BS EN 60950-1:2006 +A2:2013

Incorporating corrigenda June 2006, August 2006, September 2010, August 2011, October 2011 and August 2012

Information technology equipment — Safety

Part 1: General requirements

 $ICS\ 35.020;\ 35.260$



National foreword

This British Standard is the UK implementation of EN 60950-1:2006+A2:2013, incorporating corrigendum October 2011. It is derived from IEC 60950-1:2005, incorporating amendment 1:2009, corrigendum August 2012, and amendment 2:2013. It supersedes BS EN 60950-1:2006+A12:2011, which is withdrawn.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by tags \square \square

Where a common modification has been introduced by amendment, the tags carry the number of the amendment. For example, the common modifications introduced by CENELEC amendment A11 are indicated by C1) C1.

Where a common modification to an IEC amendment has been introduced, the tags carry the number of the amendment. For example, the common modifications introduced by CENELEC to IEC amendment 1 are indicated by $\boxed{\mathbb{C}_1}$ $\boxed{\mathbb{C}_1}$.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by (A).

Amendments/corrigenda issued since publication

Amd. No.	Date	Comments
16481 Corrigendum No. 1	June 2006	Correction to formatting errors at printing stage
16565 Corrigendum No. 2	August 2006	Correction to numbering of subclause 2.7
	31 January 2010	Implementation of CENELEC amendment A11:2009
	30 April 2010	Implementation of IEC amendment 1:2009 with CENELEC modifications
	30 September 2010	Correction to supersession details
	30 June 2011	Implementation of CENELEC amendment A12:2011
	31 August 2011	Correction to Table 2J
	31 January 2012	Implementation of CENELEC corrigendum October 2011: Correction to Swiss A-deviation in Annex ZC, Clause 1.5.1
	30 April 2013	Implementation of IEC corrigendum August 2012
	31 October 2013	Implementation of IEC amendment 2:2013 with CENELEC modifications

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 May 2006

© The British Standards Institution 2013. Published by BSI Standards Limited 2013

ISBN 978 0 580 74050 3

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by IEC corrigendum August 2012 is indicated in the text by $\boxed{\mathbb{A}\mathbb{C}_1}$ $\boxed{\mathbb{A}\mathbb{C}_1}$.

The UK participation in its preparation was entrusted to Technical Committee EPL/108, Safety of electronic equipment within the field of audio/video, information technology and communication technology.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This page deliberately set blank

EUROPEAN STANDARD NORME EUROPÉENNE

EN 60950-1:2005+A2

EUROPÄISCHE NORM

August 2013

ICS 35.020; 35.260

English version

Information technology equipment - Safety

Part 1: General requirements

(IEC 60950-1:2005, modified)

Matériel de traitement de l'information -Sécurité Partie 1: Exigences générales

(CEI 60950-1:2005, modifiée)

Einrichtungen der Informationstechnik -Sicherheit Teil 1: Allgemeine Anforderungen (IEC 60950-1:2005, modifiziert)

This European Standard was approved by CENELEC on 2005-12-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization Comité Européen de Normalisation Electrotechnique Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

© 2006 CENELEC - All rights of exploitation in any form and by any means reserved worldwide for CENELEC members.

Ref. No. EN 60950-1:2006 E

Foreword

The text of document 108/135A/FDIS, future edition 2 of IEC 60950-1, prepared by IEC TC 108, Safety of electronic equipment within the field of audio/video, information technology and communication technology, was submitted to the IEC-CENELEC parallel.

This text, together with a draft amendment, prepared by the Technical Committee CENELEC TC 108, Safety of electronic equipment within the fields of audio/video, information technology and communication technology, and submitted to the formal vote, was approved by CENELEC as EN 60950-1 on 2005-12-01.

This European Standard supersedes EN 60950-1:2001 + corrigendum April 2004 + A11:2004.

EN 60950-1 includes the basic requirements for the safety of information technology equipment.

Additional parts of EN 60950-1 will cover specific safety requirements for information technology equipment having limited applications or having special features as follows:

Part 21: Remote power feeding;

Part 22: Equipment installed outdoors;

Part 23: Large data storage equipment.

Except for notes, all text within a normative figure, or in a box under a normative table, is also normative. Text with a superscript reference is linked to a particular item in the table. Other text in a box under a table applies to the whole table.

Informative annexes and text beginning with the word "NOTE" are not normative. They are provided only to give additional information.

In this standard, the following print types are used:

- Requirements proper and normative annexes: roman type.
- Compliance statements and test specifications: italic type.
- Notes in the text and in tables: smaller roman type.
- Terms that are defined in 1.2: SMALL CAPITALS.

The following dates were fixed:

 latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement

(dop) 2006-12-01

 latest date by which the national standards conflicting with the EN have to be withdrawn

(dow) 2010-12-01

Clauses, subclauses, notes, tables and figures which are additional to those in IEC 60950-1 are prefixed "Z".

Annexes ZA, ZB and ZC have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60950-1:2005 was approved by CENELEC as a European Standard with agreed common modifications.

Foreword to amendment A11

This amendment to the European Standard EN 60950-1:2006 was prepared by the Technical Committee CENELEC TC 108X, Safety of electronic equipment within the fields of audio/video, information technology and communication technology.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A11 to EN 60950-1:2006 on 2008-12-01.

The following dates were fixed:

_	latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2009-12-01
-	latest date by which the national standards conflicting with the amendment have to be withdrawn	(dow)	2010-12-01

Foreword to amendment A1

The text of document 108/350/FDIS, future amendment 1 to IEC 60950-1:2005, prepared by IEC TC 108, Safety of electronic equipment within the field of audio/video, information technology and communication technology, was submitted to the IEC-CENELEC parallel vote.

A draft amendment, prepared by the Technical Committee CENELEC TC 108X, Safety of electronic equipment within the fields of audio/video, information technology and communication technology, was submitted simultaneously to the formal vote.

The combined texts were approved by CENELEC as amendment A1 to EN 60950-1:2006 on 2010-03-01.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

-	latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-03-01
_	latest date by which the national standards conflicting with the amendment have to be withdrawn	(dow)	2013-03-01

Subclauses, tables and figures which are additional to those in IEC 60950-1 are prefixed "Z".

Annexes ZA and ZB have been added by CENELEC.

Endorsement notice

The text of amendment A1:2009 to the International Standard IEC 60950-1:2005 was approved by CENELEC as an amendment to the European Standard with agreed common modifications.

Foreword to amendment A12

This amendment to the European Standard EN 60950-1:2006 was prepared by the Technical Committee CENELEC TC 108X, Safety of electronic equipment within the fields of audio/video, information technology and communication technology.

The text of the draft was submitted to the unique acceptance procedure and was approved by CENELEC as amendment A12 to EN 60950-1:2006 on 2011-01-24.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

 latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement

(dop) 2012-01-24

 latest date by which the national standards conflicting with the amendment have to be withdrawn

(dow) 2013-01-24

Sub-clauses, tables and figures which are additional to those in IEC 60950-1:2005 are prefixed "Z".

Foreword to amendment A2

The text of document 108/507/FDIS, future IEC 60950-1:2005/A2, prepared by IEC/TC 108 "Safety of electronic equipment within the field of audio/video, information technology and communication technology" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60950-1:2006/A2:2013.

A draft amendment, which covers common modifications to IEC 60950-1:2005/A2:2013, was prepared by CLC/TC 108X, "Safety of electronic equipment within the fields of Audio/Video, Information Technology and Communication Technology" and approved by CENELEC.

The following dates are fixed:

 latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement

(dop) 2014-07-02

 latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2016-07-02

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 60950-1 are prefixed "Z".

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

Endorsement notice

The text of the International Standard IEC 60950-1:2005/A2:2013 was approved by CENELEC as a European Standard with agreed common modifications.

CONTENTS

INT	RODU	JCTION	11
0	Princ	iples of safety	11
	0.1	General principles of safety	11
	0.2	Hazards	12
	0.3	Materials and components	16
1	Gene	eral	17
	1.1	Scope	17
	1.2	Definitions	19
	1.3	General requirements	35
	1.4	General conditions for tests	36
	1.5	Components	41
	1.6	Power interface	48
	1.7	Markings and instructions	48
2	Prote	ection from hazards	56
	2.1	Protection from electric shock and energy hazards	56
	2.2	SELV circuits	65
	2.3	TNV circuits	67
	2.4	Limited current circuits	72
	2.5	Limited power sources	73
	2.6	Provisions for earthing and bonding	75
	2.7	Overcurrent and earth fault protection in primary circuits	83
	2.8	Safety interlocks	86
	2.9	Electrical insulation	89
	2.10	Clearances, creepage distances and distances through insulation	94
3	Wirin	g, connections and supply	122
	3.1	General	122
	3.2	Connection to a mains supply	125
	3.3	Wiring terminals for connection of external conductors	132
	3.4	Disconnection from the mains supply	135
	3.5	Interconnection of equipment	138
4	Phys	ical requirements	139
	4.1	Stability	139
	4.2	Mechanical strength	140
	4.3	Design and construction	144
	4.4	Protection against hazardous moving parts	153
	4.5	Thermal requirements	156
	4.6	Openings in enclosures	159
	4.7	Resistance to fire	166
5	Elect	rical requirements and simulated abnormal conditions	175
	5.1	Touch current and protective conductor current	175
	5.2	Electric strength	184
	5.3	Abnormal operating and fault conditions	188

O	Com	ection to tele	econfindingation networks	192
	6.1		of telecommunication network service persons, and users of other connected to the network, from hazards in the equipment	193
	6.2		of equipment users from overvoltages on telecommunication	195
	6.3	Protection of	of the telecommunication wiring system from overheating	197
7	Conn	ection to cal	ple distribution systems	198
	7.1	General		198
	7.2	equipment	of cable distribution system service persons, and users of other connected to the system, from hazardous voltages in the	198
	7.3	Protection of	of equipment users from overvoltages on the cable distribution	
	7.4		etween primary circuits and cable distribution systems	
		. ,	Tests for resistance to heat and fire	
			Motor tests under abnormal conditions	
		,	Transformers	
		,	Measuring instruments for touch current tests	
		•	Temperature rise of a winding	
			Measurement of clearances and creepage distances	
		,	Alternative method for determining minimum clearances	
		,	Ionizing radiation	
			Table of electrochemical potentials (see 2.6.5.6)	
		` ,	Thermal controls	235
			Normal load conditions for some types of electrical business	237
Anr	nex M	(normative)	Criteria for telephone ringing signals	239
Anr	nex N	(normative)	Impulse test generators	244
Anr	nex P	(normative)	Normative references	246
Anr	nex Q	(normative)	Voltage dependent resistors (VDRs)	250
Anr	nex R	(informative)	Examples of requirements for quality control programmes	251
Anr	nex S	(informative)	Procedure for impulse testing	254
Anr	nex T	(informative)	Guidance on protection against ingress of water	256
Anr	nex U	(normative)	Insulated winding wires for use without interleaved insulation	258
Anr	nex V	(normative)	AC power distribution systems	261
Anr	nex W	(informative) Summation of touch currents	268
Anr	nex X	(informative)	Maximum heating effect in transformer tests	271
Anr	nex Y	(normative)	Ultraviolet light conditioning test	273
Anr	nex Z	(informative)	Overvoltage categories (see 2.10.3.2 and Clause G.2)	264
Anr	nex AA	(normative) Mandrel test (see 2.10.5.8)	275
Anr	nex BE	3 (informative	e) Changes in the second edition	278
Anr	nex C0	C (normative), Evaluation of integrated circuit (IC) current limiters	. 281
			, Requirements for the mounting means of rack-mounted equipment	
			Household and home/office document/media shredders	285

corresponding European publications	314
Annex ZB (normative) Special national conditions	
Annex ZC (informative) A-deviations	
Annex ZD (informative) IEC and CENELEC code designations for flexible cords	
Annex Zx (informative) Significance of $L_{\text{Aeq},T}$ in EN 50332-1 and additional information	າ333
Bibliography	289
Index	292
Figure 2A – Test finger	58
Figure 2B – Test pin	59
Figure 2C – Test probe	59
Figure 2D - Accessibility of internal conductive parts	60
Figure 2E – Voltages in SELV circuits under single fault conditions	66
Figure 2F – Maximum voltages permitted after a single fault	68
Figure 2G – Test generator	72
Figure 2H – Examples of application of insulation	93
Figure 2J – Thermal ageing time	119
Figure 2K – Abrasion resistance test for coating layers	120
Figure 4A – Impact test using a steel ball	142
Figure 4B – Examples of cross-sections of designs of openings preventing vertical access	160
Figure 4C – Examples of louvre design	
Figure 4D – Enclosure openings	
Figure 4E – Typical bottom of a fire enclosure for partially enclosed component or	
assembly	162
Figure 4F – Baffle plate construction	163
Figure 5A – Test circuit for touch current of single-phase equipment on a star TN or power supply system	
Figure 5B – Test circuit for touch current of three-phase equipment on a star TN or	ГТ
power supply system	
Figure 6A – Test for separation between a telecommunication network and earth	
Figure 6B – Application points of test voltage	
Figure B.1 – Determination of arithmetic average temperature	
Figure C.1 – Determination of arithmetic average temperature	
Figure D.1 – Measuring instrument	
Figure D.2 – Alternative measuring instrument	
Figure F.1 – Narrow groove	
Figure F.2 – Wide groove	
Figure F.3 – V-shaped groove	
Figure F.4 – Rib	
Figure F.5 – Uncemented joint with narrow groove	219