

UL 8750

STANDARD FOR SAFETY

Light Emitting Diode (LED) Equipment for Use in Lighting Products



UL Standard for Safety for Light Emitting Diode (LED) Equipment for Use in Lighting Products, UL 8750 Second Edition, Dated September 15, 2015

Summary of Topics

This revision to ANSI/UL 8750 dated September 23, 2021 was issued to incorporate the following changes in requirements:

- Add Exception for Transformers Utilizing a Thermoset Varnish; 6.7.3
- Revisions to Supplement SB- Type HL LED Drivers; 1.4, SB1.1, SB2.2 and Section SB2A

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 July 23, 2021.

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

SEPTEMBER 15, 2015

(Title Page Reprinted: September 23, 2021)



1

UL 8750

Standard for Light Emitting Diode (LED) Equipment for Use in Lighting

Products

First Edition - November, 2009

Second Edition

September 15, 2015

This ANSI/UL Standard for Safety consists of the Second Edition including revisions through September 23, 2021.

The most recent designation of ANSI/UL 8750 as an American National Standard (ANSI) occurred on September 23, 2021. 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 © 2021 UNDERWRITERS LABORATORIES INC.

No Text on This Page

CONTENTS

INTRODUCTION	N
--------------	---

1 2	Scope	
2	General	
	2.1 Components	
	2.2 Units of measurement	
•	2.3 Reference publications	
3	Definitions	
4	Power supplies, LED Drivers, and Transformers	13
CONST	TRUCTION	
5	Environmental Considerations	14
6	Mechanical Construction	14
	6.1 General	14
	6.2 Metal parts	15
	6.3 Polymeric materials	16
	6.3A Metal Enclosures intended for conduit connection	
	6.4 Enclosure openings	19
	6.5 Conductor protection	
	6.6 Strain relief	
	6.7 Polymeric potting compound	
	6.8 Asphalt potting compound	21
7	Electrical Construction	22
	7.1 General	22
	7.2 Accessibility	22
	7.2A Grounding and bonding	24
	7.3 Internal wiring	28
	7.4 Supply and load connections	29
	7.5 Separation of circuits	35
	7.6 Insulating materials	35
	7.7 Printed wiring boards	35
	7.8 Electrical spacings	36
	7.9 Circuit components	39
	7.10 Protective devices	41
	7.11 Coil insulation	41
	7.12 Class 2 output circuits	45
PERFO	PRMANCE	
8	Performance Tests	45
	8.1 General	
	8.2 Input test	
	8.3 Temperature test	
	8.4 Temperature test alcove	
	8.5 Temperature test oven	
	8.6 Dielectric voltage withstand test	
	8.7 Abnormal tests	
	8.8 Circuit power limit measurement test	
	8.9 Leakage current measurement test	
	8.10 Cord strain and pushback relief test	
	8.11 Security of output terminals	
	8.12 Insulation-piercing connection thermal cycling test	

		8.13 Adhesive support test	62
		8.14 Environmental tests	
		8.15 Mechanical strength tests for metal enclosures	
		8.16 Determination of low-voltage, limited-energy circuit status	
		8.17 Knockout secureness test	
		8.18 Abnormal switching test	
		8.19 Metal enclosure for conduit connection – rigidity	
		8.20 Metal enclosure for conduit connection – snap-in or tab-mounted parts pull test	
		8.21 Bonding circuit impedance test	
		8.22 Ground-screw assembly strength test	
		8.23 Bonding conductor tests	
	9 M	arkings	
		9.1 General	70
		9.2 Identification and ratings	71
		9.3 Construction-related markings	72
SU	PPLEN	ENT SA – REQUIREMENTS FOR SAFETY-RELATED ELECTRONIC CIRCUITS	
	SA1	Scope	
	SA2	Definitions	
	SA3	General	_
	SA4	Reliability Evaluation	77
SU	PPLEN SB1	Scope	
	SB2	Construction	
	SB2A	Explosion Protection by Encapsulation Construction	79
	SB3	Performance	80
	SB4	Marking	80
SU	PPLEN	ENT SC – REQUIREMENTS FOR TEMPERATURE LIMITED (TYPE TL) LED DRIVER	:S
	SC1	Scope	81
	SC2	Definitions	81
	SC3	Construction	81
	SC4	Performance	
	SC5	Marking	82
SU	PPLEN	ENT SD – REQUIREMENTS FOR LIGHT EMITTING DIODE (LED) PACKAGES	
	SD1	Scope	
	SD2	Definitions	
	SD2A	5	
	SD2E		
	SD3	Environmental Considerations	
		SD3.1 Humidity conditioning	
		SD3.2 Dry locations	
		SD3.3 Damp locations	
	o= :	SD3.4 Wet locations	
	SD4	Construction	
		SD4.1 Spacings	
		SD4.2 Printed Wiring Boards (PWBs)	
		SD4.3 Polymeric and other insulating materials – Relative Thermal Index (RTI)	88 88
		JOH H. FOROPOCADO DIDEL IOSUMBDO MAJEDAIS — FIAME (2000)	~~

SD		
SD6	6 Dielectric Voltage Withstand Test	88
SD		
SD8		
SD		
	· · · · · · · · · · · · · · · · · · ·	
SD9	9 Markings	96
SUPPLE	EMENT SE – REQUIREMENTS FOR CLASS P LED DRIVERS	
SE′	1 Scope	99
SE2	2 Definitions	99
SE	3 Construction	99
SE ₄	4 Performance	100
	SE4.1 General	100
	SE4.2 Temperature test	
	SE4.3 Class P abnormal tests	
	SE4.4 Leakage current measurement test	
SE		
OL	J Warking	
CUDDI E	EMENT SF – LED EQUIPMENT WITH WIRED CONTROL CIRCUITS	
SUPPLE	EMENT SF - LED EQUIPMENT WITH WIKED CONTROL CIRCUITS	
054	4 0	405
SF1	•	
SF2		
SF3		
SF4		
SF5		
SF6	·	
SF7	7 Dielectric Voltage Withstand Test	106
SF8	B Marking	106
SUPPLE	EMENT SG - DESIGNATION OF TEMPERATURE VALUE AT T	HE TEMPERATURE
	MEASUREMENT POINT T _C	
SG	1 Scope	109
SG	2 Definitions	109
SG:	3 Construction	109
SG	4 Performance	109
SG		
	9	
CIIDDI E	EMENT SH – REQUIREMENTS FOR LED DRIVERS WITH PHASE-CUT D	IMMING
301 1 LL	EMENT OIL - REGUIREMENTO FOR EED DRIVERO WITH FIROE-OUT D	
SH ²	1 Soono	111
	·	
SH		
SH		
SH	4 Marking	112
SUPPLE	EMENT SI – REQUIREMENTS FOR TYPE IC LED DRIVERS	
SI1	Scope	113
SI2		
SI3		113
SI4		
SI5		
5.5	SI5.1 General	
	313. I General	
	SI5.2 Type IC temperature test	

SI6	Marking	114
SUPPLEM	MENT SJ – SPECIAL USE LED ARRAYS	
SJ1	Scope	115
SJ2	Reference Publications	115
SJ3	Definitions	115
SJ4	General Requirements	
SJ5	Construction	
SJ6	Performance	
SJ7	Markings and Instructions	116
SUPPLEN SK1	MENT SK - REQUIREMENTS FOR DOUBLE INSULATED LED EQUIPMENT Scope	110
SK2	General	
SK3	Organization	
SK4	Requirements	
APPENDI	X A	
Stan	dards for Components	122
APPENDI	ХВ	
B1	Leakage Current Test Circuit – Figure 8.5	124

INTRODUCTION

1 Scope

- 1.1 These requirements cover LED equipment that is an integral part of a luminaire or other lighting equipment. These requirements cover components including LED drivers, controllers, arrays (modules), and packages as defined within this standard.
- 1.1.0 LED equipment covered by this standard are intended for operation in the visible light spectrum between 400 700 nm. Coherent light sources (e.g. laser sources) are not covered by this standard.

Exception No. 1: LED packages as described in Supplement <u>SD</u> may have applications other than general illumination and may operate outside of the visible light spectrum.

Exception No. 2: Special Use LED arrays as described in Supplement <u>SJ</u> have intended applications other than general illumination and may operate outside of the visible light spectrum.

- 1.1.1 Deleted
- 1.1.2 Deleted
- 1.1.3 These requirements do not cover LED controllers within the scopes of the following standards:
 - a) Standard for Safety for Plug-In Locking Type Photocontrols for Use with Area Lighting, UL 773, or
 - b) Standard for Safety for Solid-State Dimming Controls, UL 1472.
- 1.2 These lighting products are intended for installation on branch circuits of 600 V nominal or less in accordance with the National Electrical Code (NEC), ANSI/NFPA 70, and for connection to isolated (non-utility connected) power sources such as generators, batteries, fuel cells, solar cells, and the like.
- 1.3 LED equipment is utilized in lighting products that comply with the end-product standards listed below. The requirements in this standard are intended to supplement those in other end-product standards. Included are:
 - a) Electric Signs, UL 48,
 - b) Portable Electric Luminaires, UL 153,
 - c) Underwater Luminaires and Submersible Junction Boxes, UL 676,
 - d) Emergency Lighting and Power Equipment, UL 924,
 - e) Stage and Studio Luminaires and Connector Strips, UL 1573,
 - f) Track Lighting Systems, UL 1574,
 - g) Luminaires, UL 1598,
 - h) Direct Plug-In Nightlights, UL 1786,
 - i) Low Voltage Landscape Lighting Systems, UL 1838,
 - j) Self-Ballasted Lamps and Lamp Adapters, UL 1993,