



UL 1081

STANDARD FOR SAFETY

Swimming Pool Pumps, Filters, and
Chlorinators

UL Standard for Safety for Swimming Pool Pumps, Filters, and Chlorinators, UL 1081

Seventh Edition, Dated August 9, 2016

Summary of Topics

This revision of ANSI/UL 1081 dated July 23, 2020 includes the following:

Addition of reference to UL 61800-5-1 as a replacement to UL 508C; [27.2.3.3](#), [29.11](#)

Addition of reference to UL 62368-1 as an alternative to UL 60950-1; [68.5](#)

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 April 10, 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

AUGUST 9, 2016
(Title Page Reprinted: July 23, 2020)



ANSI/UL 1081-2020

1

UL 1081

Standard for Swimming Pool Pumps, Filters, and Chlorinators

First Edition – December, 1972
Second Edition – March, 1979
Third Edition – February, 1986
Fourth Edition – October, 1993
Fifth Edition – March, 1997
Sixth Edition – January, 2008

Seventh Edition

August 9, 2016

This ANSI/UL Standard for Safety consists of the Seventh Edition including revisions through July 23, 2020.

The most recent designation of ANSI/UL 1081 as an American National Standard (ANSI) occurred on July 2, 2020. 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 © 2020 UNDERWRITERS LABORATORIES INC.

No Text on This Page

CONTENTS

PART 1 – SWIMMING POOL PUMPS, FILTERS, AND CHLORINATORS

INTRODUCTION

1	Scope	7
2	Units of Measurement	7
3	Undated References	8
4	Glossary	8
5	Safety Critical Functions	9

CONSTRUCTION

6	Component Specifications	9
6.1	General	9
6.2	Printed wiring boards	10
6.3	Quick-connect wire connectors	10
6.4	Terminal blocks	10
6.5	Wire connectors	11
6.6	Button or coin cell batteries of lithium technologies	11
7	Frame and Enclosure	11
8	Mechanical Assembly	15
9	Accessibility of Uninsulated Live Parts, Film-Coated Wire, and Moving Parts	15
10	Provisions for Servicing	21
11	Resistance to Corrosion	21
12	Power Supply Connections – Cord- and Plug-Connected Units	23
12.1	Cords and plugs	23
12.2	Strain relief	24
12.3	Bushings	24
13	Power Supply Connections – Units Intended for Permanent Installation	25
13.1	General	25
13.2	Terminal compartments for supply connection	27
13.3	Wiring terminals and leads	29
14	Grounding	30
14.1	All units	30
14.2	Permanently-connected units	30
14.3	Cord- and plug-connected units	31
14.4	Bonding	31
14.5	Equipotential bonding	31
15	Ground-Fault Protection for Personnel	32
16	Live Parts	32
17	Internal Wiring	32
18	Double Insulation	33
19	Splices	34
20	Separation of Circuits	35
21	Insulating Material	35
22	Spacings	36
22.1	Double-insulated units	36
22.2	All other units	36
22.3	Clearance and creepage distances	38
23	Internal Bushings	39
24	Gaskets	39
25	Reduction of Risk of Injury to Persons	39

25.1	General.....	39
25.2	Stability.....	40
25.3	Button or coin cell batteries of lithium technologies	40
26	Parts Subject to Water Pressure	40
27	Motors.....	41
27.1	General.....	41
27.2	Motor overload protection	42
28	Overcurrent Protective Devices	44
29	Switches and Controls	45
30	Capacitors	47
31	Lampholders and Receptacles	47
32	Electrolytic Chlorinators	47

PERFORMANCE

33	General	48
34	Leakage Current Test	48
35	Starting Current Test.....	51
36	Power Input Test	51
37	Grounding Continuity Test.....	51
38	Temperature Test	51
39	Dielectric Voltage-Withstand Test	55
39.1	Double-insulated units.....	55
39.2	All other units	56
39.3	Method	56
40	Water Exposure Test	57
40.1	General.....	57
40.2	Water exposure	57
40.3	Flooding.....	58
40.4	Reverse siphoning	58
41	Resistance to Ultraviolet Light and Water Test	60
42	Resistance to Impact Test	60
43	Abnormal Operation Test	61
44	Hydrostatic Pressure Test	61
45	Strain Relief Test.....	61
46	Switch Test	61
47	Metallic Coating Thickness Test.....	62
48	Creep Test	63

MANUFACTURING AND PRODUCTION-LINE TESTS

49	Grounding Continuity Test.....	64
50	Dielectric Voltage-Withstand Test	64

RATINGS

51	Storable Pool Pumps	64
52	Permanently-Installed Units	65

MARKINGS

53	Details	65
54	Permanence	68
54.1	General.....	68
54.2	Cord tags	68

INSTRUCTIONS

55	General	69
----	---------------	----

PART 2 – ELECTRIC SWIMMING POOL CLEANERS**INTRODUCTION**

56	Scope.....	71
57	General	71

CONSTRUCTION

58	Cleaner Enclosure.....	71
59	Power Unit Enclosure	72
60	Handle	72
61	Accessibility of Pump Fan/Impeller	72
62	Line Cord.....	72
63	Low-Voltage Interconnection Cable.....	72
64	Low-Voltage Interconnection Cable Strain Relief.....	73
65	Low-Voltage Cable Receptacle/Plug.....	73
66	Grounding	73
67	Motor.....	73
68	Power Unit Isolation.....	73

PERFORMANCE

69	General	74
70	Handle Integrity Test.....	75
71	Abnormal Tests	75
71.1	General.....	75
71.2	Cleaner pump locked rotor test	76
71.3	Cleaner drive motor locked rotor test.....	76
71.4	Shorted output cable test.....	76
71.5	Cleaner dry operation test	76

RATINGS

72	Details	77
----	---------------	----

MARKINGS

73	General	77
----	---------------	----

INSTRUCTIONS

74	General	77
75	Important Safety Instructions	77

SUPPLEMENT SA – REQUIREMENTS FOR THE EVALUATION OF ELECTRONIC CIRCUITS

INTRODUCTION

SA1	Scope	79
SA2	General.....	79
SA3	Glossary	79

CONSTRUCTION

SA4	Components.....	80
SA4.1	Capacitors	80
SA4.2	Isolation devices	81
SA4.3	Printed wiring boards.....	81
SA4.4	Switch mode power supplies	81
SA4.5	Temperature sensing, thermistor devices	82
SA4.6	Transformers	82
SA5	Identification of Safety Critical Circuit Functions	82
SA5.1	General	82
SA5.2	Protective electronic circuits.....	82
SA5.3	Operating circuits that mitigate a dangerous malfunction of the appliance.....	82
SA6	Evaluation of the Different Types of Electronic Circuits.....	83
SA7	Circuits That Provide Safety Critical Functions	83

PERFORMANCE

SA8	General Conditions for the Tests	83
SA8.1	Details.....	83
SA8.2	Intentionally weak parts	84
SA8.3	Test results determined by overcurrent protection operation	84
SA9	Low-Power Circuit Determination	84
SA10	Abnormal Operation and Fault Tests.....	85
SA11	Transformer Overload Test	87
SA12	Switch Mode Power Supply Overload Test.....	87
SA13	Programmable Component Reduced Supply Voltage Test.....	88
SA14	Electromagnetic Compatibility (EMC) Requirements – Immunity.....	88

PART 1 – SWIMMING POOL PUMPS, FILTERS, AND CHLORINATORS

INTRODUCTION

1 Scope

1.1 These requirements apply to electric motor-operated water pumps of the nonsubmersible type, pump-filter combinations, and chlorinators for use with swimming pools, hot tubs, and spas, to be used in accordance with the National Electrical Code, NFPA 70. The pump is secured directly to the motor or the pump and motor are factory secured to a common frame.

1.2 These requirements also cover electric pool cleaners for use in swimming pools.

1.3 Swimming pool pumps, pump-filter combinations, and chlorinators covered by these requirements may be permanently connected or cord- and plug-connected to the electrical supply. Permanently-connected units may be covered for indoor use only or for indoor and outdoor use. Cord- and plug-connected units are evaluated under requirements for outdoor use, but may also be used indoors. Swimming pool pumps intended for use with storable pools are provided with a minimum 25-foot (7.6-m) nondetachable power supply cord, are double insulated, have no accessible grounded metal, and have inaccessible dead metal connected to the grounding conductor of the cord. Pumps intended for permanent use may be permanently wired or provided with a maximum 3-foot (0.91-m) nondetachable power supply cord and, in addition, are provided with an accessible wire connector for bonding to all metal parts of the pool, hot tub, or spa structure and to all electrical equipment conduit and piping within 5 feet (1.5 m) of the inside wall of the pool, hot tub, or spa. Hot tub and spa pumps covered by these requirements are not intended for use within an outer enclosure or beneath the skirt of a hot tub or spa, unless so marked.

1.4 Chlorinators covered by these requirements may consist of assemblies such as:

- a) A chlorinator and a clock-operated valve for use with a water circulating system;
- b) A water circulating pump with additional chlorine injection; or
- c) An electrolytic-type chlorinating equipment.

1.5 These requirements do not cover:

- a) Pumping equipment for fire service or other products that are covered by individual requirements elsewhere;
- b) A pump rated at more than 600 volts;
- c) A pump involving a universal motor rated at more than 250 volts; or
- d) A sump pump, fountain pump, and aquarium pump, or other products for which individual requirements exist.

2 Units of Measurement

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

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