

TECHNICAL REPORT

IEC TR 61010-3-041

First edition
1999-10

Safety requirements for electrical equipment for measurement, control, and laboratory use –

Part 3-041: Conformity verification report for IEC 61010-2-041:1995, Particular requirements for autoclaves using steam for the treatment of medical materials, and for laboratory processes

*Règles de sécurité pour appareils électriques de mesure,
de régulation et de laboratoire –*

*Partie 3-041:
Rapport de vérification de la conformité de la
CEI 61010-2-041:1995, Prescriptions particulières pour
autoclaves utilisant de la vapeur pour le traitement des
matériels à usage médical et durant les procédés de
traitement de laboratoire*



Reference number
IEC/TR 61010-3-041:1999(E)

Numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series.

Consolidated publications

Consolidated versions of some IEC publications including amendments are available. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Validity of this publication

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology.

Information relating to the date of the reconfirmation of the publication is available in the IEC catalogue.

Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is to be found at the following IEC sources:

- **IEC web site***
- **Catalogue of IEC publications**
Published yearly with regular updates
(On-line catalogue)*
- **IEC Bulletin**
Available both at the IEC web site* and as a printed periodical

Terminology, graphical and letter symbols

For general terminology, readers are referred to IEC 60050: *International Electrotechnical Vocabulary* (IEV).

For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to publications IEC 60027: *Letter symbols to be used in electrical technology*, IEC 60417: *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets* and IEC 60617: *Graphical symbols for diagrams*.

* See web site address on title page.

TECHNICAL REPORT

IEC TR 61010-3-041

First edition
1999-10

Safety requirements for electrical equipment for measurement, control, and laboratory use –

Part 3-041: Conformity verification report for IEC 61010-2-041:1995, Particular requirements for autoclaves using steam for the treatment of medical materials, and for laboratory processes

*Règles de sécurité pour appareils électriques de mesurage,
de régulation et de laboratoire –*

*Partie 3-041:
Rapport de vérification de la conformité de la
CEI 61010-2-041:1995, Prescriptions particulières pour
autoclaves utilisant de la vapeur pour le traitement des
matériels à usage médical et durant les procédés de
traitement de laboratoire*

© IEC 1999 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission
Telefax: +41 22 919 0300

3, rue de Varembe Geneva, Switzerland
e-mail: inmail@iec.ch IEC web site <http://www.iec.ch>



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE **XB**

For price, see current catalogue

CONTENTS

	Page
FOREWORD	3
Conformity verification report IEC 61010-3-041	5
Clause	
5 Marking and documentation.....	10
6 Protection against electric shock	16
7 Protection against mechanical hazards	23
8 Mechanical resistance to shock, vibration and impact	26
Mechanical resistance to shock and impact (AM 2)	
9 Equipment temperature limits and protection against the spread of fire	27
10 Resistance to heat	28
11 Resistance to moisture and liquids	29
Protection against hazards from fluids (AM 2)	
12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure.....	31
13 Protection against liberated gases, explosion and implosion	31
14 Components.....	32
15 Protection by interlocks	35
16 Measuring circuits (AM 2).....	35
Annex K (AM 2)	35
Table 1 – Documents attached to this report	7
Table 2 – Test equipment list.....	8
Table 3 – List of components relied on for safety	9
Form A.1 to Form A.30	36 to 65

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT
FOR MEASUREMENT, CONTROL, AND LABORATORY USE –****Part 3-041: Conformity verification report for IEC 61010-2-041:1995,
Particular requirements for autoclaves using steam
for the treatment of medical materials,
and for laboratory processes**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this technical report may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

Technical reports do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

IEC 61010-3-041, which is a technical report, has been prepared by IEC technical committee 66: Safety of measuring, control, and laboratory equipment.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
66/193/CDV	66/217/RVC

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

This report is a Technical Report and is of a purely informative nature and is therefore by itself not to be regarded as an International Standard. It is for use by testhouses and other users to assist them with determining and recording verification of conformity of the equipment under test with the requirements of

IEC 61010-2-041: 1997,
and
IEC 61010-1: 1990 + amendment 1: 1992
or
IEC 61010-1: 1990 + amendment 1: 1992 + amendment 2: 1995

The protocol for completion of this report is contained in publication IEC 61010-3:1997. Requirements which apply only to amendment 2 to IEC 61010-1 are indicated by "(AM 2)" in the first column. Requirements deleted by amendment 2 to IEC 61010-1 are indicated by "(AM 1 only)" in the second column.

The IEC sells read-only PDF files as a general rule. In the present instance, and quite exceptionally, to enable the user to fill in the forms, a revisable file is included in a pocket affixed to the back cover of this publication.

This publication can be downloaded from the Web as a PDF file. There is, however, at the end of the document, a revisable file containing the forms. Please use the zip/unzip function.

A bilingual version will not be issued.

A French version may be issued.

Conformity Verification Report IEC 61010-2-041 Safety requirements for electrical equipment for measurement, control, and laboratory use: Part 2-041: Particular requirements for autoclaves using steam for the treatment of medical materials, and for laboratory processes	
Report reference No : Compiled by (+ signature)..... : Approved by (+ signature)..... : Date of issue :	
Testing organization..... : Address..... : Testing location..... :	
Applicant : Address..... :	
Standard : : : : :	IEC 61010-2-041:1995 and IEC 61010-1:1990 + amendment 1:1992 or IEC 61010-1:1990 + amendment 1:1992+ amendment 2:1995
Copyright blank test report..... :	This report has been prepared by IEC/TC 66, which retains responsibility for any changes or corrections required.
Test procedure..... : Procedure deviation : Non-standard test method :	
Type of item tested : ☐ Laboratory Trademark..... : Model/type référence : Manufacturer : Rating..... :	
Copy of rating plate:	

Description of equipment function:

INSTALLATION/OVERVOLTAGE CATEGORY:

POLLUTION DEGREE:

Environmental rating: ☐ Standard ☐ Other (specify):

Equipment mobility: ☐ Portable ☐ Hand-held ☐ Floorstanding ☐ Fixed
☐ Built in ☐ Benchmounted ☐ Other (specify):

Connection to mains supply: ☐ Permanent ☐ Detachable ☐ Non-detachable ☐ None

Operating conditions: ☐ Continuous ☐ Short-time ☐ Intermittent

Overall size of the equipment (Length × Width × Height):

Mass of the equipment (kg):

Marked degree of protection to IEC 60529: IP___

Accessories and detachable parts included in the evaluation:

Options:

NOTE "(see Form A.X)" refers to a form appended to the report.

Table 1 – Documents attached to this report

[illegible]

Table 2 – Test equipment list

Item	Type	Equipment No.	Calibration date		Comments
			Last ¹⁾	Due	

1) or interval between calibrations.

Table 3 – List of components relied on for safety

Unique component reference or location (including drawing reference if required)	Application/Function	Manufacturer and part number (note 1)	RATING (note 2)	Licence number, file number or other documentary evidence of acceptance
NOTE 1 List all manufacturers concerned. NOTE 2 Electrical, mechanical, flammability, etc.				

Clause Subclause	Requirement	Result	Comments
5	Marking and documentation		
5.1.1	General Required equipment markings are:		
	a) visible:		
	– from the exterior		
	or		
	– after removing a cover		
	or		
	– opening a door		
	or		
	– after removal from a rack or panel		
	b) not put on parts which can be removed by an OPERATOR		
	c) Letter symbols (IEC 60027) used		
	d) Graphic symbols (IEC 61010-1, Table 1) used		
5.1.2	Identification Equipment is identified by		
	– manufacturer's name or registered trade mark		
	– model number, name or other means		
	– PRESSURE VESSEL markings (see 5.1.102)		
	If jacket pressure differs from CHAMBER, data for both marked on PRESSURE VESSEL		
5.1.3	Mains supply Equipment is marked as follows:		
	a) nature of supply:		
	– a.c. RATED mains frequency or range of frequencies		
	– d.c. with symbol 1		
	b) RATED supply voltage(s) or range		
	c) – maximum RATED power (W or VA) or input current		
(AM 2)	If more than one voltage range:		
	– separate values marked		
	or		
	– values differ by less than 20 % (see Form A.3)		
F			

Clause Subclause	Requirement	Result	Comments
5.1.4	d) equipment which can be set for different RATED supply voltages:		
	– for PORTABLE EQUIPMENT, indication is visible from the exterior		
	– if the supply voltage can be altered without the use of a tool, changing the setting also changes the indication		
	e) accessory mains socket-outlets accepting standard mains plugs are marked		
	– with the voltage if it is different from the mains supply voltage		
	– for use only with specific equipment		
	If not marked for specific equipment, it is marked with		
	– the maximum RATED current or power, and maximum permitted leakage current		
	or		
	– symbol 14 with full details in the documentation		
	The measured value not more than 110 %		
	F (see Form A.3)		
	Fuses		
	OPERATOR replaceable fuse marking (see also 5.4.5)		
	5.1.5 Measuring circuit TERMINALS		
	(AM 2) RATED maximum working voltage or current marked		
	Unless clear indication that below limits:		
	– maximum RATED voltage to earth is marked		
	or		
	– for specific connection only, and means for identifying provided		
	– is adjacent to TERMINALS		
	or		
	– if insufficient space		
	– on the RATING plate or scale plate		
	or		
	– if the TERMINAL is marked with symbol 14		
(AM 2)	INSTALLATION CATEGORY marked		
(AM 2)	TERMINALS permanently connected and not ACCESSIBLE		

Clause Subclause	Requirement	Result	Comments
5.1.6	TERMINALS and operating devices		
	Where necessary for safety, indication of purpose of TERMINALS, connectors, controls and indicators		
	(AM 2) Mains supply TERMINALS identified		
	(AM 2) Power supply switch on or off position marked if used as disconnecting device		
	TERMINAL marking:		
	a) FUNCTIONAL EARTH TERMINALS		
	b) PROTECTIVE CONDUCTOR TERMINALS:		
	– symbol 6 is placed close to or on the TERMINAL		
	or		
	– part of appliance inlet		
	c) TERMINALS of measuring and control circuits		
	d) TERMINALS supplied from the interior		
	e) ACCESSIBLE FUNCTIONAL EARTH TERMINALS		
	f) position on or off of power supply switch (AM 1 only)		
	aa) NORMAL USE setting a control could cause a hazard, an indicating device is provided		
5.1.7	Equipment protected by DOUBLE INSULATION or REINFORCED INSULATION		
	Protected throughout (symbol 11 used)		
	Only partially protected (symbol 11 not used)		
5.1.8	Battery charging		
	Equipment with means to charge rechargeable batteries is marked:		
	– to warn against the charging of non-rechargeable batteries		
	– to indicate the type of rechargeable battery used		
5.1.101	Overpressure safety device		
	Identification includes:		
	– model number, etc.		
	– pressure setting		
	– if bursting disc:		
	– pressure		
	– temperature		

Clause Subclause	Requirement	Result	Comments
5.1.102	PRESSURE VESSEL markings In all cases, markings include a) name of the manufacturer b) serial number c) identification number of door (may be the same as the serial number) d) maximum working pressure e) maximum working temperature f) minimum working pressure g) test pressure h) construction standard applies i) the CHAMBER volume in litres		
5.2	Warning markings – visible when ready for NORMAL USE – if necessary marked with symbol 14 – are near or on applicable parts (AM 2) – statement to isolate or disconnect – advice on how to avoid contact with ACCESSIBLE HAZARDOUS LIVE parts – TERMINAL voltage exceeding 1 kV (symbol 12) – easily touched high-temperature parts (symbol 13) – warning for more than 2 s (AM 1 only) – instruction to lock and retain key – LOAD type warning		
5.3	Durability of markings The required markings remain clear and legible in NORMAL USE (see Form A.4)		
5.4	Documentation		
5.4.1	General Equipment is accompanied by documentation which includes – technical specification		

Clause Subclause	Requirement	Result	Comments
5.4.2	– instructions for use		
	– name and address of manufacturer or supplier		
	(AM 2) Definition of INSTALLATION CATEGORY		
	Warning statements and a clear explanation of warning symbols:		
	– provided in the documentation		
	or		
	– information is marked on the equipment		
	– PRESSURE VESSEL conformity declaration		
	– instructions on warning signs for country of use		
	Equipment RATINGS		
	Documentation includes		
	– supply voltage or voltage range		
	– frequency or frequency range		
	– power or current RATING		
	– a description of all input and output connections		
	– RATING of insulation of external circuits, when such circuits are nowhere ACCESSIBLE		
	– statement of the range of environmental conditions		
	5.4.3 Equipment installation		
	Documentation includes instructions for		
	a) location and mounting		
	b) weights		
	c) floor loading		
	d) assembly		
	e) mains		
	– supply		
	– connections		
	f) protective earthing		
	g) sound power		
	– data		
	– requirements (see 12.5.1)		

Clause Subclause	Requirement	Result	Comments
5.4.4	Equipment operation		
	Instructions for use include		
	a) operating controls:		
	– identification		
	– use		
	b) not to be positioned so that disconnection is difficult		
	c) accessories:		
	– interconnection		
	– suitability		
	– detachable parts		
	– special materials		
	d) specification of intermittent operation limits		
	e) explanation of symbols used		
	f) cleaning		
	g) lockable door closure stop:		
	– correct use		
	– retain key		
	h) safe use of the override key		
	i) action in case of malfunction		
5.4.5	Equipment maintenance		
	Instructions include		
	– special precautions for safety		
	– threaded parts		
	– safety devices		
	(AM 2) – replacement of hoses, etc.		
	– specific battery type		
	– any manufacturer specified parts		
	– RATING and characteristics of fuses		

Clause Subclause	Requirement	Result	Comments
6	Protection against electric shock (see Form A.5)		
6.1	General Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.12 Asbestos not used		
6.1.1	Exceptions		
F	Capacitance test (see Forms A.6 and A.7)		
6.2	Determination of ACCESSIBLE parts (see Form A.6)		
6.3	Permissible limits for ACCESSIBLE parts		
6.3.1	Values in NORMAL CONDITION (see Form A.7)		
6.3.2	Values in SINGLE FAULT CONDITION (see Form A.8)		
6.4	Protection in NORMAL CONDITION (see 6.8 and 8.1)		
6.5	Protection in SINGLE FAULT CONDITION Additional protection is provided by – one or more of 6.5.1 to 6.5.3 or – automatic disconnection of the supply		
6.5.1	Protective earthing ACCESSIBLE conductive parts – bonded to the protective conductor terminal or – separated by screen or BARRIER from parts which are HAZARDOUS LIVE (For indirect bonding of measurement and test equipment see 6.5.1.4)		
6.5.1.1	PROTECTIVE BONDING PROTECTIVE BONDING consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses		
6.5.1.2	Bonding impedance of plug-connected equipment (see Form A.9)		
F			
6.5.1.3	Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT (see Form A.9)		
F			
6.5.1.4	Indirect bonding for measuring and test equipment (see Form A.9)		
F			

Result: P = Pass F = Fail NA = Not Applicable

Clause Subclause	Requirement	Result	Comments
6.5.2	DOUBLE INSULATION and REINFORCED INSULATION (see 6.7, 6.8 and 6.9.2)		
6.5.3	PROTECTIVE IMPEDANCE (see Form A.10)		
F	Components wires and connections are RATED as required		
6.5.4	Built-in equipment (AM 1 only) or Built-in panel meters		
(AM 2)	If, after building in, the requirements of 6.5.1 to 6.5.3 are not met:		
(AM 2)	– equipment (AM 1 only) or		
	– panel meter		
	– has no ACCESSIBLE conductive parts		
	– has basic insulation of ACCESSIBLE surfaces		
	– has DOUBLE/REINFORCED INSULATION of ACCESSIBLE surface of parts intended to be grasped		
6.6	External circuits		
6.6.1	Separation of internal circuits (see list in Forms A.1 and A.5)		
F	If the other internal circuit exceeds the values of 6.3.2 in NORMAL CONDITION and only BASIC INSULATION:		
	a) short circuit could not make external circuit HAZARDOUS LIVE		
	b) manufacturer's instructions include		
	– a statement that the TERMINAL for external circuits is for use only with equipment which has no live parts which are ACCESSIBLE		
	– the RATING of the insulation required for external circuits		
	– the connection to be used at the remote end of external circuits		
	– the type of equipment which may be connected to the TERMINAL		

Clause Subclause	Requirement	Result	Comments
6.6.2	TERMINALS for external circuits ACCESSIBLE TERMINALS are not HAZARDOUS LIVE except as permitted by 6.1.1 The following terminals are not hazardous live: – PROTECTIVE CONDUCTOR TERMINALS – FUNCTIONAL EARTH TERMINALS – headphone TERMINALS F TERMINALS which receive a charge from an internal capacitor (see Form A.7) High-voltage TERMINALS energized from the interior are – not ACCESSIBLE or – marked (AM 2)		
6.6.3	Circuits with TERMINALS which are HAZARDOUS LIVE These circuits – are not connected to ACCESSIBLE conductive parts or – are connected to ACCESSIBLE conductive parts, but are not mains circuits and have one TERMINAL contact at earth potential No ACCESSIBLE conductive parts are HAZARDOUS LIVE		
6.7	F CLEARANCES and CREEPAGE DISTANCES (see annex D of IEC 61010-1 and Form A.11)		
6.8	F Dielectric strength tests (see annex E of IEC 61010-1 and Form A.12) Protection against the spread of fire (see 9.1)		
6.9	Constructional requirements for protection against electric shock		
6.9.1	General In circuits exceeding the values of 6.3.2: – security of wiring connections – screws securing removable covers – accidental loosening		

Clause Subclause	Requirement	Result	Comments
6.9.2	ENCLOSURES of equipment with DOUBLE INSULATION OR REINFORCED INSULATION		
	ENCLOSURE surrounds all metal parts except for small metal parts which are separated		
	ENCLOSURES or parts made of insulating material		
	Protection for metal ENCLOSURES or parts by:		
	– PROTECTIVE IMPEDANCE		
	or		
	– an insulating coating or BARRIER on the inside		
	or		
	– CLEARANCES and CREEPAGE DISTANCES cannot be reduced by loosening of parts or wires		
6.9.3	Equipment using PROTECTIVE BONDING		
	a) OPERATOR removable parts		
	b) Movable conductive connections		
	c) Exterior metal braids of cables		
	d) Mains passed through the equipment		
	e) Protective earthing conductors green/yellow		
	Exceptions:		
	– earthing braids		
	– internal protective conductors		
	f) Equipment using PROTECTIVE BONDING		
6.9.4 (AM 2)	Over-range indication		
	Unambiguous		
6.10 (AM 2)	Connection to mains supply source (AM 2 only) or Connection to mains supply source and connections between parts of equipment		
6.10.1	Mains supply cords		
	RATED for maximum equipment current (see 5.1.3 c))		
	Cable complies with IEC 60227 or IEC 60245 or is a certified cord		
	(AM 2) Heat resistant if likely to contact hot parts		
	(AM 2) Temperature RATING (cord and inlet)		
	Green/yellow used only for connection to PROTECTIVE CONDUCTOR TERMINALS		

Clause Subclause	Requirement	Result	Comments
6.10.2 6.10.2.1 6.10.2.2	Combination of conductors (AM 1 only):		
	– all have same degree of insulation		
	or		
	– no hazard from short circuits		
	Detachable cords with IEC 60320 mains connectors:		
	– comply with IEC 60799		
	or		
	– have the current RATING of the mains connector		
	Fitting of non-detachable mains supply cords		
	Cord entry		
	Non-detachable cord protection:		
	– inlet smoothly rounded with radius $\geq 1,5 D$		
	or		
	– insulated cord guard protruding $\geq 5 D$		
	Cord anchorage		
	The protective earth conductor is the last to take the strain		
	Cord anchorages:		
	– the cord is not clamped by direct pressure from a screw		
	– knots are not used		
	– cannot push the cord into the equipment to cause a hazard		
	– no failure of cord insulation in anchorage with metal parts		
	– compression bushing:		
	a) clamps all types and sizes of mains cords and		
	b) is suitable		
	i) for connection to TERMINALS provided		
	or		
	ii) it is designed for screened mains cord		
	– cord replacement does not cause a hazard and method of strain relief is clear		
F	Push-pull test (see Form A.13)		

Clause Subclause	Requirement	Result	Comments
6.10.3	Plugs and connectors		
	a) Mains supply plugs, connectors etc., comply with relevant specifications		
	b) If equipment supplied at voltages below 6.3.2.1:		
	– plugs of mains supply cords do not fit mains sockets above RATED supply voltage		
	– mains type plugs used only for connection to mains supply		
	c) Plug pins which receive a charge from an internal capacitor (see Form A.7)		
	d) Accessory mains socket outlets:		
	– if a standard mains plug is accepted, there is a marking (see 5.1.3e))		
	– input has a protective earth conductor if outlet has earth TERMINAL contact		
6.11	TERMINALS		
6.11.1	ACCESSIBLE TERMINALS		
	a) No risk of accidental contact (see also 5.1.6 c))		
	b) Will not work loose		
6.11.2	PROTECTIVE CONDUCTOR TERMINAL		
	a) Appliance inlet (no requirement)		
	b) For rewirable cords and PERMANENTLY CONNECTED EQUIPMENT, PROTECTIVE CONDUCTOR TERMINAL is close to mains supply TERMINALS		
	c) If no mains supply is required, any PROTECTIVE CONDUCTOR TERMINAL is		
	– near TERMINALS of circuit for which protective earthing is necessary		
	– external if other TERMINALS external		
	d) Equivalent current-carrying capacity to mains supply TERMINALS		
	e) Soldered connections:		
	– independently secured		
	– not used for other purposes		
	– screw connections are secured		

Clause Subclause	Requirement	Result	Comments
(AM 2)	f) Contact surfaces are metal		
	g) If plug-in, makes first and breaks last		
	h) Protective conductor of measuring circuit:		
	– current RATING		
	– protective bonding:		
	i) not interrupted		
	or		
	ii) indirect bonding		
6.11.3	FUNCTIONAL EARTH TERMINALS		
	Independent connection		
6.11.101	Connection of non-detachable mains cords to TERMINALS		
	Does not require special preparation of the conductors		
6.12	Disconnection from supply source		
6.12.1	General		
	Disconnection device provided		
6.12.1.1	Exception to 6.12.1		
	Short circuit or overload cannot cause a hazard		
6.12.2	Requirements according to type of equipment		
6.12.2.1	PERMANENTLY CONNECTED EQUIPMENT		
	– switch or circuit-breaker is part of the equipment		
	or		
	– documentation specifies switch location and marking		
6.12.2.2	Single-phase cord-connected equipment		
	– switch or circuit-breakers		
	or		
	– appliance coupler (disconnectable without TOOL)		
	or		
	– separable plug (without locking device)		
6.12.2.3	Hazards arising from function		
	Emergency switch		
	Emergency switch ≤1 m from the moving part		

Clause Subclause	Requirement	Result	Comments
6.12.3	Disconnecting devices		
	Electrically close to the supply		
6.12.3.1	Switches and circuit-breakers		
	When used as disconnection device:		
	– meets IEC 60947-1 and IEC 60947-3		
	– contact separation		
	– contact position evident in off position		
	– marked to indication function		
	– not incorporated in mains cord		
	– does not interrupt protection earth conductor		
	– if has other contacts, meets separation requirements of 6.6 and 6.7		
6.12.3.2	Appliance couplers and plugs		
	Where an appliance coupler or separable plug is used as the disconnecting device (see 6.12.2.2):		
	– readily identifiable and easily reached by the OPERATOR		
	– single-phase PORTABLE EQUIPMENT cord length ≤3 m		
	Protective earth conductor connected first and disconnected last		
6.12.101	Disconnection by interruption of the mains supply		
F	Power interruption and partial interruption (see Form A.1, 7.2.101.4 and 11.102)		
7	Protection against mechanical hazards		
7.1	General		
	Conformity is checked by 7.2 to 7.5		
7.1.101	Door closure and retaining mechanism		
	SINGLE FAULT CONDITION		
	Threaded parts		

Clause Subclause	Requirement	Result	Comments
7.2	Moving parts		
	Moving parts not able to crush, etc. (see also 6.12.2.3)		
(AM 2)	If OPERATOR access permitted:		
	a) access requires TOOL		
	b) statement about training		
	c) warning markings or symbol 14		
7.2.101	Powered doors		
7.2.101.1	Shut-down device		
	a) residual movement		
	b) returns to safe condition		
	c) key, etc. for reset		
7.2.101.2	Door motion reversal and stoppage		
	F Device reverses the motion of the door upon encountering an obstruction (see Form A.30)		
7.2.101.3	Sliding doors		
	F Door speed and distance (see Form A.30)		
7.2.101.4	Interruption of power supply		
	Emergency shut-down device operates		
7.2.102	Bell-shaped PRESSURE VESSELS		
	– guard in place		
	– two hands > 1 m apart		
	Shut-down device provided (see 7.2.101.1)		
	a) residual movement		
	b) return to safe condition		
	c) key, etc. for reset		
	F Motion reversal and stoppage (see Form A.30 and 7.2.101.2)		
	F Sliding door loss of power (see Form A.30 and 7.2.101.3)		
	Emergency shut-down device on interruption of power supply, see 7.2.101.4		

Clause Subclause	Requirement	Result	Comments
7.3	Stability		
	Marking of non-automatic means		
	Conformity tests:		
	– 10° tilt test		
	– multi-directional force test		
	– downward force test		
7.4	Provisions for lifting and carrying		
	Handles or grips withstand four times mass		
	Equipment ≥18 kg:		
	– has means for lifting or carrying		
	or		
	– directions in documentation		
7.4.101	Provisions for transferring the LOAD into and out of the AUTOCLAVE		
	Protection against mechanical hazards		
	LOAD location and retention		
	Prevention of shelf tilting or disengaging		
7.5	Expelled parts		
	Equipment contains or limits the energy		
	Protection not removable without the aid of a TOOL		
7. 101	Door interlocks		
7. 101.1	General		
	See f) for AUTOCLAVES < 50 bar litres:		
	a) interlocks fitted, application of a 1 000 N force does not permit access		
	b) no steam or compressed air entering or generated until door closed with pressure retaining parts engaged (>50 bar litres)		
	c) interlock failure OPERATING CYCLE prevented		
	d) pressure-retaining parts not fully released until CHAMBER vented		
	e) seal not broken before pressure within 0,2 bar of atmospheric (>50 bar·litres)		

Clause Subclause	Requirement	Result	Comments
7. 101.2	f) AUTOCLAVES <50 bar·litres:		
	– meet a), c) and d) above		
	or		
	– vent CHAMBER before access to the door release		
	Door interlocks for AUTOCLAVES specified for use with fluids in containers		
	a) door opening prevented until specified temperature reached		
	b) interlock for unvented containers cannot be released until specified temperature reached		
	Door interlocks for double-ended AUTOCLAVES		
	OPERATOR cannot operate remote door (except automatic loading where OPERATOR not involved)		
	Doors with inflatable or pressure-activated seals		
7. 101.3	If pressure falls below minimum:		
	a) OPERATING CYCLE terminates		
	b) alarm indicates fault condition		
	c) door remains closed		
	d) fluid entry into CHAMBER prevented		
	e) no hazard is caused		
	Prevention of door closure		
	Device to prevent door closing, with lock and dedicated key		
	or		
	– Emergency shutdown control operable from within the CHAMBER		
7. 102	or		
	– CHAMBER depth < 1 m and volume < 0,65 m ³		
	Doors with inflatable or pressure-activated seals		
	If pressure falls below minimum:		
	a) OPERATING CYCLE terminates		
	b) alarm indicates fault condition		
	c) door remains closed		
	d) fluid entry into CHAMBER prevented		
	e) no hazard is caused		
	Prevention of door closure		
7. 103	Device to prevent door closing, with lock and dedicated key		
	or		
	– Emergency shutdown control operable from within the CHAMBER		
	or		
	– CHAMBER depth < 1 m and volume < 0,65 m ³		
	Mechanical resistance to shock, vibration and impact (AM 1 only)		
	or		
	(AM 2) Mechanical resistance to shock and impact		
	F After the tests of 8.1 to 8.4 (see Form A.11):		
	F – voltage tests (see Form A.12)		
8	– inspection, equipment meets the following requirements:		

Clause Subclause	Requirement	Result	Comments
9	a) hazardous live parts not ACCESSIBLE		
	b) ENCLOSURE shows no cracks (hazard)		
	c) CLEARANCES not less than their permitted values (see Form A.11)		
	– BARRIERS not damaged or loosened		
	– no moving parts exposed, except as permitted by 7.2		
	– no damage which could cause spread of fire		
	Equipment temperature limits and protection against the spread of fire		
	9.1 General		
	Conformity is checked by		
	– 9.2 and fault tests of 4.4 (see Forms A.1, A.2 and A.18)		
	or		
	– measurement of CREEPAGE DISTANCE and CLEARANCE and the voltage tests of annex G (see Form A.14)		
	or		
	– method of annex F (see Forms A.15, A.16 and A.17)		
9.2	Asbestos not used for thermal insulation		
	Temperature tests		
9.3	Guards		
	Surfaces liable to exceed 100 °C (see Form A.18):		
	– protected by guards		
	or		
9.4	– marked		
	or		
	– intended to be hot (see 9.1)		
	Guards not removable without TOOL		
	Field-wiring TERMINAL boxes		
	Temperature RATING of the cable is:		
	– marked (see Form A.18)		
	and		
	– adjacent to field-wiring TERMINALS		
	or		
	– visible during and after installation		

Clause Subclause	Requirement	Result	Comments
9.5	Overtemperature protection devices		
F	– fitted, to operate in SINGLE FAULT CONDITION (see Form A.1)		
	– meets 14.3		
	– does not operate in NORMAL USE (see 3.5.6)		
	– if self-resetting, can only be set to operate in SINGLE FAULT CONDITION		
	Protection devices to limit the CHAMBER wall temperature		
	Overtemperature protection:		
	– separate from temperature control		
	– not self-resetting		
	– does not require soldering for resetting		
9.6	Overcurrent protection		
9.6.1	PERMANENTLY CONNECTED EQUIPMENT		
	Device:		
	– fitted within the equipment		
	or		
	– specified in manufacturer's instructions		
9.6.2	Other equipment		
	Protection within the equipment		
	Devices not in the protective conductor		
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase)		
10	Resistance to heat		
10.1	Integrity of CLEARANCE and CREEPAGE DISTANCES (see Form A.11)		
F			
10.2	Resistance to heat of non-metallic ENCLOSURE (see Form A.19)		
F			
10.3	Resistance to heat of insulation material		
	Parts supporting:		
	– parts connected to mains supply		
	– TERMINALS carrying >0,5 A		

Clause Subclause	Requirement	Result	Comments
11	Resistance to moisture and liquids (AM 1 only)		
(AM 2)	Protection against hazards from fluids		
11.1	General		
11.2	F Cleaning (see Form A.20)		
11.3	F Spillage (see Form A.20)		
11.4	F Overflow (see Form A.20)		
11.5	Liquid leakage (AM 1 only)		
11.5.1	F Equipment containing liquid (AM 1 only) (see Form A.20)		
11.5.2	Battery electrolyte (AM 1 only)		
or			
11.5 (AM 2)	Battery electrolyte		
	Battery electrolyte leakage presents no hazard		
11.5.101	Discharge of residual water from the CHAMBER		
	No hazard from discharge		
11.5.102	Indicator and interlock for residual water		
	No hazard if water is present		
11.6	F Specially protected equipment (see Form A.20)		
11.7 (AM 2)	Fluid pressure and leakage		
11.7.1 (AM 2)	Maximum pressure not exceeded		
11.7.2 (AM 2)	Leakage and rupture at high pressure (see Form A.21)		
F	Test to IEC 60335 (refrigeration only)		
11.7.3 (AM 2)	Leakage from low-pressure parts (see Form A.21)		
F			
11.7.4 (AM 2)	Overpressure safety device		
	Where possible to exceed maximum CHAMBER working pressure:		
	– overpressure device fitted		
	and		
	– device set to operate at a pressure $\leq$ the maximum working pressure		
	STERILIZER CHAMBER pressure cannot be more than 10 % above the maximum working pressure		

Result: P = Pass F = Fail NA = Not Applicable

Clause Subclause	Requirement	Result	Comments		
	Safety device drain				
	has:				
	– drain connection at lowest point				
	and				
	– discharge to a safe place				
	or				
	– other provisions				
	Safety device does not operate in NORMAL USE				
	and				
	– shall comply with the following:				
	– positioned close to parts intended to be protected				
	– properly mounted				
	– direct short pipe				
	– access for inspection, maintenance and repair				
	– adjustment only with TOOL				
	– no discharge to person				
	– no hazard from discharge				
	– sufficient discharge capacity				
	– no shut-off valve between protective device and protected parts				
	11.7.101	Instruments and indicating devices			
	If necessary for safety:				
	a) CHAMBER pressure indicator				
	b) jacket pressure indicator				
	c) OPERATING CYCLE counter				
	11.101	Discharge from pressure-venting valves and overpressure safety devices			
	a) Discharge:				
	– no hazard				
	– pipe requirements				
	b) Discharge inside cabinet:				
	– jacket vented				
– cannot reach OPERATOR					

Clause Subclause	Requirement	Result	Comments
11.102	Interruption of supplies and services		
F	Not cause safety systems to be circumvented and no hazard (see Form A.1)		
12	Protection against radiation, including laser sources, and against sonic and ultrasonic pressure		
12.1	General		
12.2	Equipment producing ionizing radiation		
12.2.1	F Ionizing radiation (see Form A.22)		
12.2.2	Accelerated electrons		
12.3	Ultra-violet radiation		(Conformity test under consideration)
12.4	Microwave radiation		(Conformity test and limit of 10 W/m ² are under consideration)
12.5	Sonic and ultrasonic pressure		
12.5.1	Sound pressure level (AM 1 only) (see Form A.23)		
F	or		
(AM 2)	Sound level		
F	(see Form A.23)		
12.5.2	F Ultrasonic pressure (see Form A.23)		
12.6	Laser sources (IEC 60825)		
13	Protection against liberated gases, explosion and implosion		
13.1	Poisonous and injurious gases		
	Any data/test reports used to demonstrate conformity attached		
13.2	Explosion and implosion		
13.2.1	Components		
	Components liable to explode:		
	– pressure release device		
	or		
	– the apparatus incorporates OPERATOR protection (see also 7.5)		
	Pressure release device:		
	– discharge without danger		
	– not obstructable		

Clause Subclause	Requirement	Result	Comments
13.2.2	Batteries Explosion or fire hazard: – protection incorporated in the equipment or – instructions specify batteries and – single component cannot cause hazard (short circuit and open circuit) (see Form A.24, including circuit diagram) – warning marking or symbol 14 Battery compartment design Polarity reversal test		
13.3	Implosion of high-vacuum devices High-vacuum devices: – intrinsically protected and correctly mounted or – ENCLOSURE provides protection: – screen not removable without TOOL – if glass screen, not in contact		
13.101	CHAMBER exhaust system Discharge no hazard		
13.102	LOAD access after a fault No safety device disabled		
13.103	Interruption of supplies and services F (see Form A.1)		
14	Components		
14.1	General Where safety is involved, components meet relevant requirements (see Table 3 of this report and Figure 5 of IEC 61010-1/A2)		
14.2	Motors		
14.2.1	Motor temperatures F (see Form A.25) No hazard from stopped motor Loss of one phase no hazard		

Clause Subclause	Requirement	Result	Comments
14.2.2	Series excitation motors		
14.3	Overtemperature protection devices		
F	Devices operating in a SINGLE FAULT CONDITION (see Form A.26)		
	and have/are:		
	– reliable function		
	– RATED to interrupt maximum voltage and current of circuit		
	– RATED for maximum surface temperature of 4.4.4.2		
	– RATED for maximum temperature of 9.2 for parts in contact with flammable liquid		
	– not self-resetting unless protected part cannot function		
14.4	Fuse holders		
	No access to HAZARDOUS LIVE parts		
14.5	Mains voltage selecting devices		
	Accidental change not possible		
14.6	HIGH INTEGRITY components		
	Used in applicable positions (see Table 3)		
	Complies with IEC publications		
	Not a single electronic device		
14.7	Mains transformers		
14.7.1	Short-circuit tests		
F	Transformers meet 4.4.4.1 to 4.4.4.3. (see Form A.27)		
14.7.2	Overload tests		
	Transformer:		
	– has overtemperature protection meeting 14.3 or		
F	– meets 4.4.4.1 to 4.4.4.3 (see Form A.28)		
14.8	Overpressure safety devices		
	Meets requirements of ISO 4126-1		

Clause Subclause	Requirement	Result	Comments
14.101	PRESSURE VESSEL		
	– complies with applicable PRESSURE VESSEL regulations and codes		
14.102	or		
	– complies with codes indicated by purchaser		
	Visibility and readability of instruments and indicating devices		
	Safety related indicating devices:		
14.103	– readily seen		
	– readable at 1 m with 215 lux, except OPERATING CYCLE counters		
14.104	Access ports		
	Adequate strength and interlock system		
14.105	Control systems		
	Operator cannot set to hazardous conditions		
	Increasingly severe constraints for operating cycle:		
	a) initiation		
	b) selection		
	c) manual advance		
	d) changing programme		
	Different keys, etc. for b), c) and d) above		
	Termination does not require special TOOL, etc.		
	Safety devices cannot be circumvented:		
	– uses automatic controllers		
	– during manual advance, manual mode disables automatic controller		
	Microprocessors		
	Failure of a microprocessor cannot cause a hazard		

Clause Subclause	Requirement	Result	Comments
15	Protection by interlocks		
15.1	General		
	Interlocks are designed to remove a hazard before OPERATOR exposed		
	If exception for ≤ 2 s (AM 1 only):		
	– warning marking		
	and		
	– after 2 s:		
	i) temperatures of easily touched parts meet Table 3 of IEC 61010-1		
	ii) moving parts meet 7.2 of IEC 61010-1		
15.2	Prevention of reactivation		
15.3	Reliability		
16 (AM 2)	Measuring circuits		
16.1 (AM 2) F	Current measuring circuits (see Form A.29)		
Annex K (AM 2)	Routine tests		
	Manufacturer's declaration		

Summary of SINGLE FAULT CONDITIONS applied (4.4.2)

(see Form A.2 for details of tests)

Sub-clause	Title	Does not apply	Carried out	Comments
4.4.2.1	PROTECTIVE IMPEDANCE			
4.4.2.2	Protective conductor			
4.4.2.3	Equipment or parts for short-term or intermittent operation			
4.4.2.4	Motors including failure of one phase of a multiphase supply			
4.4.2.5	Capacitors			
4.4.2.6	Mains transformers Attach drawing of mains Tx's showing all protective devices (see Forms A.27 and A.28)			
4.4.2.7	Outputs			
4.4.2.8	Equipment for more than one supply			
4.4.2.9	Cooling – air holes closed – fans stopped – coolant stopped			
4.4.2.10	Heating devices – timer overridden – temperature controller overridden – loss of cooling liquid – pressure controller overridden – loss of feed water			
4.4.2.11	Insulation between circuits and parts			
4.4.2.12	Interlocks			
4.4.2.101	Failure or partial failure of mains supply			
4.4.2.102	Failure of other supplies			
List below all SINGLE FAULT CONDITIONS not covered by 4.4.2.1 to 4.4.2.102				

Form A.2

4.4 Testing in SINGLE FAULT CONDITION – Results

Test subclause	Fault No.	Fault description	T _d 4.4.3 (note 1)	How was test terminated Comments	Meets 4.4.4
1) T _d = Test duration in h:min:s Record dielectric strength test on Form A.12 and temperature tests on Form A.18. Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.					

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

5.1.3.c Mains supply

Marked RATING _____ _____ Phase _____ Hz _____ A _____ W _____ VA						NOTE Measurements are required only for marked RATINGS
Test No.	Voltage V	Frequency Hz	Current I	Power in W	Power in VA	Comments
General comments:						

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

5.3 Durability of markings

Table A.4.1 – Marking method (note)
NOTE Where applicable include print method, label material, ink or paint type, fixing method, adhesive and surface to which marking is fixed.

Table A.4.2 – Agent
A (specify agent)
B (specify agent)
C Water
D Isopropyl alcohol

Marking location	Marking method (see Table A.4.1)
Identification (5.1.2)	
Mains supply (5.1.3)	
Fuses (5.1.4)	
Measuring circuit TERMINALS (5.1.4)	
TERMINALS and operating devices (5.1.6)	
Double/reinforced equipment (5.1.7)	
Battery charging (5.1.8)	
Warning marking (5.2)	

Method (Table A.4.1)	Test agent (Table A.4. 2)	Remains legible Pass/Fail	Label loose Pass/Fail	Curled edges Pass/Fail	Comments

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

Clause 6 – Protection against electric shock – Block diagram of system

POLLUTION DEGREE: _____ INSTALLATION CATEGORY (OVERVOLTAGE CATEGORY): _____

Location or description	Insulation type (note 1)	Maximum working voltage (note 2) V	CREEPAGE DISTANCE (note 3)				CLEARANCE (note 3) mm	Test voltage (note 2) V	Comments
			PWB mm	CTI	Other mm	CTI			
NOTE 1 Type of insulation: BI = BASIC INSULATION RI = REINFORCED INSULATION DI = DOUBLE INSULATION SI = SUPPLEMENTARY INSULATION PI = PROTECTIVE IMPEDANCE NOTE 2 Types of voltage Peak impulse test voltage (pulse) d.c. r.m.s. peak NOTE 3 INSTALLATION CATEGORIES (OVERVOLTAGE CATEGORIES) OR POLLUTION DEGREES which differ from these should be shown under "Comments".									

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

6.1.1 Exceptions**6.2 Determination of ACCESSIBLE parts****List of ACCESSIBLE parts**

Item	Description	Determination method (note 5)	Exception under 6.1.1 (note 4)

NOTE 1 Test fingers and pins are to be applied without force unless a force is specified (see 6.2.1).

NOTE 2 Special consideration should be given to inadequate insulation and high voltage parts (see 6.2).

NOTE 3 Parts are considered to be ACCESSIBLE if they could be touched in the absence of any covering which is not considered to provide suitable insulation (see note to paragraph 1 of 6.4).

NOTE 4 Capacitor test may be required (see Form A.7).

NOTE 5 The determination methods are: visual; rigid test finger; jointed test finger; pin 3 mm diameter; pin 4 mm diameter.

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

6.1.1 Exceptions
6.3.1 Values in NORMAL CONDITION
6.6.2 TERMINALS for external circuit
6.10.3 Plugs and connections

11.2 Cleaning
11.3 Spillage
11.4 Overflow

Item (see Form A.6)	Voltage			Current			Capacitance		10 s test (note)			Comments	
	V r.m.s	V peak	V d.c.	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	μC	mJ	V	μC		mJ
NOTE A 5 s test is specified in 6.10.3 c).													

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

LICENSED TO MECON Limited. - RANCHI/BANGALORE
FOR INTERNAL USE AT THIS LOCATION ONLY, SUPPLIED BY BOOK SUPPLY BUREAU

LICENSED TO MECON Limited. - RANCHI/BANGALORE
FOR INTERNAL USE AT THIS LOCATION ONLY, SUPPLIED BY BOOK SUPPLY BUREAU

LICENSED TO MECON Limited. - RANCHI/BANGALORE
FOR INTERNAL USE AT THIS LOCATION ONLY, SUPPLIED BY BOOK SUPPLY BUREAU

6.5.1.1 Cross-sectional area bonding conductors

Conductor location	Cross-sectional area mm ²	Result Pass/Fail

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

6.5.1.2 Bonding impedance of plug-connected equipment

ACCESSIBLE part under test	Test current A	Voltage attained after 1 min V	Calculated resistance (Maximum allowed 0,1 Ω)	Result Pass/Fail

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

6.5.1.3 Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT

ACCESSIBLE part under test	Test current A	Voltage attained after 1 min (Maximum 10 V) V	Result Pass/Fail

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

6.5.1.4 Indirect bonding for measuring and test equipment

ACCESSIBLE part under test	Voltage attained	Time for voltage to drop to allowable levels	Result Pass/Fail
a) Voltage limiting device			
	Voltage applied V	Time for device to trip	
b) Voltage-sensitive tripping device			

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

6.5.3 PROTECTIVE IMPEDANCE

A HIGH INTEGRITY single component		
Component	Location	Comments

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

A combination of components		
Component	Location	Comments

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

A combination of BASIC INSULATION and a current or voltage limiting device		
Component	Location	Comments

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

6.7 CLEARANCES and CREEPAGE DISTANCES
 8 Mechanical resistance to shock and impact
 10.1 Integrity of CLEARANCES and CREEPAGE DISTANCES

Location (see Fom A.5)	Measured (initial - 6.7)		Result Pass/ Fail	Mechanical tests (note)						Measured after test (if required)		Result Pass/ Fail	Comments
	CREEPAGE DISTANCE mm	CLEARANCE mm		Applied force (6.7) N	Rigidity (8.1)	Impact hammer (8.2)	Drop 8.1.4 and 8.4.2 Normal Hand-held		40 °C ambient test (10.1)	CREEPAGE DISTANCE mm	CLEARANCE mm		

NOTE Refer to Form A.12 for dielectric strength tests following the above tests.

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

6.8 Dielectric strength tests

Location (see Form A.5 and/or fault Form A.2)	Working voltage V	Test voltage r.m.s./peak/d.c.	Result Pass/Fail	Comments (note)

NOTE Describe conditions prior to testing:

A = Humidity preconditioning (6.8.2 and 6.8.3)

B = ENCLOSURE tests (clause 8)

C = Resistance to heat of non-metallic ENCLOSURES (10.2)

D = After single faults (4.4)

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

6.10.2.2 Cord anchorage

Location	Mass kg	Pull N	Result Pass/Fail	Torque Nm	Result Pass/Fail	Comments

General comments:

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

Form A.14

9.1 General

Annex G – Test details

Between parts and circuits		CREEPAGE DISTANCE mm	CLEARANCE mm	Working voltage V	Test voltage r.m.s./peak/d.c. V	Result Pass/Fail	Comments

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

9.1 General

Annex F – Test details

F.2.1 Limited circuits

Circuit/ Location	Open- circuit voltage r.m.s./d.c. V	Energy limitation					Comments
		Maximum current A	Maximum available power VA	Overload protection	Limited circuit Yes/No	Test to 4.4.3	

General comments:

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

F.2.2 Unlimited circuit

Location/ Circuit	Operator controlled switch	Overcurrent protection	Over- temperature protection	Comments

General comments:

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

9.1 General**Annex F – Test details** (continued)**F.4.2 Constructional details****F.4.3 Enclosures**

Clause	Requirement	Result Pass/Fail	Comments
F.4.2.1	Connectors comply with IEC standards		
F.4.2.2	Printing wiring boards are flame RATED FV 0 or FV 1		
F.4.2.3	ENCLOSURE surrounds unlimited circuits		
F.4.2.4	Wires comply with IEC standards		
F.4.3.1	High-current devices: – door or – cover and – means to hold door or cover closed or – gap less than limits		
F.4.3.2	Bottom of ENCLOSURES: – no opening or – with Table F.1 and Figure F.1 or – placement of components complies with Figure F.2		
F.4.3.3	Baffle or flame BARRIER: – ENCLOSURE made of metal or – ENCLOSURE made of non-metallic material (FV 0 or FV 1)		

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

9.1 General

Annex F – Test details (continued)

F.4.3 ENCLOSURES (F4.3.3 test to IEC 60707)

Material tested: _____		Overall result Pass/Fail		
Generic name: _____				
Material manufacturer: _____				
Type: _____				
Colour: _____				
Conditioning details: _____				

		Sample 1	Sample 2	Sample 3
Thickness of specimen	mm			
Duration of flaming after first application	s			
Duration after flaming plus glowing after second application	s			
Specimen burns to holding clamp	Yes/No			
Cotton ignited	Yes/No			
Sample result	Pass/Fail			

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

9.2 Temperature tests

9.3 Guards

9.4 Field wiring TERMINAL boxes

Operating conditions:

Frequency: _____ Hz; _____ Duration: _____ h _____ min

Voltage: _____ V Test room ambient: _____ °C

Part	t_m °C	t_c °C	t_a °C	Result Pass/ Fail	Comments
NOTE 1 See also 14.1 with reference to component operating conditions.					
NOTE 2 t_m = measured temperature					
t_c = corrected maximum temperature (t_m °C + 40 °C - test room ambient)					
t_a = maximum permitted temperature					

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

10.2 Resistance to heat of non-metallic enclosures

Test method used: Non-operative treatment [] Empty ENCLOSURE [] Operative treatment []			
Temperature during test: _____ °C			
ENCLOSURE samples tested were:			
Description	Material	Result Pass/Fail	Comments
Dielectric strength test (6.8.4): _____ V _____ r.m.s./peak/d.c. Comments:			

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

Form A.20

8 Mechanical resistance to shock, vibration and impact (AM 1 only)**8 Mechanical resistance to shock and impact (AM 2 only)****11 Resistance to moisture and liquids (AM 1 only)****11 Protection against hazards from fluids (AM 2 only)**

Voltage tests can be carried out once after performing the tests of clause 8 and clause 11. However, if voltage tests are carried out separately after each set of tests, two forms can be used.

Location (see Form A.5)	Clause 8 tests				Clause 11 tests					Working voltage (note 2) V	Test voltage (note 2) V	Result Pass/ Fail	Comments				
	Rigidity (8.1)	Impact hammer (8.2)	Drop (8.4.1 and 8.4.2)		Cleaning (11.2)	Spillage (11.3)	Overflow (11.4)	Equipment plus liquid (11.5.1 and note 1)	IEC 60529 (11.6)								
			Normal	Hand-held													

NOTE 1 Not for amendment 2.

NOTE 2 Use r.m.s., d.c or peak to indicate the test voltage used.

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

11.7.2 Leakage and rupture at high pressure (AM 2)

Part	Maximum permissible working pressure MPa	Factor (Figure 4 of IEC 61010-1)	Test pressure MPa	Leakage test Pass/Fail	Burst test Pass/Fail	Comments

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

11.7.3 Leakage from low-pressure parts (AM 2)

Part	Test pressure MPa	Leakage test Pass/Fail	Comments

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

12.2.1 Ionizing radiation

Locations tested	Measured values μSv/h	Result Pass/Fail	Comments

General comments:

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

12.5.1 Sound pressure level (AM 1 only)

12.5.1 Sound level (AM 2 only)

Locations tested	Measured values dBA	Calculated maximum sound pressure level (AM 2)
1 m from the enclosure (AM 1 only)		
At OPERATOR'S normal position and at bystanders' positions (AM 2)		
a)		
b)		
c)		
d)		
e)		
Result Pass/Fail (AM 1 only)		
Comments:		

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

12.5.2 Ultrasonic pressure

Locations tested	Measured values		Comments
	dB	kHz	
At OPERATOR'S normal position			
At 1 m from the ENCLOSURE			
a)			
b)			
c)			
d)			
e)			
NOTE No limit is specified at present, but a limit of 110 dB above the reference pressure value of 20 µPa is under consideration for applicable frequencies between 20 kHz and 100 kHz.			
Result Pass/Fail			
Comments:			

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

13.2.2 Batteries

Battery load and charging circuit diagram:

Battery type:

Battery manufacturer/model/catalogue No.:

Battery ratings:

Reverse polarity instalment test – Result (Pass/Fail):

Single components failures	Result Pass/Fail	
Component	Open circuit	Short circuit

Comments:

Tested by: Date: Test equipment No. (Table 2)

4.4.2.4 SINGLE FAULT CONDITIONS, motors

14.2.1 Motor temperatures

Operating conditions:

Frequency: _____ Hz; _____ Duration: _____ h _____ min

Voltage: _____ V Test room ambient: _____ °C

Motor No. and location	Insulation class (IEC 60085)	t_m °C	t_c °C	t_a °C	Result Pass/Fail	Comments

NOTE

t_m = Measured temperature

t_c = Corrected maximum temperature (t_m °C + 40 °C - test room ambient °C)

t_a = Maximum allowed temperature

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

14.3 Overtemperature protection devices

Component	Type (note)	Result Pass/Fail	Comments
NOTE SR = self-resetting (200 times) NSR = non-self-resetting (10 times) NR = non-resetting (1 time)			

General comments:

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

4.4.2.6 Mains transformer

14.7.1 Short-circuit tests (for mains transformers)

Type: _____ Manufacturer: _____				
Tested ☐ in equipment or ☐ on bench				
Optional – Insulation class (IEC 60085) of the lowest rated winding:				
Winding identification				
Type of protector for winding (note 1)				
Elapsed time				
Current A	Primary			
	Secondary			
Winding temperature °C (note 2)	Primary			
	Secondary			
Tissue paper/cheesecloth OK? (Pass/Fail)				
Voltage tests (note 3)				
Primary to secondary _____ V _____				
Primary to core _____ V _____				
Secondary to secondary _____ V _____				
Secondary to core _____ V _____				
Result (Pass/Fail)				
NOTE 1 Primary fuse PF / ()A Secondary fuse SF / ()A Overtemperature protection OP / ()°C Impedance protection Z NOTE 2 Indicate method of measurement TC = with thermocouple R = resistance method If resistance method is used, record resistance in cold and warm condition under "Comments". NOTE 3 Record the voltage applied and the type of voltage (r.m.s./d.c./peak) and for results use: NB = no breakdown or B = breakdown.				
Comments:				

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

4.4.2.6 Mains transformer**14.7.2 Overload tests (for mains transformers)**

Type: _____ Manufacturer: _____				
Tested ☐ in equipment or ☐ on bench				
Optional – Insulation class (IEC 60085) of the lowest rated winding:				
Winding identification				
Type of protector for winding (note 1)				
Elapsed time				
Current	A	Primary		
		Secondary		
Winding temperature (note 2)	°C	Primary		
		Secondary		
Tissue paper/cheesecloth OK?		(Pass/Fail)		
Voltage tests (note 3)				
Primary to secondary _____ V _____				
Primary to core _____ V _____				
Secondary to secondary _____ V _____				
Secondary to core _____ V _____				
Result		(Pass/Fail)		
NOTE 1 Primary fuse PF / ()A Secondary fuse SF / ()A Overtemperature protection OP / ()°C Impedance protection Z NOTE 2 Indicate method of measurement TC = with thermocouple R = resistance method If resistance method is used, record resistance in cold and warm condition under "Comments". NOTE 3 Record the voltage applied and the type of voltage (r.m.s./d.c./peak) and for results use: NB = no breakdown or B = breakdown.				
Comments:				

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

16.1 Current measuring circuits (AM 2 only)

The test is performed with all types and models of current transformers without internal protection, and which are specified by the manufacturer for use with the equipment.

a) Current transformers

Type/Model	RATED current A	Test current A	Interrupt Yes/No	Result Pass/Fail	Comments

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

b) Range changing switches

Type/Model	Maximum RATED current of switch	Cycling test Pass/Fail	Comments

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

7.2.101.2 Door motion reversal and stoppage

Description where test applied	Force N	Interlocked Yes/No	Reverse motion Yes/No	Result Pass/Fail

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____

7.2.101.3 Sliding doors

Description where test applied	Speed cm/s	Distance moved cm	Result Pass/Fail

Tested by: _____ Date: _____ Test equipment No. (Table 2) _____



Standards Survey

The IEC would like to offer you the best quality standards possible. To make sure that we continue to meet your needs, your feedback is essential. Would you please take a minute to answer the questions overleaf and fax them to us at +41 22 919 03 00 or mail them to the address below. Thank you!

Customer Service Centre (CSC)

International Electrotechnical Commission

3, rue de Varembé
1211 Genève 20
Switzerland

or

Fax to: **IEC/CSC** at +41 22 919 03 00

Thank you for your contribution to the standards-making process.

A Prioritaire

Nicht frankieren
Ne pas affranchir



Non affrancare
No stamp required

RÉPONSE PAYÉE

SUISSE

Customer Service Centre (CSC)
International Electrotechnical Commission
3, rue de Varembé
1211 GENEVA 20
Switzerland



Q1 Please report on **ONE STANDARD** and **ONE STANDARD ONLY**. Enter the exact number of the standard: (e.g. 60601-1-1)

.....

Q2 Please tell us in what capacity(ies) you bought the standard (tick all that apply). I am the/a:

- purchasing agent ☐
 librarian ☐
 researcher ☐
 design engineer ☐
 safety engineer ☐
 testing engineer ☐
 marketing specialist ☐
 other.....

Q3 I work for/in/as a:
(tick all that apply)

- manufacturing ☐
 consultant ☐
 government ☐
 test/certification facility ☐
 public utility ☐
 education ☐
 military ☐
 other.....

Q4 This standard will be used for:
(tick all that apply)

- general reference ☐
 product research ☐
 product design/development ☐
 specifications ☐
 tenders ☐
 quality assessment ☐
 certification ☐
 technical documentation ☐
 thesis ☐
 manufacturing ☐
 other.....

Q5 This standard meets my needs:
(tick one)

- not at all ☐
 nearly ☐
 fairly well ☐
 exactly ☐

Q6 If you ticked NOT AT ALL in Question 5 the reason is: (tick all that apply)

- standard is out of date ☐
 standard is incomplete ☐
 standard is too academic ☐
 standard is too superficial ☐
 title is misleading ☐
 I made the wrong choice ☐
 other

Q7 Please assess the standard in the following categories, using the numbers:

- (1) unacceptable,
 (2) below average,
 (3) average,
 (4) above average,
 (5) exceptional,
 (6) not applicable

- timeliness.....
 quality of writing.....
 technical contents.....
 logic of arrangement of contents
 tables, charts, graphs, figures.....
 other

Q8 I read/use the: (tick one)

- French text only ☐
 English text only ☐
 both English and French texts ☐

Q9 Please share any comment on any aspect of the IEC that you would like us to know:

.....



ISBN 2-8318-4987-X



ICS 19.080; 11.080.10
