TECHNICAL REPORT

IEC TR 61010-3-042

First edition
1999-10

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

Part 3-042: Conformity verification report for IEC 61010-2-042:1997, Particular requirements for autoclaves and sterilizers using toxic gas for the treatment of medical materials, and for laboratory processes

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

Partie 3-042:
Rapport de vérification de la conformité de la CEI 61010-2-042:1997, Prescriptions particulières pour autoclaves et stérilisateurs utilisant des gaz toxiques pour le traitement des matériels à usage médical et durant les procédés de traitement de laboratoire

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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.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE –

Part 3-042: Conformity verification report for IEC 61010-2-042:1997, Particular requirements for autoclaves and sterilizers using toxic gas for the treatment of medical materials, and for laboratory processes

FOREWORD

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Technical reports do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

IEC 61010-3-042, 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
66/194/CDV	66/218/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 61010-2-042: 1997,

and

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.

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 61010-2-042
Safety requirements for electrical equipment
for measurement, control, and laboratory use:
Part 2-042: Particular requirements for autoclaves and sterilizers using toxic gas
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 61010-1:1990 + amendment 1:1992+ amendment 2:1995
.....	IEC 61010-2-042: 1997
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 ..... :	☐ Measurement ☐ Control ☐ 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

Document No.	Document description	Number of pages

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		
	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
	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		
F	The measured value not more than 110 % (see Form A.3)		
5.1.4	**Fuses**		
	OPERATOR replaceable fuse marking (see also 5.4.5)		
5.1.5	**Measuring circuit TERMINALS**		
	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		
	INSTALLATION CATEGORY marked		
	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		
	Mains supply TERMINALS identified		
	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		
	aa) NORMAL USE setting a control could cause a harzard, 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**		
	Markings comply with the regulations and codes applicable in the country of intended use		
	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		
	– 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)		
	– instruction to lock and retain key		
	– to indicate any hazardous properties of the sterilant gas		
	– LOAD type warning		
5.3	**Durability of markings**		
F	The required markings remain clear and legible in NORMAL USE (see Form A.4)		

Clause Subclause	Requirement	Result	Comments
5.4	**Documentation**		
5.4.1	**General**		
	Equipment is accompanied by documentation which includes		
	– technical specification		
	– instructions for use		
	– name and address of manufacturer or supplier		
	– PRESSURE VESSEL conformity declaration		
	– emergency guidelines		
	– instructions on warning signs for country of use		
	Definition of INSTALLATION CATEGORY		
	Warning statements and a clear explanation of warning symbols:		
	– provided in the documentation or – information is marked on the equipment		
5.4.2	**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		
	– the RATED maximum leak rate:		
	a) air in		
	b) air or sterilant out		
5.4.3	**Equipment installation**		
	Documentation includes instructions for		
	– assembly, location and mounting		
	– protective earthing		

Clause Subclause	Requirement	Result	Comments
	– connections to supply		
	– ventilation requirements		
	– special services		
	– maximum sound power level		
	– instructions about sound pressure		
	Additional for permanently connected equipment:		
	– supply wiring		
	– any external switch or circuit-breaker (including location)		
	– any external overcurrent protection		
5.4.3.1	**Assembly and installation instructions**		
	Instructions include		
	a) – location		
	– mounting		
	– maintenance space		
	b) – component weights		
	– overall weight		
	c) floor loading		
	d) assembly		
	e) – mains supply		
	– mains connections		
	f) protective earthing		
	g) – sound power data		
	– sound power requirements		
	h) hazardous gas atmospheres		
5.4.3.2	**Requirements for special services**		
	Installation instructions for		
	a) non-recirculating ventilation system		
	b) separate space ventilation sensing device		
	c) non-recirculating local exhaust system		
	d) drainage system		

Clause Subclause	Requirement	Result	Comments
	e) drain venting system		
	f) CHAMBER exhaust system		
	g) – steam supply		
	– steam drain		
5.4.3.3	**For permanently connected equipment**		
	– external switch or circuit breaker		
	– external overcurrent protection device		
5.4.4	**Equipment operation**		
5.4.4.1	**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) limits for intermittent operation		
	e) explanation of symbols used		
	f) cleaning		
	g) lockable door closure stop:		
	– correct use		
	– retain key		
	h) safe use of the overide key		
	i) action in case of malfunction		
5.4.4.2	**Consumable materials**		
	Instructions given for inspection, replacement and storage		

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

Clause Subclause	Requirement	Result	Comments
5.4.4.3	**OPERATOR training**		
	Instructions for RESPONSIBLE BODY:		
	a) to arrange operation and safety training		
	b) to supervise sterilization procedures		
	c) comprehensive instructions for personnel working with toxic gas:		
	– health hazard		
	– national regulations		
	– safe use		
	– leak detection		
	d) in-service programmes:		
	– conducted		
	– attendance records		
	– evidence of understanding		
5.4.5	**Equipment maintenance**		
	Instructions include		
	– special precautions for safety		
	– threaded parts		
	– safety devices		
	– sufficient preventive maintenance and inspection information		
	– replacement of hoses, etc.		
	– specific battery type		
	– any manufacturer specified parts		
	– RATING and characteristics of fuses		
6 **F**	**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)		

Clause Subclause	Requirement	Result	Comments
6.2	**Determination of ACCESSIBLE parts**		
F	(see Form A.6)		
6.3	**Permissible limits for ACCESSIBLE parts**		
6.3.1	**Values in NORMAL CONDITION**		
F	(see Form A.7)		
6.3.2	**Values in SINGLE FAULT CONDITION**		
F	(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		
F	(see Form A.9)		
6.5.1.3	Bonding impedance of PERMANENTLY CONNECTED		
F	EQUIPMENT (see Form A.9)		
6.5.1.4	Indirect bonding for measuring and test equipment		
F	(see Form A.9)		
6.5.2	**DOUBLE INSULATION and REINFORCED INSULATION** (see 6.7, 6.8 and 6.9.2)		
6.5.3	**PROTECTIVE IMPEDANCE**		
F	(see Form A.10)		
	Components wires and connections are RATED as required		

Clause Subclause	Requirement	Result	Comments
6.5.4	**Built-in panel meters** If, after building in, the requirements of 6.5.1 to 6.5.3 are not met, the 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**		
F	(see list in Forms A.1 and A.5)		
	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		
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		

Clause Subclause	Requirement	Result	Comments
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	**CLEARANCES and CREEPAGE DISTANCES**		
F	(see annex D of IEC 61010-1 and Form A.11)		
6.8	**Dielectric strength tests**		
F	(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		
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		

Clause Subclause	Requirement	Result	Comments
	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	**Over-range indication**		
	Unambiguous		
6.10	**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		
	Heat resistant if likely to contact hot parts		
	Temperature RATING (cord and inlet)		
	Green/yellow used only for connection to PROTECTIVE CONDUCTOR TERMINALS		
	Detachable cords with IEC 60320 mains connectors		
	– comply with IEC 60799 or – have the current RATING of the mains connector		
6.10.2	**Fitting of non-detachable mains supply cords**		
6.10.2.1	**Cord entry**		
	Non-detachable cord protection:		
	– inlet smoothly rounded with radius ≥1,5 D or – insulated cord guard protruding ≥5 D		
6.10.2.2	**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		

Clause Subclause	Requirement	Result	Comments
	– 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)		
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		
F	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		

Clause Subclause	Requirement	Result	Comments
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		
	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		

Clause Subclause	Requirement	Result	Comments
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		
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		

Clause Subclause	Requirement	Result	Comments
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		
7.2	**Moving parts**		
	Moving parts not able to crush, etc. (see also 6.12.2.3)		
	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 the mains supply**		
	Does not cause any safety system to be circumvented and no hazard arises		

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 CHAMBER**		
	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**		
	Interlocks prevent:		
	a) hazardous access, 1 000 N applied		
	b) no gas enters CHAMBER until door secured		
	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)		
	f) AUTOCLAVES <50 bar·litres		
	– meet a), c) and d) above or – vent CHAMBER before access to the door release		

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

Clause Subclause		Requirement	Result	Comments
7.101.2		**Door interlocks for double-ended AUTOCLAVES**		
		OPERATOR cannot operate remote door (except automatic loading where OPERATOR not involved)		
7.102		**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 and gas does not escape		
		d) ventilation operates		
		e) sterilant gas isolating valve automatically operated		
		f) complete system is evacuated to the discharge pipe		
		g) if sterilant is flammable, system is purged using air or inert gas		
		h) no hazard is caused		
7.103		**Prevention of door closure**		
		Device to prevent door closing, with lock and dedicated key or – Emergency shutdown control operable from within the CHAMBER or – CHAMBER depth < 0,7 m and volume < 0,4 m^3		
8		**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)		
		– inspection, equipment meets the following requirements:		
		a) hazardous live parts not ACCESSIBLE		
		b) ENCLOSURE shows no cracks (hazard)		
	F	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		

Clause Subclause		Requirement	Result	Comments
9		**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		
	F	(see Forms A.1, A.2 and A.18)		
		or		
		– measurement of CREEPAGE DISTANCE and CLEARANCE and the voltage tests of annex G		
	F	(see Form A.14)		
		or		
		– method of annex F		
	F	(see Forms A.15, A.16 and A.17)		
		Asbestos not used for thermal insulation		
9.2		**Temperature tests**		
9.3		**Guards**		
		Surfaces liable to exceed 100 °C		
	F	(see Form A.18):		
		– protected by guards		
		or		
		– marked		
		or		
		– intended to be hot (see 9.1)		
		Guards not removable without TOOL		
9.4		**Field-wiring TERMINAL boxes**		
		Temperature RATING of the cable is:		
	F	– marked (see Form A.18)		
		and		
		– adjacent to field-wiring TERMINALS		
		or		
		– visible during and after installation		
9.5		**Overtemperature protection devices**		
		– fitted, to operate in SINGLE FAULT CONDITION		
	F	(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		

Clause Subclause		Requirement	Result	Comments
		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	**F**	**Integrity of CLEARANCE and CREEPAGE DISTANCES** (see Form A.11)		
10.2	**F**	**Resistance to heat of non-metallic ENCLOSURE** (see Form A.19)		
10.3		**Resistance to heat of insulation material**		
		Parts supporting		
		– parts connected to mains supply		
		– TERMINALS carrying >0,5 A		
11		**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		**Battery electrolyte**		
		Battery electrolyte leakage presents no hazard		
11.6	**F**	**Specially protected equipment** (see Form A.20)		

Clause Subclause	Requirement	Result	Comments
11.7	**Fluid pressure and leakage**		
11.7.1	Maximum pressure not exceeded		
11.7.2 **F**	Leakage and rupture at high pressure (see Form A.21)		
	Test to IEC 60335 (refrigeration only)		
11.7.3 **F**	Leakage from low-pressure parts (see Form A.21)		
11.7.4	**Overpressure safety device**		
	Where possible to exceed maximum CHAMBER working pressure:		
	– overpressure device fitted and		
	– device set to operate at a pressure ≤ the maximum working pressure		
	– does not exceed maximum working pressure by more than 10 %		
	– no discharge during NORMAL USE		
	– no accumulation of water on seating		
	– discharge to a safe place		
	Does not operate in NORMAL USE and Complies with the following:		
	– positioned close to parts intended to be protected		
	– mounted according to instructions		
	– connected by the shortest length of 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		

Clause Subclause		Requirement	Result	Comments
11.7.101		**Instruments and indicating devices**		
		If necessary for safety:		
		a) CHAMBER pressure indicator		
		b) jacket pressure indicator		
		c) OPERATING CYCLE counter		
		d) supply line pressure indicator		
		e) leak detection		
	F	Indicators operate in SFC (see Form A.2)		
11.101		**Discharge from pressure-venting valves and overpressure safety devices**		
		a) Discharge:		
		– no hazard		
		– pipe requirements		
		b) Discharge inside cabinet:		
		– cabinet vented		
		– cannot reach OPERATOR		
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	**F**	**Sound level** (see Form A.23)		
12.5.2	**F**	**Ultrasonic pressure** (see Form A.23)		
12.6		**Laser sources** (IEC 60825)		

Clause Subclause	Requirement	Result	Comments
13	**Protection against liberated gases, explosion and implosion**		
13.1	**Poisonous and injurious gases**		
	a) Any data/test reports used to demonstrate conformity attached		
	b) – parts do not react with sterilant or carrier gas and – liberation of gas does not cause a hazard		
13.1.101	**CHAMBER leakage**		
	– leakage test before sterilant gas admitted		
	– shutdown if level exceeded		
13.1.102	**Non-return valve in the air inlet pipe**		
	Non-return valve operating above atmospheric pressure		
13.1.103	**Protection from hazards before any door can be opened**		
13.1.103.1	OPERATING CYCLE includes sterilant removal to below flammable limit		
13.1.103.2	Means provided so no hazard when left in a closed unventilated condition		
13.1.104	**Protection against gases liberated from the LOAD**		
13.1.104.1	The sterilant removal stage is followed by		
	– flushing stage or – multiple evacuations and – door does not open until completion		
13.1.104.2	No hazard from desorption of sterilant from LOAD		
13.1.105	**Failure of CHAMBER exhaust system**		
	– audible and visible warning signals		
	– OPERATING CYCLE is not initiated or – if cycle in progress, access to LOAD prevented until exhaust system is operational		
13.1.106	**Failure of space ventilation system**		
	Terminals for sensing device		

Clause Subclause	Requirement	Result	Comments
13.1.107	**Failure of sensor or timer**		
	Visible alarm to indicate hazard		
	If failure occurs:		
	– OPERATING CYCLE not initiated or – if cycle in progress, access to LOAD prevented until sterilant removed		
13.1.108	**Protection against gases liberated from the drain**		
	Discharge to a safe place		
13.1.109	**Local exhaust ventilation**		
	Connected to remove fugitive emissions		
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		
	Parts do not react with sterilant or carrier gas to cause explosion or implosion		
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) **F** (see Form A.24, including circuit diagram)		
	– warning marking or symbol 14		
	Battery compartment design		
	Polarity reversal test		

Clause Subclause	Requirement	Result	Comments
13.2.101	**Heating of sterilant**		
	– No hazard when containers subject to direct heating		
	– Sterilant liquids have no direct contact with electrical heating element		
	– Parts do not have a temperature to cause fire, explosion or other hazard		
13.2.102	**Flammable sterilants**		
	– Equipment has no source of ignition and – OPERATING CYCLE includes air removal stage		
13.2.103	**Electrical requirements**		
13.2.103.1	**Hazardous area classification and requirements**		
	Hazardous area according to IEC 60079:		
	– classified		
	– protected		
13.2.103.2	**Bonding of electrically conductive components**		
	If explosion hazard under SFC:		
	– all conductive components earth-bonded		
	– non-conductive components protected against electrostatic discharge		
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**		
	Under SFC:		
	– no safety devices disabled		
	– no access to LOAD until no hazard		

Clause Subclause	Requirement	Result	Comments
13.103	**Interruption of supplies and services**		
F	Interruption or partial interruption of non-electrical supply or service (see Form A.1)		
13.104	**Sterilant supply system**		
13.104.1	**Purging**		
	Means to purge before disconnected or opened		
13.104.2	**Gas blending**		
	Means provided to ensure correct gas mixture		
13.104.3	**Supply pipe**		
	Each CHAMBER sterilant supply pipe has		
	a) a non-return valve and for flammable sterilants:		
	– a flame arrester or – a heat-sensitive cut-off valve		
	b) automatic and manual shut-off valves		
13.104.4	**Sterilant cartridges**		
	a) access during OPERATING CYCLE prevented		
	b) means to retain cartridge for puncturing		
13.104.5	**Liquid sterilant**		
	Means provided to safely dispense, connect and position containers		
	Means provided to prevent excess gas being liberated in the CHAMBER (see also 13.1)		
13.104.6	**Isolation of any part of the sterilant supply system**		
	Protected by an overpressure safety device		
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)		

Clause Subclause	Requirement	Result	Comments
14.2	**Motors**		
14.2.1	**Motor temperatures**		
F	(see Form A.25)		
	No hazard from stopped motor		
	Loss of one phase no hazard		
14.2.2	**Series excitation motors**		
14.3	**Overtemperature protection devices**		
	Devices operating in a SINGLE FAULT CONDITION		
F	(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)		

Clause Subclause	Requirement	Result	Comments
14.8	**Overpressure safety devices**		
	Meets requirements of ISO 4126-1		
	Bursting disc:		
	– used only with a safety valve		
	– complies with ISO 6718		
14.101	**PRESSURE VESSEL**		
	– complies with applicable PRESSURE VESSEL regulations and codes or – complies with codes indicated by purchaser		
14.102	**Visibility and readability of instruments and indicating devices**		
	Safety related indicating devices:		
	– readily seen		
	– readable at 1 m with 215 lux, except OPERATING CYCLE counters		
14.103	**Control system**		
	OPERATOR cannot set to hazardous condition		
	AUTOMATIC CONTROLLER provided with system to control access to system functions		
	No keys, codes or TOOLS for OPERATING CYCLE:		
	a) initiation		
	b) selection		
	c) manual advance		
	d) changing programme		
	Functions b), c) and d) protected by increasingly severe restraints		
	Not possible to disable safety devices:		
	– using AUTOMATIC CONTROLLER		
	– using manual advance		
	Manual mode disables AUTOMATIC CONTROLLER		
14.104	**Microprocessors**		
	Failure cannot cause a hazard		

Clause Subclause	Requirement	Result	Comments
14.105	**Access ports**		
	Access port retained by interlock under 7.101 or Independent interlock provided		
15	**Protection by interlocks**		
15.1	**General**		
	Interlocks are designed to remove a hazard before OPERATOR exposed		
15.2	**Prevention of reactivation**		
15.3	**Reliability**		
16	**Measuring circuits**		
16.1 **F**	**Current measuring circuits** (see Form A.29)		
Annex K	**Routine tests**		
	Manufacturer's declaration		

Form A.1

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			
4.4.2.5	Capacitors			
4.4.2.6	Mains transformers Attach drawing of mains Txs 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			
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)_____

Form A.3

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)_____

Form A.4

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 (5.1.5)	
TERMINALS and operating devices (5.1.6)	
Double/reinforced equipment (5.1.7)	
Battery charging (5.1.8)	
Warning markings (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)_____

Form A.5

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)	Test voltage (note 2) V	Comments
			PWB mm	CTI	Other mm	CTI	mm		

NOTE 1 Type of insulation:

BI = BASIC INSULATION
DI = DOUBLE INSULATION
PI = PROTECTIVE IMPEDANCE
RI = REINFORCED INSULATION
SI = SUPPLEMENTARY INSULATION

NOTE 2 Types of voltage

Peak impulse test voltage (pulse)
r.m.s.
d.c.
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)_____

Form A.6

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)_____

Form A. 7

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)_____

6.3.2 Values in SINGLE FAULT CONDITION

Item (see Form A.6)	Subclause and fault No. (see Form A.2)	Voltage			Transient (see note)		Current				Capacitance µF (note)	Comments
		V r.m.s.	V peak	V d.c.	V	s	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.		

NOTE Transient voltages must be below the limits given from Figure 1 and the capacitance below the limits from Figure 2 of IEC 61010-1.

Tested by:_____Date:_____Test equipment No. (Table 2)_____

Form A.9

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)_____

Form A.10

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)_____

Form A.11

6.7 CLEARANCES and CREEPAGE DISTANCES
8 Mechanical resistance to shock, vibration and impact (AM 1 only)
8 Mechanical resistance to shock and impact (AM 2 only)
10.1 Integrity of CLEARANCES and CREEPAGE DISTANCES

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

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

Tested by:_____Date:_____Test equipment No. (Table 2)_____

Form A.12

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)_____

Form A.13

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)_____

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)_____

Form A.15

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)_____

Form A.16

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)_____

Form A.17

9.1 General

Annex F – Test details (continued)
F.4.3 ENCLOSURES (F4.3.3 test to IEC 60707)

Material tested:_____ Generic name: _____ Material manufacturer: _____ _____	Overall result Pass/Fail
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)_____

Form A.18

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)_____

Form A.19

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)_____

8 Mechanical resistance to shock and impact
11 Protection against hazards from fluids

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) V	Test voltage (note) 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)	IEC 60529 (11.6)				
			Normal	Hand-held								
NOTE Use r.m.s., d.c or peak to indicate the test voltage used.												

Tested by:_____Date:_____Test equipment No. (Table 2)_____

Form A.21

11.7.2 Leakage and rupture at high pressure

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

Part	Test pressure MPa	Leakage test Pass/Fail	Comments

Tested by:_____Date:_____Test equipment No. (Table 2)_____

Form A.22

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)_____

Form A.23

12.5.1 Sound level

Location tested	Measured values dBA	Calculated maximum sound pressure level
At OPERATOR'S normal position and at bystanders' positions		
a)		
b)		
c)		
d)		
e)		
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)_____

Form A.24

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)_____

Form A.25

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)_____

Form A.26

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)_____

Form A.27

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		Primary				
(note 2)		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)_____

Form A.28

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 °C	Primary				
(note 2)	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)_____

Form A.29

16.1 Current measuring circuits

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)_____

Form A.30

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)_____

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other.....

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nearly ❑
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standard is incomplete ❑
standard is too academic ❑
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I made the wrong choice ❑
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