

# **UL 1993**

## STANDARD FOR SAFETY

Self-Ballasted Lamps and Lamp Adapters



MARCH 26, 2021 - UL1993 tr1

UL Standard for Safety for Self-Ballasted Lamps and Lamp Adapters, UL 1993

Fifth Edition, Dated January 27, 2017

#### **Summary of Topics**

This revision of ANSI/UL 1993 dated March 26, 2021 includes the following changes in requirements:

- Copper-alloy screw bases and moist ammonia air stress cracking test option for copper alloys; 6.1.2, <u>Table 6.0A</u>, <u>Table 8.1</u>, <u>8.20</u> and <u>Table 8.3</u>
- Maximum conductive length of Edison screw bases; <u>6.1.5</u>, <u>6.1.6</u>, <u>Table 6.0B</u>, <u>Figure 6.1</u> and <u>8.10A</u>
- Evaluation of tack-soldered electrical connections; 6.2.2 and 8.21
- Drop impact test determination for severely damaged lamps; <u>SA8.8.2</u>, <u>SA8.8.4</u>, <u>Figure</u> SA8.0, <u>Table SA10.1</u> and <u>SA10.4.3</u>
- Thickness of meal G5 and G13 lamp bases; <u>5.1.3</u>, <u>6.1.7</u>, and <u>6.1.7</u>
- Lamps with movable joints; <u>5.5</u>, <u>Table 8.1</u>, <u>8.22</u>, <u>8.23</u> and <u>Table 8.4</u>
- Revision to Type A lamps Revisions to HF test source; SC4.1.2, SC4.1.3 and SC4.1.4
- Additional requirements for evaluating LED lamps as direct replacements for specific high intensity discharge (HID) lamps; 2.1 and Supplement SD
- Type A/B tube lamp markings; SA10.4.4, SA10.2.8 and Table SA10.1
- Linear LED lamps; <u>SA1.6</u>, <u>SA5.4.2</u>, <u>SA8.5.3</u>, <u>SA8.5.6</u>, <u>SA3.10A</u>, <u>SA6.14A</u>, <u>SA8.24</u> and SA8.5.5
- Temperature Test LED Lamps; <u>SA8.5.6</u> and <u>SA8.5.7</u>
- Addition of Supplement SE Special Use Lamps; 1.6, Table 5.2, and Supplement SE
- New Test, Construction, and Marking requirements for LED Lamps with Integral Rechargeable Batteries; Supplement SF
- Miscellaneous editorial updates; 4.5.1.2, SA6.13.4, SA8.19.3

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 new and revised requirements are substantially in accordance with Proposal(s) on this subject dated August 9, 2019 and October 9, 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.

tr2 MARCH 26, 2021 - UL1993

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.



Association of Standardization and Certification NMX-J-578/1-ANCE Third Edition



CSA Group CSA C22.2 No. 1993-17 Third Edition



Underwriters Laboratories Inc. UL 1993 Fifth Edition

### **Self-Ballasted Lamps and Lamp Adapters**

January 27, 2017

(Title Page Reprinted: March 26, 2021)



#### **Commitment for Amendments**

This standard is issued jointly by the Association of Standardization and Certification (ANCE), the Canadian Standards Association (operating as "CSA Group"), and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to ANCE, CSA Group, or UL at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of ANCE, CSA Group, and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue. ANCE will incorporate the same revisions into a new edition of the standard bearing the same date of issue as the CSA Group and UL pages.

#### Copyright © 2021 ANCE

Rights reserved in favor of ANCE

#### ISBN 978-1-77139-711-7 © 2017 Canadian Standards Association

All rights reserved. No part of this publication may be reproduced in any form whatsoever without the prior permission of the publisher.

This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquiries@csagroup.org and include "Proposal for change" in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

To purchase CSA Group Standards and related publications, visit CSA Group's Online Store at <a href="https://www.csagroup.org/store/">www.csagroup.org/store/</a> or call toll-free 1-800-463-6727 or 416-747-4044.

#### Copyright © 2021 Underwriters Laboratories Inc.

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.

This ANSI/UL Standard for Safety consists of the Fifth Edition including revisions through March 26, 2021. The most recent designation of ANSI/UL 1993 as an American National Standard (ANSI) occurred on March 26, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

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 <a href="https://csds.ul.com">https://csds.ul.com</a>.

To purchase UL Standards, visit UL's Standards Sales Site at http://www.shopulstandards.com/HowToOrder.aspx or call toll-free 1-888-853-3503.

NOTE – The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to the validity of this claim or of any patent rights in connection there with. The patent holder has, however, filed a statement of willingness to grant a license under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license. Details may be obtained from UL.

### **CONTENTS**

reface	e	9
1	Scope	
2	Reference Publications	
	2.1 Normative references	
	2.2 Informative references	
3	Definitions	
4	General Requirements	
	4.1 Components	
	4.2 Application of requirements	
	4.3 Units of measurement	
	4.4 Assembly and packaging	
	4.5 Principles	
5	Mechanical Construction	
	5.1 Enclosures	
	5.2 Openings	22
	5.3 Polymeric materials	
	5.4 Weight and moment	23
	5.5 Movable joints	
6	Electrical Construction	
	6.1 Lamp bases and lampholders	
	6.2 Current-carrying parts	
	6.3 Printed circuit boards	
	6.4 Ballasts and LED drivers	
	6.5 Power capacitors	
	6.6 Spacing of electrical parts	
	6.7 Accessibility of live parts	
	6.8 Light source – fluorescent lamps	
	6.9 Light source – light emitting diodes (LED)	
	6.10 Light source – non-discharge lamps	
7	Environmental Locations	
	7.1 Dry locations	
	7.2 Damp locations	
	7.3 Wet locations	32
8	Tests	32
	8.1 General	32
	8.2 Input measurements	
	8.3 Lamp starting and operating measurements	35
	8.4 Leakage-current test	
	8.5 Temperature test	
	8.6 Dielectric voltage-withstand test	
	8.7 Harmonic distortion test	
	8.8 Drop impact test	39
	8.9 Mold-stress relief conditioning	39
	8.10 Deflection test	40
	8.10A Base insulation displacement test	40
	8.11 Strain relief test for lamp connectors	
	8.12 Tests of dimmer circuits	
	8.13 Humidity conditioning	
	8.14 Water spray test	
	8.15 Cold impact test	42
	8.16 Lamp fault conditions test	42
	8.17 End-of-lamp-life tests for fluorescent lamp adapters	43

	8.18 End-of-life test for integral, self-ballasted fluorescent lamps – one filament	
	free test	
	8.19 15-VA available power measurement test	
	8.20 Moist ammonia air stress cracking test	
	8.21 Evaluation of tack-soldered electrical connections	55
	8.22 Joint endurance test	56
	8.23 Joint torsion test	56
9	Test Apparatus	57
	9.1 General	
	9.2 Instrumentation	57
	9.3 Thermocouples	
	9.4 Plywood test box material	
	9.5 Temperature test box	
	9.6 Articulated probe	
	9.7 Water spray apparatus	
	9.8 Cheesecloth	
10	Device Markings	
10	10.1 General	
	10.2 Identifications and ratings	
	<u> </u>	
	10.3 Marking requirements in Mexico	
	10.4 Instructions	/1
	MENT SA – SUPPLEMENTAL REQUIREMENTS FOR LIGHT-EMITTING DIODE	,
SA1	·	
SA2		
SA3		
SA4	·	
SA5		
	SA5.1 Enclosures	
	SA5.2 Openings	
	SA5.3 Polymeric materials	
	SA5.4 Weight and moment	76
SA6	Electrical Construction	76
	SA6.1 Lamp bases and lampholders	76
	SA6.2 Current-carrying parts	76
	SA6.3 Printed circuit boards	
	SA6.4 Ballasts and LED drivers	
	SA6.5 Power capacitors	
	SA6.6 Spacing of electrical parts	
	SA6.7 Accessibility of live parts	
	SA6.8 Light source – fluorescent lamps	
	SA6.9 Light source – light emitting diodes (LED)	
	SA6.10 Light source – non-discharge lamps	
	SA6.11 Grounding	
	SA6.12 Polarization	
	SA6.13 Devices substituting for linear fluorescent lamps	
	SA6.14 Devices interchangeable with tungsten-halogen incandescent lamps	
	SA6.14A Linear LED lamps	
	SA6.15 Double insulation	
SA7		
SA7 SA8		
SAO		
	SAS 3 Input managements	
	SA8.2 Input measurements	
	SA8.3 Lamp starting and operating measurements	
	SA8.4 Leakage-current test	రన

SA8.5 Temperature test .......83

	SA8.6 Dielectric voltage-withstand test	
	SA8.7 Harmonic distortion test	84
	SA8.8 Drop impact test	84
	SA8.9 Mold-stress relief conditioning	
	SA8.10 Deflection test	
	SA8.11 Strain relief test for lamp connectors	
	SA8.12 Tests of dimmer circuits	
	SA8.13 Humidity conditioning	
	SA8.14 Water spray test	
	·	
	SA8.15 Cold impact test	
	SA8.16 Lamp fault conditions test	
	SA8.17 End-of-lamp-life tests for fluorescent lamp adapters	
	SA8.18 End-of-life test for integral, self-ballasted fluorescent lamps – one filament emission mix from test	)N- OG
	mix-free test	
	SA8.19 Risk of electric shock – relamping	
	SA8.20 Isolation of lamp pins	
	SA8.21 Misapplication of lamp supply connections	
	SA8.22 LED lamp and driver abnormal condition tests	
	SA8.23 Rigidity after drop	
	SA8.24 Voltage mismatch test – linear LED lamps	
SA9	Test Apparatus	
	SA9.1 General	92
	SA9.2 Instrumentation	92
	SA9.3 Thermocouples	92
	SA9.4 Plywood test box material	92
	SA9.5 Temperature test boxes	
	SA9.6 Articulated probe	
	SA9.7 Water spray apparatus	
	SA9.8 Cheesecloth	
SA10		
	SA10.1 General	
	SA10.2 Identifications and ratings	
	SA10.3 Marking requirements in Mexico	
	SA10.4 Instructions	
	OATO.+ IIISUUCIOIIS	90
	MENT SB – ADDITIONAL REQUIREMENTS FOR SOLID-STATE LAMPS CONTAIN SILICONE FLUID	
SB1	Special Terminology	
SB2	General	97
SB3	Construction	
SB4	Tests	
	SB4.1 General	98
	SB4.2 Abnormal operation – partial fluid loss	98
	SB4.3 Abnormal Operation – Total Fluid Loss	98
SB5	Markings	98
	MENT SC – ADDITIONAL REQUIREMENTS FOR LED LAMPS AND FLUORESCENT LAMPS AND FLUORESCENT LAMPS ADAPTERS INTENDED AS DIRECT REPLACEMENTS FOR FLUORESCENT LAMPS	AMP
201	On a sight Transition has a	401
SC1	Special Terminology	
SC2	General	
SC3	Construction	
SC4	Tests	
	SC4.1 General	102

This is a preview. Click here to purchase the full publication.

	SC4.2 Additional test criteria	104
	SC4.3 Rigidity after drop	105
	SC4.4 Cathode measurement	106
	SC4.5 Risk of electric shock – Relamping – Type A lamps	106
SC5	Markings and Instructions	107
	MENT SD - ADDITIONAL REQUIREMENTS FOR LED LAMPS INTENDED	AS DIRECT
F	REPLACEMENTS FOR HIGH INTENSITY DISCHARGE (HID) LAMPS	
SD1	Special Terminology	109
SD2	General	
SD3	Construction	109
SD4	Test	110
	SD4.1 General	110
	SD4.2 Additional test criteria	111
	SD4.3 Voltage pulse withstand	111
SD5	Markings and Instructions	
SIIDDI EN	MENT SE – SPECIAL USE LAMPS	
SUPPLEM	IENT SE - SPECIAL USE LAWIFS	
SE1	Scope	115
SE2	Reference Publications	115
SE3	Definitions	115
SE4	General Requirements	116
SE5	Markings and Instructions	116
V	MENT SF - ADDITIONAL REQUIREMENTS FOR LIGHT-EMITTING DIODE (LICHT INTEGRAL SECONDARY BATTERIES	
SF1	Special Terminology	
SF2	General	
SF3	Construction	
SF4	Performance	
	SF4.1 General	
	SF4.2 Battery charge and discharge measurement	
OF.	SF4.3 Battery short-circuit test	
SF5	Markings	121
ANNEX A	(normative) Standards for Components	
ANNEX B	(CAN) (normative) Markings – French Translations	
ANNEX C	(MEX) (normative) Markings – Spanish Translations	
ANNEX D	(normative) Manufacturing and Production Tests	
D1	Dielectric Voltage-Withstand Test	131
ANNEX E	(CAN) (normative) Printed Circuit Boards	
<b>⊑</b> 1	Special Terminology	133

This is a preview. Click here to purchase the full publication.