IEC 60950-1

Edition 2.0 2009-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Information technology equipment – Safety –
Part 1: General requirements

Matériels de traitement de l'information – Sécurité –
Partie 1: Exigences générales

IEC 60950-1:2005/A1:2009

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

Useful links:

IEC publications search - www.iec.ch/searchpub

The advanced search enables you to find IEC publications by a variety of criteria (reference number, text, technical committee,…).
It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available on-line and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary (IEV) on-line.

Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Liens utiles:

Recherche de publications CEI - www.iec.ch/searchpub

La recherche avancée vous permet de trouver des publications CEI en utilisant différents critères (numéro de référence, texte, comité d'études,…).
Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

Just Published CEI - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications de la CEI. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (VEI) en ligne.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.

IEC 60950-1

Edition 2.0 2009-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Information technology equipment – Safety – Part 1: General requirements

Matériels de traitement de l'information – Sécurité – Partie 1: Exigences générales

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE
CODE PRIX

W

ICS 35.020; 35.260

ISBN 978-2-88912-075-8

FOREWORD

This amendment has been prepared by IEC technical committee 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology.

This bilingual version (2012-04) corresponds to the monolingual English version, published in 2009-12.

The text of this amendment is based on the following documents:

FDIS	Report on voting
108/350/FDIS	108/357/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The French version of this amendment has not been voted upon.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

The contents of the corrigendum of August 2012 have been included in this copy.

———————

CONTENTS

Add the titles of the new annexes as follows:

Annex CC (normative), Evaluation of integrated circuit (IC) current limiters

Annex DD (normative), Requirements for the mounting means of rack-mounted equipment

Annex EE (normative), Household and home/office document/media shredders

Add the titles of the new figures as follows:

Figure 4G – Example for determining opening 'X' without a deflector

Figure 4H – Example for determining opening 'X' with a deflector

Figure EE.1 – Wedge probe (overall view)

Figure EE.2 – Wedge probe (tip details)

1.2 Definitions

Add after "RATING, PROTECTIVE CURRENT…..1.2.13.17" *in the list of "*Definitions in alphabetical order of nouns*" the following new entry:*

SHREDDER (DOCUMENT/MEDIA, HOUSEHOLD AND HOME/OFFICE) …..1.2.13.18

Add, after the existing definition 1.2.13.17*, the following new definition:*

1.2.13.18
(HOUSEHOLD AND HOME/OFFICE DOCUMENT/MEDIA) SHREDDER
equipment with a plug configuration associated with PLUGGABLE EQUIPMENT TYPE A, or battery operated equipment, designed to shred paper or other forms of media as instructed by the manufacturer

NOTE 1 Examples of other forms of media include but are not limited to digital video disks, compact disks, flash memory, magnetic strip cards, or magnetic disks, or the like.

NOTE 2 HOUSEHOLD AND HOME/OFFICE DOCUMENT/MEDIA SHREDDERS are typically identified as either strip-cut type or cross-cut type. A strip-cut HOUSEHOLD AND HOME/OFFICE DOCUMENT/MEDIA SHREDDER shreds the paper into long strips using a motor-based shredding mechanism. A cross-cut DOCUMENT/MEDIA SHREDDER shreds paper two or more ways into tiny particles, typically using a more powerful motor and more complex shredding mechanism.

NOTE 3 A document/media shredder is considered to be non-household or non-home/office type if the document/media shredder is provided with a plug configuration associated with PLUGGABLE EQUIPMENT TYPE B, or is PERMANENTLY CONNECTED EQUIPMENT.

Table 1C – Capacitor ratings according to IEC 60384-14

Replace the existing rule 3 *of this table by the following:*

3 For a single capacitor bridging FUNCTIONAL INSULATION, BASIC INSULATION or SUPPLEMENTARY INSULATION, the peak test voltage of the capacitor shall be at least equal to the peak value of the test voltage (not the r.m.s. voltage) of Table 5B, or the peak value of the test voltage of Table 5C, as applicable, and the r.m.s. test voltage shall be not less than the required r.m.s. test voltage of Table 5B, or the equivalent r.m.s. test voltage (not the peak voltage) of Table 5C, as applicable.

Replace the existing rule 4 of this table by the following:

4 For a single capacitor bridging DOUBLE INSULATION or REINFORCED INSULATION, the peak test voltage of the capacitor shall be not less than the peak value of the test voltage (not the r.m.s. voltage) of Table 5B, or the peak value of the test voltage of Table 5C, as applicable; and the r.m.s. test voltage shall be not less than the required r.m.s. test voltage of Table 5B, or the equivalent r.m.s. test voltage (not the peak voltage) of Table 5C, as applicable.

Replace the existing rule 7 *of this table by the following:*

7 If two or more capacitors are used in series, all of the following apply:

– under single fault conditions, the voltage on each of the remaining individual capacitors shall not exceed the voltage rating of the relevant individual capacitor;

– for BASIC INSULATION or SUPPLEMENTARY INSULATION, the sum of the peak impulse test voltages of all capacitors shall be not less than the peak value of the test voltage (not the r.m.s. voltage) of Table 5B, or the peak value of the test voltage of Table 5C, as applicable;

– for BASIC INSULATION or SUPPLEMENTARY INSULATION, the sum of the r.m.s. test voltages of all capacitors shall be not less than the required r.m.s. test voltage of Table 5B, or the equivalent r.m.s. test voltage (not the peak voltage) of Table 5C, as applicable;

– for REINFORCED INSULATION, the sum of the peak impulse test voltages of all capacitors shall be not less than the peak value of the test voltage (not the r.m.s. voltage) of Table 5B, or the peak value of the test voltage of Table 5C, as applicable;

– for REINFORCED INSULATION, the sum of the r.m.s. test voltages of all capacitors shall be not less than the required r.m.s. test voltage of Table 5B, or the equivalent r.m.s. test voltage (not the peak voltage) of Table 5C, as applicable;

– they shall comply with the other rules above.

Table 1D – Informative examples of application of capacitors

Replace the existing Table 1D by the following new table:

AC MAINS SUPPLY voltage up to and including V r.m.s.	Overvoltage Category	MAINS TRANSIENT VOLTAGE kV	Bridged insulation	Capacitor type	Number of capacitors	
					Using Table 5B	Using Table 5C
150	II	1,5	B or S	Y2	1	1
	II	1,5	D or R	Y2	2	2
	II	1,5	D or R	Y1	1	1
	II	1,5	F	X2	1	1
	III	2,5	F	X2	1	1
	III	2,5	B or S	Y2	–	2
	III	2,5	D or R	Y1	-	1
	IV	4,0	F	X1	-	1
	IV	4,0	B or S	Y1	-	1
	IV	4,0	B or S	Y2	-	2
	IV	4,0	D or R	Y1	-	2
250	II	2,5	F	X2	1	1
	III	4,0	F	X1	1	1
300	II	2,5	B or S	Y2	1	2
	II	2,5	D or R	Y1	1	1
	II	2,5	D or R	Y2	2	3
	III	4,0	B or S	Y1	-	1
	III	4,0	B or S	Y2	-	2
	III	4,0	D or R	Y1	-	2
	III	4,0	D or R	Y2	-	4
	IV	6,0	F	X1	-	2
	IV	6,0	B or S	Y1	-	2
	IV	6,0	D or R	Y1	-	3
500	II	4,0	F	X1	1	1
	II	4,0	B or S	Y1	1	1
	II	4,0	D or R	Y1	1	2
	III	6,0	F	X1	-	2
	III	6,0	B or S	Y1	-	2
	III	6,0	D or R	Y1	-	3
	IV	8,0	F	X1	-	2
	IV	8,0	B or S	Y1	-	2
	IV	8,0	D or R	Y1	-	3

The values in the table apply to FUNCTIONAL INSULATION (F), BASIC INSULATION (B), SUPPLEMENTARY INSULATION (S), DOUBLE INSULATION (D) and REINFORCED INSULATION (R).

NOTE Table 5B is used for Overvoltage Categories I and II only.

1.5.7.1 Resistors bridging functional insulation, basic insulation or supplementary insulation

Replace the existing note of this subclause by the following new note:

NOTE In Finland, Norway and Sweden resistors bridging BASIC INSULATION in CLASS I PLUGGABLE EQUIPMENT TYPE A must comply with 1.5.7.1. In addition when a single resistor is used, the resistor must withstand the resistor test in 1.5.7.2.

1.5.7.2 Resistors bridging double insulation or reinforced insulation between the a.c. mains supply and other circuits

Replace the fifth paragraph of this subclause by the following new paragraph:

If an accessible conductive part or circuit is separated from another part by DOUBLE INSULATION or REINFORCED INSULATION that is bridged by a resistor or group of resistors, the accessible part or circuit shall comply with the requirements for a LIMITED CURRENT CIRCUIT in 2.4 between the accessible conductive part or circuit and earth. If a group of resistors is used, the current measurement in 2.4.2 is made with each resistor short-circuited in turn, unless the group passes the resistor test below. When measuring the LIMITED CURRENT CIRCUIT, the ammeter is placed between the load side of the bridging components and any USER accessible part, including earth.

1.5.9.4 Bridging of basic insulation by a VDR

After the existing note of this subclause, add the following new paragraph:

It is permitted to use a gas discharge tube (GDT) in series with a VDR that bridges BASIC INSULATION in accordance with the conditions in this subclause if the GDT complies with the requirements for FUNCTIONAL INSULATION.

1.7 Markings and instructions

Replace the existing note of this subclause by the following new note:

NOTE Additional requirements for markings and instructions are contained in the following subclauses:

2.1.1.2	Battery compartments	4.3.3	Adjustable controls
2.1.1.8	Energy hazards	4.3.5	Plugs and sockets
2.3.2.3	Protection by earthing	4.3.13.4	UV radiation
2.6.1	Unearthed parts	4.3.13.5	Lasers
2.6.2	FUNCTIONAL EARTHING	4.4.2	Hazardous moving parts
2.6.3.4 c)	Bonding conductors	4.4.5.2	Fan protection for USERS
2.6.5.1	Bonding conductors	4.4.5.3	Fan protection for service persons
2.7.1	External protective devices	4.5.4 Table 4C	Marking of hot parts
2.7.6	Neutral fusing	4.5.4	Touch temperatures
2.10.3.2	Overvoltage Categories	4.6.2	Equipment on non-combustible floors
3.2.1.2	DC MAINS SUPPLY	4.6.3	Removable doors and covers
3.3.7	Grouping of wiring terminals	5.1.7.1	TOUCH CURRENT exceeding 3,5 mA
3.4.3	Disconnect devices	5.1.8.2	Summation of TOUCH CURRENTS
3.4.6	Two-pole disconnect devices	6.1.1 and 6.1.2.2	Earthing for a TELECOMMUNICATION NETWORK
3.4.7	Four-pole disconnect devices	7.2 and 7.4.1	Earthing for a CABLE DISTRIBUTION SYSTEM
3.4.9	Plugs as disconnect devices	G.2.1	Equipment in Overvoltage Categories III and IV
3.4.10	Interconnected equipment	DD.2	Maximum shelf load
3.4.11	Multiple power sources	EE.2	Shredder warning
4.1	Equipment stability	EE.4	Shredder power disconnection
4.2.5	Impact test		

1.7.1 Power rating

Replace the existing title and text of this subclause by the following new title and text (including the new subclauses 1.7.1.1 and 1.7.1.2):

1.7.1 Power rating and identification markings

1.7.1.1 Power rating markings

Equipment shall be provided with a power rating marking, the purpose of which is to specify a supply of correct voltage and frequency, and of adequate current-carrying capacity.

If the equipment is not provided with a means for direct connection to a MAINS SUPPLY, it need not be marked with any electrical rating, such as its RATED VOLTAGE, RATED CURRENT or RATED FREQUENCY. If the equipment, or a system, has multiple MAINS SUPPLY connections, each individual MAINS SUPPLY electrical rating must be marked, but the overall equipment or system electrical rating need not be marked.

For equipment intended to be installed by an OPERATOR, the power rating marking, if required, shall be readily visible in any OPERATOR ACCESS AREA. If a manual voltage selector is not OPERATOR-accessible, the power rating marking shall indicate the RATED VOLTAGE for which the equipment is set during manufacture; a temporary marker is permitted for this purpose. The power rating marking is permitted on any outer surface of the equipment, except the bottom of equipment having a mass exceeding 18 kg.

For STATIONARY EQUIPMENT, the power rating marking shall be visible after the equipment has been installed as in normal use.

For equipment intended to be installed by a SERVICE PERSON, and if the power rating marking is in a SERVICE ACCESS AREA, the location of the permanent marking shall be indicated in the installation instructions or on a readily visible marker on the equipment. It is permitted to use a temporary marker for this purpose.

The power rating marking shall include the following:

– RATED VOLTAGE(S) or RATED VOLTAGE RANGE(S), in volts;

- the voltage range shall have a hyphen (-) between the minimum and maximum RATED VOLTAGES and when multiple RATED VOLTAGES or RATED VOLTAGE RANGES are given, they shall be separated by a solidus (/);

NOTE 1 Some examples of RATED VOLTAGE markings are:

– RATED VOLTAGE RANGE: 220-240 V. This means that the equipment is designed to be connected to an AC MAINS SUPPLY having any voltage between 220 V and 240 V.

– multiple RATED VOLTAGE: 120/230/240 V. This means that the equipment is designed to be connected to an AC MAINS SUPPLY having a voltage of 120 V or 230 V or 240 V, usually after internal adjustment.

- if equipment is to be connected to both line conductors and to the neutral conductor of a single-phase, three-wire power distribution system, the power rating marking shall give the line-to-neutral voltage and the line-to-line voltage, separated by a solidus (/), with the added notation "Three wires plus protective earth", "3W + PE" or equivalent;

NOTE 2 Some examples of the above system rating markings are:

120/240 V; 3 wire + PE;

120/240 V; 3W + ⏚ (60417-IEC-5019);

100/200 V; 2W + N + PE;

100-120/200-240 V; 2W + N + PE.

– symbol for nature of supply, for d.c. only;

– RATED FREQUENCY or RATED FREQUENCY RANGE, in hertz, unless the equipment is designed for d.c. only;

– RATED CURRENT, in milliamperes or amperes;

- for equipment with multiple RATED VOLTAGES, the corresponding RATED CURRENTS shall be marked such that the different current ratings are separated by a solidus (/) and the relation between RATED VOLTAGE and associated RATED CURRENT appears distinctly;
- equipment with a RATED VOLTAGE RANGE shall be marked with either the maximum RATED CURRENT or with the current range;
- the power rating marking for RATED CURRENT of a group of units having a single supply connection shall be placed on the unit which is directly connected to a MAINS SUPPLY. The RATED CURRENT marked on that unit shall be the total maximum current that can

be on circuit at the same time and shall include the combined currents to all units in the group that can be supplied simultaneously through the unit and that can be operated simultaneously.

NOTE 3 Some examples of RATED CURRENT markings are:

– for equipment with multiple RATED VOLTAGES:

120/240 V; 2,4/1,2 A;

100-120/200-240 V; 2,4/1,2 A;

– for equipment with a RATED VOLTAGE RANGE:

100-240 V; 2,8 A;

100-240 V; 2,8-1,4 A;

100-120 V; 2,8 A;

200-240 V; 1,4 A.

It is recognized that in some regions it is customary to use a point (·) as a decimal marker instead of a comma.

Additional markings are permitted, provided that they do not give rise to misunderstanding.

Where symbols are used, they shall conform to ISO 7000 or IEC 60417 where appropriate symbols exist.

1.7.1.2 Identification markings

Equipment shall be provided by the following identification markings:

– manufacturer's name or trade-mark or identification mark;

– manufacturer's model identification or type reference;

– symbol □, IEC 60417-5172 (DB:2003-02), for the identification of CLASS II EQUIPMENT only, except where this is forbidden by 2.6.2.

Additional identification markings are permitted, provided that they do not give rise to misunderstanding.

These identification markings shall be readily visible in any OPERATOR ACCESS AREA, except that they shall not be located on the bottom of equipment having a mass exceeding 18 kg. For STATIONARY EQUIPMENT, the identification markings shall be visible after the equipment has been installed as in normal use.

1.7.7.1 Protective earthing and bonding terminals

Replace the first paragraph of this subclause by the following new paragraph:

A wiring terminal intended for connection of a PROTECTIVE EARTHING CONDUCTOR shall be indicated by the symbol ⏚, IEC 60417-5019 (DB:2002-10). This symbol shall not be used for other earthing terminals, except that the symbol may also be used to identify the separate protective earthing terminal specified in 5.1.7.1.

2.1.1.5 Energy hazards

Replace the existing text of c)2) by the following:

2) *the stored energy in a capacitor is at a* HAZARDOUS ENERGY LEVEL *if the voltage, U, is 2 V or more, and the stored energy, E, calculated from the following equation, is 20 J or more:*

$$E = 0{,}5\ CU^2 \times 10^{-6}$$

Where:

E is the energy, in joules (J);

C is the capacitance, in microfarads (μF);

U is the measured voltage on the capacitor, in volts (V).

2.1.1.7 Discharge of capacitors in equipment

Replace the last sentence of the last paragraph of this subclause by the following:

When conducting the voltage decay measurement, the measurement is either made with, or referred to, an instrument having an input impedance consisting of a resistance of 100 MΩ ± 5 MΩ in parallel with an input capacitance of 25 pF or less.

2.1.1.8 Energy hazards - d.c. mains supplies

Replace the last sentence of item a) by the following:

A HAZARDOUS ENERGY LEVEL *exists if the voltage, U, is 2 V or more, and the stored energy, E, is 20 J or more.*

2.4.1 General requirements

Add the following new Note 2 at the end of this subclause, and renumber the existing note as Note 1:

NOTE 2 A LIMITED CURRENT CIRCUIT may be derived from either a PRIMARY CIRCUIT or a SECONDARY CIRCUIT.

2.5 Limited power sources

Replace the existing item b) by the following:

b) a linear or non-linear impedance limits the output in compliance with Table 2B. If a positive temperature coefficient device is used, it shall:
   - pass the tests specified in IEC 60730-1, Clauses 15, 17, J.15 and J.17; or
   - meet the requirements in IEC 60730-1 for a device for Type 2.AL action;

Replace the existing item c) by the following:

c) a regulating network, or an integrated circuit (IC) current limiter, limits the output in compliance with Table 2B, both with and without a simulated single fault (see 1.4.14) in the regulating network or the IC current limiter (open circuit or short circuit). A single fault between the input and output is not conducted if the IC current limiter meets a suitable test program as given in Annex CC;

2.6.2 Functional earthing

*Delete the words "*or inaccessible*" in the first sentence of the existing first paragraph of this subclause.*

2.6.5.6 Corrosion resistance

Replace the words "protective earthing" *by* "protective earthing and protective bonding" *in the first sentence of the existing first paragraph of this subclause.*

2.8.4 Fail-safe operation

Add, after the second item of the list, the following new paragraph and note:

For protection against extreme hazard, either a redundant system of two SAFETY INTERLOCK systems shall be used or the fixed separation distances in a single SAFETY INTERLOCK system circuit (for example, those associated with printed boards) shall meet the requirements for REINFORCED INSULATION.

NOTE A SAFETY INTERLOCK system is considered to consist of the components/elements that are directly capable of disconnecting the hazardous part (for example, relay contacts or a switch) including components (for example, a relay coil) and other parts forming part of the initiation circuit (for example, those mounted on printed boards).

Replace the first compliance statement of this subclause by the following:

Compliance is checked by inspection of the SAFETY INTERLOCK system, circuit diagrams and available data and, if necessary, by simulation of single faults (see 1.4.14) (for example, failure of a semi-conductor device or an electromechanical component). Moving mechanical parts in mechanical and electromechanical systems are not subjected to simulated single faults if they comply with 2.8.5 and 2.8.7. Fixed separation distances in SAFETY INTERLOCK system circuits (for example, those associated with printed boards) that protect against other than extreme hazards are not subjected to simulated single faults if the separation distances comply with 2.8.7.1.

2.8.7 Switches and relays

Replace the existing title of this subclause by the following new title:

2.8.7 Switches, relays and their related circuits

2.8.7.1 Contact gaps

Replace the existing title and text of this subclause by the following new title and text:

2.8.7.1 Separation distances for contact gaps and their related circuits

If the separation distances for contact gaps and their related circuits are located in the PRIMARY CIRCUIT, the separation distances shall not be less than that for a disconnect device (see 3.4.2). If the separation distance is located in a circuit other than a PRIMARY CIRCUIT, the separation distance shall be not less than the relevant minimum CLEARANCE value for BASIC INSULATION in a SECONDARY CIRCUIT specified in 2.10.3 (or Annex G).

Compliance is checked by inspection of the available data and, if necessary, by measurement.

2.8.7.2 Overload test

Replace the existing text of this subclause by the following new text:

The contact of a switch or relay in the SAFETY INTERLOCK system is subjected to an overload test consisting of 50 cycles of operation at the rate of 6 to 10 cycles per minute, making and breaking 150 % of the current imposed in the application, except that where a switch or relay contact switches a motor load, the test is conducted with the rotor of the motor in a locked condition. After the test, the SAFETY INTERLOCK system, including the switch or relay, shall still be functional.

2.8.7.3 Endurance test

Replace the existing text of this subclause by the following new text:

The contact of a switch or a relay in the SAFETY INTERLOCK system is subjected to an endurance test, making and breaking 100 % of the current imposed in the application at a rate of 6 to 10 cycles of operation per minute. A higher rate of cycling is permitted if requested by the manufacturer. For reed switches used in SAFETY INTERLOCK systems located in ELV CIRCUITS, SELV CIRCUITS and TNV-1 CIRCUITS, the test is 100 000 operating cycles. For other switches and relays in SAFETY INTERLOCK systems, the test is 10 000 operating cycles. After the test, the SAFETY INTERLOCK system, including a switch or relay, shall still be functional.

2.8.7.4 Electric strength test

Replace the existing text of this subclause by the following new text:

Except for reed switches in ELV CIRCUITS, SELV CIRCUITS and TNV-1 CIRCUITS, an electric strength test as specified in 5.2.2, is applied between the contacts of the relays and switches after the tests of 2.8.7.2 and 2.8.7.3. If the contact is in a PRIMARY CIRCUIT, the test voltage is as specified for REINFORCED INSULATION. If the contact is in a circuit other than a PRIMARY CIRCUIT, the test voltage is as specified for BASIC INSULATION in a PRIMARY CIRCUIT.

2.9.2 Humidity conditioning

Replace the first paragraph of this subclause by the following new paragraph:

Where required by 2.9.1, 2.10.8.3, 2.10.10 or 2.10.11, humidity conditioning is conducted for 48 h in a cabinet or room containing air with a relative humidity of (93 ± 3) %. The temperature of the air, at all places where samples can be located, is maintained within 2 K of any convenient value t between 20 °C and 30 °C such that condensation does not occur. During this conditioning the component or subassembly is not energized.

Table 2K – Minimum clearances for insulation in primary circuits and between primary and secondary circuits

Replace the existing Table 2K by the following new table:

CLEARANCES in mm

PEAK WORKING VOLTAGE up to and including V	MAINS TRANSIENT VOLTAGE														
	1 500 V [c]						2 500 V [c]						4 000 V [c]		
	Pollution degree														
	1 and 2 [b]			3			1 and 2 [b]			3			1, 2 [b] and 3		
	F	B/S	R	F	B/S	R	F	B/S	R	F	B/S	R	F	B/S	R
71 [a]	0,4	1,0 (0,5)	2,0 (1,0)	0,8	1,3 (0,8)	2,6 (1,6)	1,0	2,0 (1,5)	4,0 (3,0)	1,3	2,0 (1,5)	4,0 (3,0)	2,0	3,2 (3,0)	6,4 (6,0)
210 [a]	0,5	1,0 (0,5)	2,0 (1,0)	0,8	1,3 (0,8)	2,6 (1,6)	1,4	2,0 (1,5)	4,0 (3,0)	1,5	2,0 (1,5)	4,0 (3,0)	2,0	3,2 (3,0)	6,4 (6,0)
420 [a]	F 1,5 B/S 2,0 (1,5) R 4,0 (3,0)												2,5	3,2 (3,0)	6,4 (6,0)
840	F 3,0 B/S 3,2 (3,0) R 6,4 (6,0)														
1 400	F/B/S 4,2 R 6,4														
2 800	F/B/S/R 8,4														
7 000	F/B/S/R 17,5														
9 800	F/B/S/R 25														
14 000	F/B/S/R 37														
28 000	F/B/S/R 80														
42 000	F/B/S/R 130														

The values in the table are applicable to FUNCTIONAL INSULATION (F) if required by 5.3.4 a) (see 2.10.1.3), BASIC INSULATION (B), SUPPLEMENTARY INSULATION (S) and REINFORCED INSULATION (R).

The values in parentheses apply to BASIC INSULATION, SUPPLEMENTARY INSULATION or REINFORCED INSULATION only if manufacturing is subjected to a quality control programme that provides at least the same level of assurance as the example given in Clause R.2. DOUBLE INSULATION and REINFORCED INSULATION shall be subjected to ROUTINE TESTS for electric strength.

If the PEAK WORKING VOLTAGE exceeds the peak value of the AC MAINS SUPPLY voltage, linear interpolation is permitted between the nearest two points, the calculated minimum CLEARANCE being rounded up to the next higher 0,1 mm increment.

[a] If the PEAK WORKING VOLTAGE exceeds the peak value of the AC MAINS SUPPLY voltage, use the peak value of the AC MAINS SUPPLY voltage in this column and use Table 2L in accordance with 2.10.3.3 b) regarding additional CLEARANCES

[b] It is not required to pass the tests of 2.10.10 for Pollution Degree 1.

[c] The relationship between MAINS TRANSIENT VOLTAGE and AC MAINS SUPPLY voltage is given in Table 2J.

Table 2L – Additional clearances in primary circuits

Add the following new paragraph to the existing conditions of Table 2L (after "For voltage values…linear extrapolation is permitted."):

For voltage values within the PEAK WORKING VOLTAGE values given in the table, linear interpolation is permitted between the nearest two points, the calculated minimum additional CLEARANCE being rounded up to the next higher 0,1 mm increment.

Table 2M – Minimum clearances in secondary circuits

*In the 7 000 V row of Table 2M, replace the existing value "*7,5*" by "*17,5*".*