

UL 60950-22

ISBN 0-7629-1239-1

Information Technology Equipment – Safety – Part 22: Equipment to be Installed Outdoors



LISTED BY
UNDERWRITERS LABORATORIES INC.
FOR USE IN THE U.S.



LISTED BY
UNDERWRITERS LABORATORIES INC.
FOR USE IN CANADA



CLASSIFIED BY
UNDERWRITERS LABORATORIES INC.
IN ACCORDANCE WITH
IEC PUBLICATION 60950
FOR USE IN INTERNATIONAL
APPLICATIONS

Document Was Downloaded By Rice, Shi SHIMISHENG
For Use By KUANTECH CO LTD
12039 : 8/6/2007 - 3:01 AM
UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

Document Was Downloaded By Rice, Shi SHIMISHENG
For Use By KUANTECH CO LTD
12039 : 8/6/2007 - 3:01 AM

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



Documents

Document Sharing Hub

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

UL Standard for Safety of Information Technology Equipment – Safety – Part 22: Equipment to be Installed Outdoors, UL 60950-22

First Edition, Dated April 23, 2007

Summary of Topics

This Standard is the first edition of UL 60950-22. This binational Standard is based on IEC 60950-22, first edition.

UL Standards for Safety are developed and maintained in the Standard Generalized Markup Language (SGML). SGML -- an international standard (ISO 8879-1986) -- is a descriptive markup language that describes a document's structure and purpose, rather than its physical appearance on a page. Due to formatting differences resulting from the use of UL's new electronic publishing system, please note that additional pages (on which no requirements have been changed) may be included in revision pages due to relocation of existing text and reformatting of the Standard.

The new requirements are substantially in accordance with UL's Proposal(s) on this subject dated December 8, 2006.

As indicated on the back side of the title page (page 2), this UL Standard for Safety is an American National Standard. Attention is directed to the note on the back side of 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://ulstandardsinfo.net/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.

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 preface. 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 signed in writing.

Copyright © 2007 Underwriters Laboratories Inc.

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

Page	Date
1-38	April 23, 2007

Document Was Downloaded By Rice, Shi SHIMISHENG
For Use By KUANTECH CO LTD
12039 : 8/6/2007 - 3:01 AM

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



Documents

Document Sharing Hub

No Text on This Page

Document Was Downloaded By Rice, Shi SHIMISHENG
For Use By KUANTECH CO LTD
12039 : 8/6/2007 - 3:01 AM

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



Documents

Document Sharing Hub

Canadian Standards Association
CAN/CSA-C22.2 No. 60950-22-07
First Edition
(IEC 60950-22: 2005, MOD)

Underwriters Laboratories Inc.
UL 60950-22
First Edition



Information Technology Equipment – Safety – Part 22: Equipment to be Installed Outdoors

April 23, 2007

This national standard is based on publication IEC 60950-22, First Edition (2005).

Approved
by
Standards Council
of Canada



ANSI/UL 60950-22-2007

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



Documents
Document Sharing Hub

Commitment for Amendments

This Standard is issued jointly by the Canadian Standards Association and Underwriters Laboratories Incorporated. Amendments to this Standard will be made only after processing according to the Standards writing procedures by both the Canadian Standards Association and Underwriters Laboratories Incorporated.

The following paragraph regarding purchase information applies only to the CSA Standard:

To purchase CSA Standards and related publications, visit CSA's Online Store at **www.ShopCSA.ca** or call toll-free 1-800-463-6727 or 416-747-4044.

The following paragraphs regarding ANSI approval, revisions and purchase information apply only to the UL Standard:

The most recent designation of ANSI/UL 60950-22 as an American National Standard (ANSI) occurred on April 23, 2007.

This ANSI/UL Standard for Safety, which consists of the First Edition, is under continuous maintenance, whereby each revision is ANSI approved upon publication.

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. 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>.

To purchase UL Standards, visit COMM 2000 at http://www.comm-2000.com/help/how_to_order.aspx or call toll free 1-888-853-3503.

ISBN 1-55436-413-2

ISBN 0-7629-1239-1

Copyright © 2007

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.

Copyright © 2007

Underwriters Laboratories Inc.

UL COPYRIGHTED MATERIAL –

**NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM**



Documents

Document Sharing Hub

CONTENTS

PREFACE	5	DE
FOREWORD	8	
INTRODUCTION	10	
1 Scope	11	
1.1 Equipment covered	11	
1.2 Additional requirements	11	
2 Normative references	11	
3 Terms and definitions	13	
4 Conditions for outdoor equipment	13	
4.1 Ambient air temperature	13	
4.2 AC mains supply	14	
4.3 Rise of earth potential	15	
5 Marking and instructions	15	
6 Protection from electrical shock in an outdoor location	15	
6.1 Voltage limits of user-accessible parts in outdoor locations	15	
6.2 Limited current circuits in outdoor locations	16	
7 Wiring terminals for connection of external conductors	16	
8 Construction requirements for outdoor enclosures	16	
8.1 General	16	
8.2 Resistance to ultra-violet radiation	17	
8.3 Resistance to corrosion	17	
8.4 Bottoms of fire enclosures	19	
8.5 Gaskets	19	
9 Protection of equipment within an outdoor enclosure	20	
9.1 Protection from moisture	20	
9.2 Protection from plants and vermin	21	
9.3 Protection from excessive dust	22	
10 Mechanical strength of enclosures	22	
10.1 General	22	
10.2 Impact test	22	
11 Outdoor equipment containing vented batteries	23	

Annex A (normative) Water-saturated sulphur dioxide atmosphere (see 8.3.2 and 8.3.3)

Annex B (normative) Water spray test (see 9.1)

Annex C (normative) Ultraviolet light conditioning test (see 8.2)

C.1 Test apparatus	28
C.2 Mounting of test samples	28
C.3 Carbon-arc light-exposure apparatus	28
C.4 Xenon-arc light-exposure apparatus	28

UL COPYRIGHTED MATERIAL –

NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM



Documents

Document Sharing Hub

Annex D (normative) Gasket tests (see 8.5)

D.1 Gasket tests	29
D.2 Tensile strength and elongation tests	29
D.3 Compression test	29
D.4 Oil immersion test	30

Annex E (informative) Rationale

E.1 General	32
E.2 Electric shock	32
E.3 Energy related hazards	33
E.4 Fire	33
E.5 Mechanical hazards	33
E.6 Heat related hazards	33
E.7 Radiation	34
E.8 Chemical hazards	34
E.9 Biological hazards	34
E.10 Explosion hazards	34

Annex F (informative) Bibliography**Annex NAE (informative) U.S. and Canadian regulatory requirements**

D1

PREFACE

DE

This is the common CSA and UL Standard for Information Technology Equipment – Safety – Part 22: Equipment to be Installed Outdoors. It is the first edition of CAN/CSA-C22.2 No. 60950-22 and the first edition of UL 60950-22. This standard is based on IEC 60950-22, first edition.

DE
DE
DE
DE

This common standard was prepared by the Canadian Standards Association (CSA) and Underwriters Laboratories Inc. (UL). The efforts and support of representatives of leading industry companies and organizations are gratefully acknowledged.

DE
DE
DE

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

DE
DE

This Standard was reviewed by the CSA Subcommittee on Safety of Electronic Equipment within the Field of Audio/Video, Information, and Communication Technology, under the jurisdiction of the CSA Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee.

DE
DE
DE
DE
DE

This Standard has been approved as a National Standard of Canada by the Standards Council of Canada.

DE
DE

This Standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

DE
DE

Note: Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

DE
DE**Level of harmonization**

DE

This standard adopts the IEC text with national differences. This standard is published as an equivalent standard for CSA and UL.

DE
DE

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

DE
DE
DE
DE
DE
DE
DE

All national differences from the IEC text are included in the CSA and UL versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

DE
DE
DE**Reasons for differences from IEC**

DE

The national differences in this binational Part 22 Standard are included to reference the binational version of IEC 60950-1, which is designated as CAN/CSA-C22.2 No. 60950-1/UL 60950-1, to address issues related to references to the first and second editions of CSA/UL 60950-1, and to address additional requirements for lightning strikes (Clauses 1 and 2),

DE
DE
DE
DE

UL COPYRIGHTED MATERIAL –

NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM



Documents

Document Sharing Hub

components used to reduce the Overvoltage Category (Clause 4), markings (Clause 5), national codes related to wiring (Clause 7), additional requirements for resistance to UV radiation (Clause 8), and U.S. and Canadian regulatory requirements (Annex NAE). DE
DE
DE

Interpretations DE

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent. DE
DE
DE
DE
DE
DE

CSA effective date DE

The effective date for CSA International will be announced through CSA Informs or a CSA certification notice. DE
DE

UL effective date DE

The effective date for UL is available on UL's website at www.ul.com. DE

General DE

National differences from the text of the International Electrotechnical Commission (IEC) Publication 60950-22, Information Technology Equipment – Safety – Part 22: Equipment to be installed outdoors, Copyright 2005, are indicated by the following margin notations: DE
DE
DE

There are six types of national differences, as noted below. The national difference type is noted in the margin next to the affected text. The standard may not include all types of these national differences. DE
DE
DE

D1 – national differences based on national regulatory requirements which result in equivalent or more stringent requirements than in IEC 60950-22. DE
DE

D2 – national differences based on other than national regulatory requirements which result in equivalent or more stringent requirements than in IEC 60950-22. DE
DE

DI – national differences based on IEC final draft international standards (FDIS). DI national differences may be less stringent than, equivalent to, or more stringent than requirements in IEC 60950-22. DE
DE
DE

DC – national differences based on UL and CSA component requirements. DC national differences may be less stringent than, equivalent to, or more stringent than component requirements in IEC 60950-22. DE
DE
DE

D3 – national differences based on binational requirements which result in less stringent requirements than in IEC 60950-22. DE
DE

DE – editorial national differences that correct typographical errors in IEC 60950-22 or revise the terminology, but do not alter the technical intent of the requirements. This notation is also used for informative statements such as the Preface. DE
DE
DE

UL COPYRIGHTED MATERIAL –

NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM



Documents

Document Sharing Hub

National differences have been incorporated into the body of the standard. If national differences necessitate the deletion of IEC 60950-22 text, the IEC 60950-22 text has been retained but has been ~~lined out~~. Text added as a result of national differences has been underlined. Text added as the Preface and Annex NAE is not underlined.

DE
DE
DE
DE

Annex NAE has been included at the back of the standard. Pointers to this annex are provided in the right-hand margin of the body of the standard to direct the user to this informative annex. The pointer text is provided in ***BOLD ITALICS***. An examples of such a pointer is shown here in the right-hand margin.

DE
DE
DE **NAE**
DE

The text, figures, and tables of International Electrotechnical Commission Publication 60950-22, Information Technology Equipment – Safety – Part 22: Equipment to be installed outdoors, Copyright 2005, are used in this standard with the consent of the International Electrotechnical Commission.

DE
DE
DE
DE

The International Electrotechnical Commission Foreword and Introduction are not a part of the requirements of this standard but are included for information purposes only.

DE
DE

Document Was Downloaded By Rice, Shi SHIMISHENG
For Use By KUANTECH CO LTD
12039 : 8/6/2007 - 3:01 AM
UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM
 Documents
Document Sharing Hub

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INFORMATION TECHNOLOGY EQUIPMENT – SAFETY – Part 22: Equipment to be installed outdoors

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60950-22 has been prepared by IEC TC 108 Safety of electronic equipment within the field of audio/video, information technology and communication technology.

UL COPYRIGHTED MATERIAL –

NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM



Documents

Document Sharing Hub