeling Systems	17
3.16	Motors and Motor Overload Protection.....	17
3.17	Overcurrent Protection	20
3.18	Polymeric Materials and Enclosures	20
3.19	Power Supplies.....	20
3.20	Printed Wiring Boards.....	21
3.21	Semiconductors and Small Electronic Components	21
3.22	Supplemental Insulation, Insulating Bushings, and Assembly Aids.....	22
3.23	Switches	22
3.24	Transformers	23
3.25	Valves (Electrically Operated) and Solenoids	23
3.26	Video and Audio Components.....	23
3.27	Induction Power Transmitters and Receivers for Use with Low Energy Products	24
4	Units of Measurement	24
5	References.....	24
6	General	24

CONSTRUCTION

7	General.....	24
8	Frame and Enclosure	24
9	Mechanical Assembly.....	32
10	Protection Against Corrosion.....	32
11	Supply Connections.....	33
11.1	Permanently connected products	33
11.2	Cord- and plug-connected products	35
12	Live Parts	40
13	Reservoir.....	40
14	Dispensers	40
15	Internal Wiring	40
16	Separation of Circuits	42
17	Printed Wiring	42
18	Heating Element	42
19	Electrical Insulation	42

20	Thermal Insulation.....	43
21	Overload Protection.....	43
22	Overtemperature Protection.....	43
23	Arc-Fault, and Leakage Current Detectors / Interrupters	43
24	Receptacles.....	44
25	Switches and Controls.....	44
26	Controls – End Product Test Parameters.....	44
	26.1 General.....	44
	26.2 Auxiliary Controls	44
	26.3 Operating Controls (regulating controls)	44
	26.4 Protective Controls (limiting controls).....	46
	26.5 Controls using a Temperature Sensing Device	47
27	Transformers	47
28	Motors	49
	28.1 Construction	49
	28.2 Overload Protection	50
	28.3 Insulation Systems.....	50
29	Spacings	51
	29.1 Field-wiring terminals	51
	29.2 Primary circuits	51
	29.3 Secondary circuits.....	52
	29.4 Spacings on printed wiring boards	52
30	Grounding	53
31	Brushes and Brush Holders	53
32	Double Insulation	54

PROTECTION AGAINST INJURY TO PERSONS

33	General	54
34	Sharp Edges.....	54
35	Enclosures and Guards	54
36	Materials	55
37	Surface Temperatures	55
38	Stability	56
39	Strength of Handles.....	56
40	Rotating or Moving Members	57
41	Parts Subject to Pressure	57
42	Pressure-Relief Devices	58
43	Switches, Controls, and Interlocks	59

PERFORMANCE

44	General	60
45	Operational Test.....	60
46	Leakage Current Test	60
47	Leakage Current Following Humidity Conditioning Test	63
48	Starting Current Test	63
49	Input Test	64
50	Temperature Test	64
	50.1 General.....	64
	50.2 Maximum normal load	68
51	Dielectric Voltage-Withstand Test	69
	51.1 General.....	69
	51.2 Primary circuits	70
	51.3 Secondary circuits.....	70

51.4	Maximum voltage	71
51.5	Induced potential	71
52	Immersion Test	71
53	Grounding Impedance Test	72
54	Abnormal Operation Tests	72
54.1	General	72
54.2	Output loading test	73
54.3	Switch position test	74
54.4	Component breakdown test	74
55	Connector Cycling Test	74
56	Reservoir Overflow Test	74
57	Dispenser Leakage Test	75
58	Cleaning Test	75
59	Thermostats Test	75
59.1	General	75
59.2	Overload	75
59.3	Endurance	76
60	Printed Wiring Assemblies Test	77
60.1	Dielectric voltage-withstand test	77
60.2	Limited power test	77
60.3	Abnormal operation test	79
60.4	Dielectric voltage-withstand or arcing test	80
61	Strain Relief Test	80
61.1	Supply cord test	80
61.2	Output or interconnecting cable strain relief test	80
62	Solenoids	81
63	General Purpose Transformers	81
63.1	General	81
63.2	Voltage Measurement Test	81
63.3	Overload Test	82
63.4	Repeated Dielectric Voltage-Withstand Test	82
64	Thermoplastic motor insulation systems	82
64.1	General	82
64.2	Abnormal conditioning	83
64.3	Overload-burnout conditioning	83
64.4	Thermal aging	83

MANUFACTURING AND PRODUCTION TESTS

65	Dielectric Voltage-Withstand Test	85
66	Grounding Continuity Test	87

RATINGS

67	Details	87
----	---------------	----

MARKINGS

68	Details	87
68.1	General	87
68.2	Permanently-connected products	88
69	Servicing	89
70	Fuse Replacement	89
71	Oxygen	89

USE AND CARE INSTRUCTIONS

72	General	89
73	Warning Instructions.....	90
74	User Instructions	92
75	Grounding Instructions	92
76	Two-Wire Polarized Attachment Plug Instructions	94

HYDROMASSAGE UNITS

77	General	94
78	Construction	94
78.1	General	94
78.2	Cord-Connected Hydromassage Unit Immersion Protection	95
78.3	Immersion-Detection Circuit Interrupters (IDCIs)	96
79	Performance	96
79.1	Stability test – all types	96
79.2	Siphoning and back flow test – air blower type.....	97
79.3	Exposure to water test.....	97
79.4	Immersion-Detection Circuit-Interrupter (IDCI) Trip Time Measurement Test.....	98
79.5	Dew Point Humidity Test.....	99
79.6	Conductive Coating Test.....	99
80	Marking and Instructions.....	100

APPLIANCES GENERATING ULTRAVIOLET (UV) RADIATION

81	General	101
82	Construction	101
83	Protection against injury to persons	101
83.1	Protection from overexposure to ultraviolet radiation	101
83.2	Protection from ozone emissions.....	102
83.3	Glass covers and guards	103
84	Performance	103
84.1	Ultraviolet irradiance test	103
84.2	Ozone emissions	103
84.3	Glass impact.....	105
85	Markings	105
86	Instructions	106

INTRODUCTION

1 Scope

1.1 These requirements cover household electric products having personal hygienics or health care applications, such as hydromassage units, contact lens disinfectors and cleaners, and toothbrushes, rated at 250 V or less, for use on premises wiring systems in accordance with the National Electrical Code.

1.2 These requirements do not cover professional medical and dental equipment, electrically heated pads, facial saunas, sun and heat lamps, permanently-installed whirlpool baths, spas and hot tubs, shavers, hair dryers, steam and dry heat cabinets or other equipment or products that are covered by separate, individual requirements separate from this Standard.

1.3 The requirements of this Standard do not consider the complete spectrum of physiological or therapeutic effects, beneficial or otherwise, except where generally recognized limits for conditions where a potential risk of injury to persons are defined.

2 Glossary

2.1 For the purpose of this Standard, the following definitions apply.

2.2 **ACCESSIBLE PART** – A part located so that it can be contacted by a person, either directly or by means of a probe or tool during user servicing, or that is not recessed the required distance behind an opening.

2.3 **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).

2.4 **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.

2.5 **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.

2.6 **BASIC INSULATION** – The insulation applied to live parts to provide basic protection against electric shock. Basic insulation does not necessarily include insulation used exclusively for functional purposes.

2.7 **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.

2.8 **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.

2.9 **CONTROL, AUTOMATIC ACTION** – An appliance coupler type of device having a cord guard and a slot configuration specified for use with heating or cooking appliances.

2.10 **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. For example,