

UL 1310

ISBN 0-7629-1088-7

Class 2 Power Units

UL COPYRIGHTED MATERIAL
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL

UL COPYRIGHTED MATERIAL -
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL.

Underwriters Laboratories Inc. (UL)
333 Pfingsten Road
Northbrook, IL 60062-2096

UL Standard for Safety for Class 2 Power Units, UL 1310

Fifth Edition, Dated May 3, 2005

Summary of Topics

This new edition of ANSI/UL 1310 includes changes in requirements to Backfeed Protection, Coil Insulation, Evaluation of Winding Wire, Use of Wood Blocks in Resistance to Crushing Test, Traveler Use of Direct Plug-In Units, and other editorial revisions.

The following table lists the future effective dates with the corresponding reference.

Future Effective Dates	References
October 20, 2006	Paragraph 54.5
May 3, 2007	Paragraphs 7.11, 14.1.4, 15.1.1, 15.4.3, 15.4.4, 39.5.1, 39.8.1 – 39.8.4, 51.8, 51.9, and 54.4

The new requirements are substantially in accordance with UL's Bulletin(s) on this subject dated July 16, 2004 and February 1, 2005. The bulletin(s) is now obsolete and may be discarded.

As indicated on the title page (page 1), this UL Standard for Safety is an American National Standard. Attention is directed to the note on the title page of this Standard outlining the procedures to be followed to retain the approved text of this ANSI/UL Standard.

The UL Foreword is no longer located within the UL Standard. For information concerning the use and application of the requirements contained in this Standard, the current version of the UL Foreword is located on ULStandardsInfoNet at: <http://ulstandardsinfolnet.ul.com/ulforeword.html>

The master for this Standard at UL's Northbrook Office is the official document insofar as it relates to a UL service and the compliance of a product with respect to the requirements for that product and service, or if there are questions regarding the accuracy of this Standard.

UL's Standards for Safety are copyrighted by UL. Neither a printed copy of a Standard, nor the distribution diskette for a Standard-on-Diskette and the file for the Standard on the distribution diskette 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.

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.

Revisions of UL Standards for Safety are issued from time to time. A UL Standard for Safety is current only if it incorporates the most recently adopted revisions.

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.

**UL COPYRIGHTED MATERIAL -
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**

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.

UL will attempt to answer support requests concerning electronic versions of its Standards. However, this support service is offered on a reasonable efforts basis only, and UL may not be able to resolve every support request. UL supports the electronic versions of its Standards only if they are used under the conditions and operating systems for which it is intended. UL's support policies may change from time-to-time without notification.

UL reserves the right to change the format, presentation, file types and formats, delivery methods and formats, and the like of both its printed and electronic Standards without prior notice.

Purchasers 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 judgement (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.

If a single-user version electronic Standard was purchased, one copy of this Standard may be stored on the hard disk of a single personal computer, or on a single LAN file-server or the permanent storage device of a multiple-user computer in such a manner that this Standard may only be accessed by one user at a time and for which there is no possibility of multiple concurrent access.

If a multiple-user version electronic Standard was purchased, one copy of the Standard may be stored on a single LAN file-server, or on the permanent storage device of a multiple-user computer, or on an Intranet server. The number of concurrent users shall not exceed the number of users authorized.

Electronic Standards are intended for on-line use, such as for viewing the requirements of a Standard, conducting a word search, and the like. Only one copy of the Standard may be printed from each single-user version of an electronic Standard. Only one copy of the Standard may be printed for each authorized user of a multiple-user version of an electronic Standard. Because of differences in the computer/software/printer setup used by UL and those of electronic Standards purchasers, the printed copy obtained by a purchaser may not look exactly like the on-line screen view or the printed Standard.

An employee of an organization purchasing a UL Standard can make a copy of the page or pages being viewed for their own fair and/or practical internal use.

The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing, Recognition, and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

Copyright © 2005 Underwriters Laboratories Inc.

UL COPYRIGHTED MATERIAL
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL

This Standard consists of pages dated as shown in the following checklist:

Page	Date
1-94	May 3, 2005
A1-A2	May 3, 2005
SR1-SR2	May 3, 2005

UL COPYRIGHTED MATERIAL -
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL

No Text on This Page

UL COPYRIGHTED MATERIAL -
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL

MAY 3, 2005



ANSI/UL 1310-2005

1

UL 1310

Standard for Class 2 Power Units

The first and second edition were titled Standard for Direct Plug-In Transformer Units.

First Edition – May, 1981
Second Edition – September, 1986
Third Edition – August, 1992
Fourth Edition – July, 1994

Fifth Edition

May 3, 2005

The most recent designation of ANSI/UL 1310 as an American National Standard (ANSI) occurred on April 11, 2005.

This ANSI/UL Standard for Safety, which consists of the Fifth edition is under continuous maintenance, whereby each revision is ANSI approved upon publication. 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 <http://csds.ul.com>.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Revisions of this Standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

ISBN 0-7629-1088-7

COPYRIGHT © 1981, 2005 UNDERWRITERS LABORATORIES INC.

*UL COPYRIGHTED MATERIAL -
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL*

No Text on This Page

UL COPYRIGHTED MATERIAL --
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL

CONTENTS**INTRODUCTION**

1 Scope	6
2 Glossary	7
3 Components	8
4 Units of Measurement	9
5 Undated References	9
6 Terminology	9

CONSTRUCTION

7 Mechanical Assembly	9
8 Enclosure	16
9 Protection Against Corrosion	17
10 Switches	17
11 Protective Devices	18
12 Components	19
13 Coil Insulation	20
13.1 General	20
13.2 Insulation for transformers	20
14 Input Connections	23
14.1 Direct plug-in units	23
14.2 Cord-connected units	24
14.3 DC input units	25
15 Output Connections	25
15.1 General	25
15.2 Output wiring	26
15.3 Output terminals	26
15.4 Output connectors	27
15.5 Bushings	28
16 Accessibility of Live Parts	28
16.1 General	28
16.2 Live parts other than exposed wiring terminals	31
16.3 Exposed wiring terminals	33
17 Live Parts	33
18 Strain Relief	34
19 Internal Wiring	34
20 Separation of Circuits	35
21 Insulating Materials	35
22 Printed Wiring Boards	35
23 Grounding	36
23.1 General	36
23.2 Bonding conductor	37
24 Spacings	37

UL COPYRIGHTED MATERIAL -

NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL

PERFORMANCE

25	General	40
26	Leakage Current Test	43
27	Leakage Current Test and Dielectric Voltage Withstand Test After Humidity Exposure	45
28	Maximum Output Voltage Test	46
29	Maximum Input Test	46
30	Output Current and Power Test	46
	30.1 General	46
	30.2 Inherently limited	47
	30.3 Not inherently limited	48
31	Calibration of Overcurrent Protection Devices Test	49
32	Full-Load Output Current Test	49
33	Normal Temperature Test	50
34	Dielectric Voltage Withstand Test	53
	34.1 General	53
	34.2 Induced potential	54
35	Endurance Test on Overcurrent- and Overtemperature-Protective Devices	54
36	Overload and Endurance Tests on Switches and Controls	55
37	Overload Test on Secondary Switches	55
38	Operation Test	56
39	Abnormal Tests	56
	39.1 General	56
	39.2 Output loading	57
	39.3 Transformer burnout	58
	39.4 Reverse polarity	59
	39.5 Switch position	59
	39.6 Component breakdown	59
	39.7 Printed wiring board abnormal operation test	60
	39.8 Backfeed protection	60
40	Tests on Insulating Materials	61
41	Strain Relief Test	62
42	Push-Back Relief Test	63
43	Direct Plug-In Blade Secureness Test	63
44	Direct Plug-In Security of Input Contacts Test	63
	44.1 General	63
	44.2 Folding and retractable blade units	64
45	Security of Output Connectors Test	65
46	Abuse Tests	66
	46.1 General	66
	46.2 Impact on direct plug-in units	66
	46.3 Impact on cord connected units	67
	46.4 Rod pressure on direct plug-in units	68
	46.5 Resistance to crushing on direct plug-in units	68
47	Bonding Conductor Test	68

MANUFACTURING AND PRODUCTION TESTS

48	Dielectric Voltage Withstand Test	69
49	Grounding Continuity Test	70

UL COPYRIGHTED MATERIAL --
 NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
 DISTRIBUTION WITHOUT PERMISSION FROM UL

RATING

50 General	71
------------------	----

MARKING

51 General	71
52 Cautionary Markings	73
53 Application of Labeling	75

INSTRUCTIONS

54 Instruction Manual	75
-----------------------------	----

OUTDOOR USE

55 General	76
56 Enclosures	76
57 Protection Against Corrosion	77
58 Gaskets	80
59 Supply Connections	80
60 Output Connections and Wiring	81
61 Spacings	81
62 Accessibility of Live Parts	82
63 Ground-Fault Circuit-Interrupters	82
64 Performance	83
64.1 General	83
64.2 Abuse tests	83
64.3 Rain test	83
64.4 Standing water immersion test	87
65 Markings	87
66 Instructions	88

PERMANENTLY-CONNECTED UNITS

67 General	89
68 Construction	90
69 Wiring Terminals and Leads	91
70 Markings	92
71 Installation Instructions	93

APPENDIX A

Standards for Components	A1
--------------------------------	----

UL COPYRIGHTED MATERIAL -
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL