TECHNICAL REPORT

IEC 61010-3-020

First edition
1999-04

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

Part 3-020: Conformity verification report for IEC 61010-2-020:1992 Particular requirements for laboratory centrifuges

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

Partie 3-020: Rapport de vérification de la conformité de la CEI 61010-2-020:1992 Prescriptions particulières pour centrifugeuses de laboratoire

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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 3, rue de Varembé Geneva, Switzerland
Telefax: +41 22 919 0300 e-mail: inmail@iec.ch IEC web site http://www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 3-020: Conformity verification report for IEC 61010-2-020:1992, Particular requirements for laboratory centrifuges

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Technical reports do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.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 61010-3-020, 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
66/187/CDV	66/211/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 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 61010-2-020:1992 + amendment 1:1996

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 also 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.

Conformity Verification Report
IEC 61010-2-020
Safety requirements for electrical equipment for measurement, control and laboratory use:
Part 2-020: Particular requirements for laboratory centrifuges
(including amendment 1:1996)

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 61010-2-020:1993 + amendment 1:1996
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 reference ..... :	
Manufacturer..... :	
Rating..... :	
Copy of rating plate:	

Description of equipment function:

INSTALLATION/OVERVOLTAGE CATEGORY:

POLLUTION DEGREE:

Environmental rating: ☐ Standard ☐ Other (specify):

Equipment mobility: ☐ Portable ☐ 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
			Last1)	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 used (IEC 61010-1, Table 1)		
5.1.2	**Identification** Equipment is identified by: – manufacturer's name or registered trade mark – unique production batch identification		
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) OPERATOR – set for different RATED supply voltages:		
	– indicates the equipment set voltage		
	– PORTABLE EQUIPMENT indication is visible from the exterior		
	– changing the setting 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		

Clause Subclause	Requirement	Result	Comments
	INSTALLATION CATEGORY marked		
	TERMINALS permanently connected and not ACCESSIBLE		
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 the appliance inlet		
	c) TERMINALS of measuring and control circuits		
	d) TERMINALS supplied from the interior		
	e) ACCESSIBLE FUNCTIONAL EARTH TERMINALS		
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	**ROTORS and accessories**		
	OPERATOR replaceable ROTORS and (their) subassemblies are marked with:		
	– manufacturer's identification		
	– part identification		

Clause Subclause	Requirement	Result	Comments
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 how to avoid contact with ACCESSIBLE HAZARDOUS LIVE parts		
	– TERMINAL voltage exceeding 1 kV (symbol 12)		
	– easily touched high temperature parts (symbol 13)		
5.3	**Durability of markings**		
F	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		
	– instructions for use		
	– name and address of manufacturer or supplier		
	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		

Clause Subclause	Requirement	Result	Comments
	– 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		
	– list of ROTORS and accessories		
	– rotational frequencies		
	– restriction markings		
	– density, volume limits and derating		
5.4.3	**Equipment installation**		
	Documentation includes instructions for:		
	– assembly, location and mounting		
	– CLEARANCE ENVELOPE area		
	– total weight		
	– site preparation		
	– levelling		
	– means of securing		
	– protective earthing		
	– connections to supply		
	– ventilation requirements		
	– special services		
	– maximum sound power level		
	– instructions about sound pressure		
	– emergency switch		
	Additional for permanently connected equipment:		
	– supply wiring		
	– any external switch or circuit-breaker (including location)		
	– any external overcurrent protection		

Clause Subclause	Requirement	Result	Comments
5.4.4	**Equipment operation**		
	Instructions for use include**:**		
	– identification of operating controls		
	– positioning for disconnection		
	– interconnection		
	– specification of intermittent operation limits		
	– explanation of symbols used		
	– replacement of consumable materials		
	– loading and balancing		
	– ROTOR changing procedure		
	– requirement for an OPERATOR to be present		
	– necessary safeguards for personnel		
	– instructions for use of BIOSEALS, etc.		
	A warning against use in a manner not specified by the manufacturer		
5.4.4.101	**Hazardous substances**		
	Precautions to be observed:		
	– toxic materials		
	– radioactive materials		
	– micro-organism contamination		
	– containers		
	– multiple protection levels		
	Materials prohibited:		
	– flammable or explosive		
	– materials which chemically react vigorously		

Clause Subclause	Requirement	Result	Comments
5.4.5	**Equipment maintenance** Instructions include: – sufficient preventive maintenance and inspection information – replacement of hoses, etc. – Includes: a) inspection: – fixing means – mounting surfaces b) safeguards during cleaning c) inspection of the PROTECTIVE CASING d) ROTOR ASSEMBLY: – inspection – safety considerations e) continuity of the protective earth f) inspection of BIOSEALS and other biosafety components: – importance of regular maintenance of BIOSEALS, etc. – specific battery type – any manufacturer specified parts – RATING and characteristics of fuses		
5.4.5.101	**Cleaning and decontamination** Documentation indicates: – user responsibility for decontamination – recommendations for cleaning and decontamination/generic names Withstands steam sterilization See Table 1A of IEC 61010-2-020 Wording in quotes appears in the documentation		

Clause Subclause	Requirement	Result	Comments
5.4.101	**Not used**		
5.4.102	**Not used**		
5.4.103	**Effects of chemicals and environmental influences**		
	Documentation identifies damage		
6	**Protection against electric shock**		
F	(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		
6.1.1	**Exceptions**		
F	Capacitance test (see Forms A.6 and A.7)		
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)		

Clause Subclause	Requirement	Result	Comments
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 **F**	Bonding impedance of plug-connected equipment (see Form A.9)		
6.5.1.3 **F**	Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT (see Form A.9)		
6.5.1.4 **F**	Indirect bonding for measuring and test equipment (see Form A.9)		
6.5.2	**DOUBLE INSULATION AND REINFORCED INSULATION** (see 6.7, 6.8 and 6.9.2)		
6.5.3 **F**	**PROTECTIVE IMPEDANCE** (see Form A.10)		
	Components wires and connections are RATED as required		
6.5.4	**Built-in panel meters**		
	If after building-in, the requirements of 6.5.1 to 6.5.3 are not met:		
	– 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 **F**	**Separation of internal circuits** (see lists 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		

Clause Subclause	Requirement	Result	Comments
	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		
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)		

Clause Subclause	Requirement	Result	Comments
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		
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		

Clause Subclause	Requirement	Result	Comments
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 conforms to 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:		
	– conform to 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		
	– knots are not used		

Clause Subclause		Requirement	Result	Comments
		– 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. conform to relevant specifications		
		b) If equipment supplied at voltages below those given in 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 5.1.3 e))		
		– 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:		
	i) independently secured		
	ii) 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		
6.12	**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 a 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		

Clause Subclause		Requirement	Result	Comments
		– single-phase PORTABLE EQUIPMENT cord length ≤3 m		
		Protective earth conductor connected first and disconnected last		
7		**Protection against mechanical hazards**		
7.1		**General**		
		Conformity is checked by 7.2 to 7.5		
7.2		**Moving parts**		
	F	Easily touched moving parts (see Form A.30)		
		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		**LID**		
		LID locked closed (2 m/s)		
		Power failure:		
		– LID does not release		
		– release requires TOOL		
		LID held closed with sufficient strength (see 7.5.103)		
		Fragments contained (see 7.5.103)		
		CENTRIFUGE-ROTOR COMBINATION evaluation information recorded:		
		– mechanical abuse		
		– mismatching		
		– misalignment		
		– corrosion		
		– material defects		

Clause Subclause	Requirement	Result	Comments
	– vibration		
	– cleaning and decontamination		
	– environmental influences		
	– other considerations appropriate for the design		
	If motor power interruption device instead of interlock, the following are satisfied:		
	– a device holds the LID closed		
	– drive motor cannot be energized unless the LID is closed		
	– rotational frequency does not exceed 3 600 r.p.m.		
	– energy does not exceed 1 kJ		
	– centrifugal force does not exceed 2 000 *g*		
	– ROTOR dia does not exceed 250 mm		
	– disconnection switch is independent of LID position		
	– rotation is observable with LID closed		
	– all ROTOR ASSEMBLIES used conform to 7.2 of Part 1		
	– if access is possible at over 2 m/s, a warning label is provided		
7.2.102	**ROTOR ASSEMBLIES requiring access during rotation**		
	Override control:		
	a) – motor energized only by special key or – limited access to ROTOR ASSEMBLY		
	b) means to cancel override function automatically		
7.3	**Stability**		
	Marking of non-automatic means		
	No visible displacement during NORMAL USE		

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

Clause Subclause	Requirement	Result	Comments
	Conformity tests:		
	– 10 tilt test		
	– multi-directional force test		
	– downward force test		
7.3.101	**CENTRIFUGE movement during malfunction**		
F	(see Form A.31)		
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		
7.5	**Protection against expelled parts or projected parts** (see Forms A.33 and A.34)		
	– no part completely penetrates the PROTECTIVE CASING		
	– LID fastening not loosened or distorted		
	– outside body of centrifuge intact		
7.5.101	**Information for MCA considerations**		
F	(see Form A.32)		
7.5.102	**Factors to be considered for determining the**		
F	**worst-case conditions** (see Form A.33)		
7.5.103	**Testing the PROTECTIVE CASING**		
F	Parts expelled (see Forms A.34 and A.35)		
7.5.104	**Small particles in air exhaust streams**		
F	No particles greater than 1,5 mm outside the clearance envelope (see Form A.35)		
7.5.105	**High energy chemical reaction after DISRUPTION**		
F	Parts expelled (see Form A.36)		

Clause Subclause		Requirement	Result	Comments
8		**Mechanical resistance to shock, vibration and impact**		
		After the tests of 8.1 to 8.4		
	F	(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		
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)		
9.2		**Temperature tests**		
9.3		**Guards**		
	F	Surfaces liable to exceed 100 °C (see Form A.18):		
		– protected by guards		
		or		
		– marked		
		or		
		– intended to be hot (see 9.1)		
		Guards not removable without TOOL		

Clause Subclause	Requirement	Result	Comments
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		
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 CLEARANCES and CREEPAGE DISTANCES**		
F	(see Form A.11)		
10.2	**Resistance to heat of non-metallic ENCLOSURES**		
F	(see Form A.19)		
10.3	**Resistance to heat of insulating material**		
	Parts supporting:		
	– parts connected to mains supply		
	– TERMINALS carrying >0,5 A		

Clause Subclause		Requirement	Result	Comments
11		**Protection against hazards from fluids**		
11.1		**General**		
11.2		**Cleaning**		
	F	Cleaned ”20 times” (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)		
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**		
		– shall not operate in NORMAL USE and – shall conform to the following:		
		– positioned close to parts intended to be protected		
		– 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
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		**Micro-wave 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)		
13		**Protection against liberated gases, explosion and implosion and escape of microbiological materials**		
13.1		**Poisonous and injurious gases**		
		Attach any data/test reports used to demonstrate conformity		
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		
13.2.2		**Batteries**		
		Explosion or fire hazard:		
		– protection incorporated in the equipment or		

Clause Subclause		Requirement	Result	Comments
		– 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		
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	**F**	**Microbiological materials** (see Form A.37)		
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)		
14.2		**Motors**		
14.2.1	**F**	**Motor temperatures** (see Form A.25)		
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		

Clause Subclause		Requirement	Result	Comments
		– 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)		
		Conforms to 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 ISO 4126		
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			
List below all SINGLE FAULT CONDITIONS not covered by 4.4.2.1 to 4.4.2.12				

Form A.2

4.4 Testing in SINGLE FAULT CONDITION – Results

Test subclause	Fault No.	Fault description	Td 4.4.3 (note)	How was test terminated Comments	Meets 4.4.4

NOTE – Td = 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 only required 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 (5.1.4)	
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)_____

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)	CREEPAGE DISTANCE (note 3)				CLEARANCE (note 3)	Test voltage (note 2)	Comments
			PWB mm	CTI	Other mm	CTI	mm	V	

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) 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)_____

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 AM 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)_____

Form A.8

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)_____

6.7 CLEARANCES and CREEPAGE DISTANCES
8 Mechanical resistance to shock, vibration and impact
8 Mechanical resistance to shock and impact (IEC 61010-1 with amendment 2)
10.1 Integrity of CLEARANCES and CREEPAGE DISTANCES

Location (see Form 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	Drop 8.1.4 and 8.4.2 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)_____

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)_____

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)_____

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	Remarques
F.4.2.1	Connectors conform to 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 conform to 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 – components placement conform to 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 °C)
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 tests:_____ °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
Mechanical resistance to shock and impact
11 Resistance to moisture and liquids
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., or 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 (AM 2)

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 pressure level
Sound level

Locations 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 component 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 Moving parts

List of easily touched moving parts

Item	Description	Determination method (note)	Result Pass/Fail	Comments	Meets 4.4.4

NOTE – Test fingers and pins to be applied without force except for rigid test finger.
V = visible
J = jointed test finger
R = rigid test finger (10 N)
P4 = 4 mm pin

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

7.3.101 Centrifuge movement during malfunction

Test surface_____

	Description	Instrument mounting method and test surface	Result Pass/Fail	Comments (note)
a) imbalance				
b) ROTOR ASSEMBLY DISRUPTION				
c) seizure				
NOTE – Specify manufacturer's limit if less than 300 mm.				

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

Form A.32

7.5.101 Information for MCA considerations

Information to be recorded	Details/Comments
a) Corrosion effects expected	
b) Material fatigue	
c) Material degradation	
d) Temperature limitation	
e) Material defect	
f) Improper BUCKET installation	
g) Relevant environmental considerations	
h) Maximum loading considerations	
i) Electrical circuit diagram and functional description	
j) Material specifications and technical data	
k) Pretreatment methods	
l) MAXIMUM CREDIBLE ACCIDENT(S) (MCA) to be envisaged	
m) Measuring instrument traceability	
n) Any other relevant information	

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

Form A.33

7.5.102 Factors to be considered for determining the worst-case conditions

Factors to be considered	Identification of ROTOR selected	Details/comments
a) ROTOR selection		
b) Rotational frequency control setting		
c) Supply voltage 10 % above maximum RATED		
d) Rotational frequency control condition (SFC)		
e) Rotational frequency limiting system		HIGH INTEGRITY – Yes / No / SFC:
f) ROTOR ASSEMBLY load		
g) ROTOR ASSEMBLY imbalance		
h) Mains power interruption		
i) Altitude factors		
j) CENTRIFUGE mounting friction		
k) Drive seizure		
l) Ambient temperature		
m) Instability of the dynamic behaviour		
n) Installation as specified by the manufacturer		
o) Component failure		
p) Non-quantitative SINGLE FAULT CONDITIONS		

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

Form A.34

7.5.102 a) ROTOR selection worksheet

ROTOR	RATED speed	Maximum energy

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

Form A.35

7.5.103 Testing the PROTECTIVE CASING

CENTRIFUGE model	
ROTOR type	
Accessories	
ROTOR loading	
MCA conditions	
ROTOR ASSEMBLY failure inducement method	
Date and time of test	
Environmental conditions	
Photographs, with cine- or video-recording of the DISRUPTION (indicate where located)	
Rotational frequency energy involved	
Type of ROTOR ASSEMBLY failure	

Test subclause	Result Pass/Fail	Comment
CENTRIFUGE movement 7.3.101		
Small particles in air-exhaust 7.5.104		
No part completely penetrates PROTECTIVE CASING 7.5 (first dash)		
LID fastenings not loosened or distorted 7.5 (second dash)		
Outside body of CENTRIFUGE intact 7.5 c)		
Parts expelled 7.5.103		

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

Form A.36

7.5.105 High-energy chemical reaction after DISRUPTION

CENTRIFUGE model	
ROTOR type	
Refrigeration system adjustments	
Accessories	
ROTOR loading	
Test conditions	
ROTOR ASSEMBLY failure inducement method (pretreatment)	
Date and time of test	
Environmental conditions	
Photographs, with cine- or video-recording of the DISRUPTION (indicate where located)	
Rotational frequency energy involved	
Type of ROTOR ASSEMBLY failure	

Test subclause	Result Pass/Fail	Comment
CENTRIFUGE movement 7.3.101		
Small particles in air-exhaust 7.5.104		
No part completely penetrates PROTECTIVE CASING 7.5 (first dash)		
LID fastenings not loosened or distorted 7.5 (second dash)		
Outside body of CENTRIFUGE intact 7.5 c)		
Parts expelled 7.5.103		

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

Form A.37

13.101 Microbiological materials

Annex AA

Sample locations	No. of spores Control 1	No. of spores Test 1	No. of spores Control 2	No. of spores Test 2	No. of spores Control 3	No. of spores Test 3	Result Pass/Fail
Cyclone sampler							
Slit sampler							
Exterior of seal							
Inside cap							
Inside bowl							
Surface of rotor							

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

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