SHENZHEN YARUI TESTING CO., LTD.

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SAFETY TEST REPORT

Product name	:	Electric Scooter
Trademark	:	Leon Scooter / Leon Citycoco
Model No.	:	S1, S2, S3, S4, S5, S6, S7, S8, S9, S11, S15, S16, S17, S18, S19, S20, S21, S22, M8
Test Standards	:	**EN ISO 12100:2010** **EN 60204-1:2018** **EN 15194:2017** **DS DSF-FPREN 17128:2018** **EN 60335-1:2012 + A11:2014 + A13:2017 + A1:2019 + A2:2019 + A14:2019**
Applicant	:	Suzhou Leon Technology Co., Ltd.
Address of applicant	:	G1 Shazhou Lake Industry Park, Zhangjiagang High-Tech Zone, Jiangsu Province, China
Date of test	:	Jan. 08, 2021- Jan. 13, 2021
Date of issue.	:	Jan. 13, 2021
Report No.	:	YRT202101207S

Test result	:	Pass *

* In the configuration tested, the EUT complied with the standards specified above

CE

Remark: The CE mark as shown above can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The sample detailed above has been tested to the requirements of council **Machinery Directive 2006/42/EU and Low Voltage Directive(2014/35/EU)**.The results shown in this test report refer only to the sample(s) tested , this test report cannot be reproduced, except in full, without prior written permission of the company.

EN ISO 12100-1			
Clause	Requirement – Test	Result - Remark	Verdict

TEST REPORT

EN ISO12100

Safety of machinery — General principles for design — Risk assessment and risk reduction

EN 60204-1
Safety of Machinery-electrical Equipment of Machines-part 1: Generalrequirements

EN15194
Cycles — Electrically power assisted cycles — EPAC Bicycles

DS DSF-FPREN 17128
test reportLight motorized vehicles for the transportation of persons and goods and relatedfacilities and not subject to typeapproval for on-road use-personal light electricvehicles(PLEV) -Safety requirements and test methods

IEC 60335-1
Safety of household and similar electrical appliances

Report reference No	YRT202101207S
Tested by (+ signature)	Tommy Zhang
Compiled by (+ signature)	Tony Wang
Approved by (+ signature)	Lily Yu

Testing laboratory	SHENZHEN YARUI TESTING CO., LTD.
Address	No. 1107-1109., Weidonglong Technology Building, Meilong Avenue, Qinghu Longhua District , Shenzhen 518109, Guangdong, China
Testing location	As above

Applicant .....:	Suzhou Leon Technology Co., Ltd.
Address .....:	G1 Shazhou Lake Industry Park, Zhangjiagang High-Tech Zone, Jiangsu Province, China
Manufactory .....:	Suzhou Leon Technology Co., Ltd.
Address .....:	G1 Shazhou Lake Industry Park, Zhangjiagang High-Tech Zone, Jiangsu Province, China
Standard .....:	EN ISO 12100:2010 EN 60204-1:2018 EN 15194:2017 DS DSF-FPREN 17128:2018 EN 60335-1:2012 + A11:2014 + A13:2017 + A1:2019 + A2:2019 + A14:2019
Test procedure .....:	CE Approval
Non-standard test method .....:	N/A
Test Report Form No. :	YRT
Type of test object .....:	Electric Scooter
Trademark .....:	Leon Scooter / Leon Citycoco
Model/type reference .....:	S1, S2, S3, S4, S5, S6, S7, S8, S9, S11, S15, S16, S17, S18, S19, S20, S21, S22, M8
Rating .....:	Supply by external power adapter (60V⎓ <5A) Supply by Rechargeable Li-ion Battery (60VDC 20Ah for battery)

Particulars: test item vs. test requirements	
Class of protection against electrical shock ……..……:	Class III equipment
Nature of supply ……..…:	~
Possible test case verdicts:	
-test case does not apply to the test object…..:	N(.A.)
-test object does meet the requirement……:	P(ass)
-test object does not meet the requirement ……:	F(ail)
Testing:	
Date of receipt of test item ……..…..:	Jan. 08, 2021
Date(s) of performance of test ……..:	Jan. 08, 2021- Jan.13, 2021
Degree of protection against moisture ……..……..:	IP20

General remarks:

”(see remark #)” refers to a remark appended to the report.

(see appended table)” refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

Copy of Label:

Electric Scooter

Model: S1

Input: Supply by external power adapter (60V⎓ <5A)

Supply by Rechargeable Li-ion Battery

(60VDC 20Ah for battery)

Suzhou Leon Technology Co., Ltd.

Address: G1 Shazhou Lake Industry Park, Zhangjiagang High-Tech Zone, Jiangsu Province, China

Importer: xxxxx

Address: xxxxx

WARNING: Keep the appliance dry

EN ISO 12100-1			
Clause	Requirement – Test	Result - Remark	Verdict
4	**Hazards to be taken intoaccount when designing machinery**		**P**
4.1	General		P
4.2	Mechanical hazard		P
4.3	Electrical hazard		P
4.4	Thermal hazard		P
4.5	Hazard generated by noise		P
4.6	Hazards generated by vibration		P
4.7	Hazards generated by radiation		P
4.8	Hazards generated by materials and substances		P
4.9	Hazards generated by neglecting ergonomic principles in machine design		P
4.10	Slipping, tripping and falling hazards		P
4.11	Hazard combinations		P
4.12	Hazards associated with the environment in which the machine is used		P
5	**Strategy for risk reduction**		**P**
5.1	General provisions		P
5.2	Specification of the limits of the machine		P
5.3	Hazard identification, risk estimation and risk evaluation		P
5.4	Elimination of hazards or reduction of risk by protective measures		P
5.5	achievement of risk reduction objectives		P

4	Inherently safe design measures		P
4.1	General		P
4.2	Consideration of geometrical factors and physical aspects		P
4.3	Taking into account the general technical knowledge regarding machine design		P
4.4	Choice of an appropriate technology		P
4.5	Applying the principle of the positive mechanical action of a component on another component		P

EN ISO 12100-1			
Clause	Requirement – Test	Result - Remark	Verdict
4.6	Provisions for stability		P
4.7	Provisions for maintainability		P
4.8	Observing ergonomic principles		P
4.9	Preventing electrical hazard		N/A
4.10	Preventing hazards from pneumatic and hydraulic equipment		P
4.11	Applying inherently safe design measures to control system		P
4.12	Minimizing the probability of failure of safety functions		P
4.13	Limiting exposure to hazards through reliability of equipment		P
4.14	Limiting exposure to hazards through mechanization or automation of loading (feeding) /unloading (removal) operations		P
4.15	Limiting exposure to hazards through location of the setting and maintenance points outside of danger zones		P
5	Safeguarding and complementary protective measures		P
5.1	General		P
5.2	Selection and implementation of guards and protective devices		P
5.3	Requirements for the design of guards and protective devices		P
5.4	Safeguarding for reducing emissions		P
5.5	Complementary protective measures		P
6	Information for use		P
6.1	General requirements		P
6.2	Location and nature of the information for use		P
6.3	Signals and warning devices		P
6.4	Markings, signs (pictograms), written warnings		P

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict
4.2.1	Electric circuit		P
	The electrical control system shall be designed so that, should it malfunction in a hazardous manner, it shall switch off power to the electric motor.		P
4.2.2	Batteries		P
4.2.2.1	Requirements		P
	EPAC and pack of batteries shall be designed in order to avoid risk of fire, mechanical deterioration resulting from abnormal use. Compliance is checked by the test described in 4.2.2.2.	No hazards	P
	During the test the EPAC and the batteries shall not emit flames, molten metal or poisonous ignitable gas in hazardous amounts and any enclosure shall show no damage that could impair compliance with this European Standard.		P
	Safety and compatibility of the combination battery/charger combination shall be ensured, according to the manufacturer's specifications.		P
	The battery terminals shall be protected against creating an accidental short circuit. Care shall be taken to ensure that the batteries are protected against overcharging. An appropriate overheating and short circuit protection device shall be fitted.		P
	Batteries and the charger unit shall be labelled in order to be able to check their compatibility.		P
4.2.2	Test method		P
	1) Battery terminals are short-circuited with the batteries in a fully charged condition. 2) Motor terminals are short-circuited; all commands are in ON position, whilst the batteries are fully charged. 3) The EPAC is operated with the electric motor or drive system locked up so as to fully discharge the battery or until the system stops. 4) The battery is charged for double the recommended charging period or for 24 hours depending upo which is the longest period.		P
4.2.3	Electric cables and connections		P
4.2.3.1	Requirements		P
	Cable and plug temperature shall be lower than that specified by the manufacturer of the cables and plugs. There shall be no corrosion on plug pins and no damage to cable and plug insulation.		P
4.2.3.2	Test method		P

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Discharge the fully charged EPAC battery to the discharging limit specified by the EPAC or ESA manufacturer at the maximum current allowable by the system and record it, giving consideration to the electric motor and/or the controller and/or the battery controller. Measure the cable and plug temperatures and ensure, by examination, that there is no deterioration of the insulation on either assembly.		P
4.2.3.3	Wiring		P
	a) Wire ways shall be smooth and free from sharp edges. b) Wires shall be protected so that they do not come into contact with burrs, cooling fins or similar sharp edges that may cause damage to their insulation. Holes in metal through which insulated wires pass shall have smooth well-rounded surfaces or be provided with bushings. c) Wiring shall be effectively prevented from coming into contact with moving parts. Separate parts of the EPAC that can move in normal use or during user maintenance relative to each other, shall not cause undue stress to electrical connections and internal conductors, including those providing earthing continuity. Compliance with a), b), c) shall be checked by inspection. d) If an open coil spring is used, it shall be correctly installed and insulated. Flexible metallic tubes shall not cause damage to the insulation of the conductors contained within them. e) The movable part is moved backwards and forwards, so that the conductor is flexed through the largest angle permitted by its construction.		P
4.2.3.4	Power cables and conduits		P
	Conduit entries, cable entries and knock-outs shall be constructed or located so that the introduction of the conduit or cable does not reduce the protection measures adopted by the manufacturer. Compliance is checked by inspection.		P
4.2.3.5	External and internal electrical connections		P
	Electrical connection shall comply with IEC 60364-5-52:2001, Clauses 526.1 and 526.2.		P
4.2.3.6	Moisture resistance		N/A
	The EPAC are subjected to the test of IEC 60529 as follows: IPX4 appliances as described in Clause 14.2.4.a.		N/A
4.2.3.7	Mechanical strength		P

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict
	EPAC shall have adequate mechanical strength and be constructed to withstand such rough handling that may be expected in normal use. Compliance is checked by: - applying impacts to the battery pack mounted on the EPAC by means of the spring hammer as specified in IEC 60068-2-75. The battery pack is rigidly supported and three impacts are applied to every point of the enclosure that is likely to be weak with an impact energy of (0,7 ± 0,05) J. After the test the battery pack shall show no damage that could impair compliance with this European Standard; - detachable battery packs are submitted to free fall at a height of 0,90 meter in three different positions. After the test the battery pack shall show no damage that could lead to emission of dangerous substances (gas or liquid) ignition, fire or overheating.		P
4.2.6	Maximum speed for which the electric motor gives assistance		P
4.2.6.1	Requirements		P
	The maximum speed for which the electric motor gives assistance may differ by ± 5% of the speed indicated on the label described within Clause 5 when determined according to the test method described in 4.2.6.2, from 25 km/h or lower values as specified by the manufacturer. During a production conformity check, the maximum speed may differ by ± 10% from the above-mentioned determined value.	The maximum speed is 10 km/h The maximum speed within the range.	P
4.2.6.2	Test method		P
4.2.6.2.1	Test conditions		P
	a) The test may be performed either on a test track, a test bench or on a stand that keeps the motor driven wheel free of the ground. b) The speed-measuring device shall have the following characteristics: - Accuracy: ± 2% - Resolution: 0,1 km/h c) The ambient temperature shall be between 5 °C and 35 °C. d) Maximum wind speed: 3 m/s. e) The battery shall be fully charged according to the manufacturer instructions.		P
4.2.6.2.2	Test procedure		P

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Any appropriate method for checking for this requirement is acceptable; one solution is to measure the cut-off speed, another being to measure the torque output. The following example describes the cut-off speed test. a) Pre-condition the EPAC by running it for 5 min at 80% of the maximum assistance speed as declared by the manufacturer. b) Record continuously the current and note the speed at which the current drops to a value equal to or less than “no load current point”. c) Whilst pedalling, ride steadily to reach a speed equal to 1,25 times (if possible by design) the maximum assistance speed as declared by the manufacturer. d) Verify the noted value in b) is equal to or less than the maximum speed declared by the manufacturer.		P

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict

4.	**GENERAL REQUIREMENTS**		
4.1	General considerations	See below	P
	Hazard and risk assessment		P
4.2	Electrical components/devices suitable for their intended use	Suitable for their intended use	P
	and conform to the relevant IEC or EN standards	See attachment table	P
4.3	Power supply and related conditions:		
4.3.1	Electrical equipment to be designed for correct operation with conditions of mains power supply	See below	P
4.3.2	Supply Voltage :		P
	Frequency :	50Hz, comply with ±1% rated frequency	P
	Harmonics :	Exceed evaluation scope	N
	Voltage unbalance :	Exceed evaluation scope	N
	Voltage interruption :	Exceed evaluation scope	N
	Voltage dips :	Exceed evaluation scope	N
4.3.3	DC Supplies Voltage :	AC power supply	N
	Voltage interruption		N
	Ripple (peak-peak) :		N
4.3.4	Onboard power supply acc. to cl. 4.3.2 and 4.3.3		N
4.4	Physical environment and operating conditions		P
4.4.1	Electrical equipment to be suitable for use in physical environment and operating conditions	Operation temperature 5-38℃ Operation humidity up to 85%	P
4.4.2	Electromagnetic compatibility (EMC)	See EMC Test Report.	P
	Equipment not to generate electromagnetic disturbances above harmful levels: (applicable EMC-standard: EN 50081-2)		N
	Equipment has adequate level of immunity to EMC: (applicable EMC-standards: EN 50082-2)		N
4.4.3	Electrical equipment to be capable for correct operation at intended ambient air temperature	5-38℃	P
4.4.4	Electrical equipment to be capable for correct operation at specified relative humidity: at and	Up to 85%	P
4.4.5	Electrical equipment capable of operating correctly at altitudes up to 1000 m above m.s.l.	machine equipment used for less than 1000m altitudes	N

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict
4.4.6	Electrical equipment shall be adequately protected against ingress of solid properties and liquids	For elcectrical equipment,	P
4.4.7	Ionizing and non-ionizing radiation Electrical equipment subject to radiation, additional measures to be taken to avoid equipment malfunction	No ionizing and non-ionizing radiation outside this equipment	N
4.4.8	Undesirable effects of vibration, shock and bump avoided	The machine equip with cushion reduced vibration	P
4.5	Electrical equipment designed to withstand the effects of transportation and storage within a temperature range of -25 to +55 °C	-25 to +55 °C applied	P
4.6	Heavy or bulky electrical equipment of the machine provided with suitable means for handling		P
4.7	Electrical equipment installed and operated in accordance with the supplier's instruction	Skilled person for installing and See instruction	P
5.	**INCOMING SUPPLY CONDUCTOR TERMINATIONS AND DEVICES FOR DISCONNECTING AND SWITCHING OFF**		P
5.1	Incoming supply conductor terminal		P
	electrical equipment of a machine connected to a single power supply	Incoming supply conductor provided by user and detail specification refer to manual instruction	P
	Power supply conductors terminated to main disconnecting device of electrical equipment		N
	neutral conductor "N" clearly indicated in technical documentation.	Labelled by Letter N	P
	no connection between neutral conductor and protective bonding circuit nor combined PEN-terminals.	No conection between neutral and protective bonding circuit	N
	All terminals of incoming supply clearly marked (symbols acc. to EN 60445)	All terminals marked correct label	P
5.2	Terminal for connection to external protective earthing system.		P
	Terminal for connection of external protective conductor provided and marked with "PE"	The graphic symbol 60417-2-IEC -5019 used.	P
	Cross section of incoming PE conductor acc. to cl. 5.2, table 1	2.5 mm^2 Copper used	P
	Terminals allow connection of external protective earth conductors PE		P
	other protective earth identified either by graphic symbol, letters "PE", or bicolour combination green / yellow	Identified by graphic symbol Green/Yellow bicolour used	P
5.3	Supply disconnecting device		

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict
5.3.1	Power supply disconnecting device provided for electrical equipment	Circuit-breakers C32	P
5.3.2	The power supply disconnecting device shall be one of the following type:		
	a) Switch-disconnector, acc. to EN 60947-3 for appliance category AC-23 B or DC-23 B		N
	b) Disconnector with or without fuses, with aux. contact (acc. to EN 60947-3)	protected by Miniature Circuit breakers	P
	c) Power CB suitable for isolation (acc. to EN 60947-2)		N
	d) Plug/socket combination for electrical load =3kW or 16A.		N
	e) plug and socket outlets or appliance couplers for flexible cable supply under following conditions:		
	- not possible to connect or disconnect while load is connected		N
	-wired such with equipment, that IP-Protection degree is at least IP2X or IPXXB		N
	plug/socket-outlet combination as supply disconnecting device have sufficient breaking capacity		N
	plug/socket-outlet combination as overload connecting device have sufficient overload capacity		N
	equipment has a switching device		N
5.3.3	When supply disconnecting device is a switch-disconnector or a circuit- breaker		P
	Isolate electrical equipment from supply (acc. to EN 60947-2)		N
	One OFF (isolated) and one ON position only		P
	Clearly marked with ”0” and ”I”	Marked with “O” and “I” for used.	N
	CB’s with additional reset position between ”0” and ”I”		N
	visible isolating distance or	Visible gap and position indicator for used.	P
	Position indication which cannot indicate the OFF-position until all contacts are actually open	Comply with requirement	P
	External operating device provided (except power operated CB’s)		N
	Colour black or grey preferred.	Back handle used	P
	If used as an emergency stop, red/yellow combination selected		N
	Locking means provided to lock in OFF-position		N

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict
	In locked position an unintended closing for local or remote operation mode possible		N
	Disconnection of all live conductors (Exception: TN- supply systems, neutral conductor)		N
	Sufficient breaking capacity		N
5.3.4	Handle of disconnecting device to be easily accessible	Easy to access	P
	Handle located between 0.6m and 1.9m above service level	The servicing height from 1.3m.	P
5.3.5	Following circuits not disconnect by supply disconnecting device:		
	Lighting circuits during maintenance or repair	No such as circuits	N
	Plug/socket outlets exclusively used for maintenance or repair		N
	Undervoltage protection circuits used for automatic tripping only at power supply failures		N
	Circuits of equipment to remain normally energised for satisfactory operation		N
	Control circuits for interlocking purposes		N
	Circuits which are not disconnected by supply disconnecting device:		
	Permanent warning labels placed in proximity of supply disconnectors		N
	Appropriate remark in maintenance manual		N
	Warning label in proximity of circuit concerned		N
	or wiring separated from other wiring		N
	Wiring of safety interlocking circuits installed with different colour of insulation.		N
5.4	Devices for switching off for prevention of unexpected start-up:		
	Means shall be provided to prevent inadvertent and / or mistaken closure of the disconnecting device		N
	Such devices appropriate and convenient for intended use		N
	Suitable placed		N
	Readily identifiable		N
	Disconnecting devices acc. To cl. 5.3.2 used:		N
	Other disconnecting devices for the following situations only:		
	- no significant dismantling of the machine		N
	- adjustments requiring a relatively short time		N
	No work at the electrical equipment of the machine except:		
	- no hazard arising of electric shock or burn		N

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict
	- switched-off status cannot be released due to maintenance work		N
	- work of minor nature		N
5.5	Devices provided for disconnecting electrical equipment	Device in 5.3 applied	P
	Supply-disconnecting device used		P
	Disconnecting device provided for each separated part of the machine or partial machine where necessary		N
	Disconnectors, fuse links etc. Used only in enclosed electrical operating areas	These parts was Used in enclosed electrical operating areas.	P
	Such disconnecting devices appropriate and convenient for intended use and	Appropriate and convenient for intended use	P
	Suitably located and	Location suitable	P
	readily identifiable to which part it serves and	Marking used	P
5.6	Provided with adequate means to prevent unauthorised, inadvertent and /or mistaken closing		N
	Devices acc. To cl. 5.4 and 5.5 provided with locking means		N
	Locking means provided with device		N
	Other means of protection against unintended energising used for non-lockable disconnecting devices (for electrical operating areas only)		N
	Locking device not necessary for plug/ socket outlet combinations, if located in a suitable manner and		N
	Under immediate supervision of the person carrying out the work		N
6	**PROTECTION AGAINST ELECTRIC SHOCK**		P
6.2	Protection against direct contact:		
6.2.1	- by means of protection by enclosure	Enclosure used	P
	- by means of insulation of live parts	Insulation applied	P
	- by means of protection against residual voltages	Residual voltage less than 60V after 1s	P
6.2.2	Protection by enclosure:		
	Live parts located inside enclosures conform to relevant requirements of clauses 4, 12 and 15 Protection against direct contact at least IP2X or IPXXB	Protected by grounded metal enclosure, which only can be opened by screwdriver , and IP20 used	P

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Where top surfaces of enclosures are readily accessible, degree of protection against direct contact is IP4X or IPXXD.	Impossible to cause accessible hazard	P
	Opening of enclosure possible only under one of the following conditions:		
	a) use of a key or a tool. Special requirements for enclosed electrical operating areas may apply		P
	live parts inside of doors with protection degree of IP1X or IPXXA		P
	live parts likely to be touched during resetting or adjustment with protection degree IP2X or IPXXB		P
	b) disconnection of live parts inside enclosure prior to opening of enclosure		N
	at door interlocking safety circuit, door will open only when main isolator is in open position		N
	For skilled persons a special device provided, to defeat interlocking circuit under following conditions:		
	Special device or tool provided to permit skilled persons to defeat the interlock provided that:		
	- opening of disconnector possible at all times while interlock is defeated		N
	- upon closing the door, interlock is automatically restored		N
	If more than one door allows access to live parts, care must be taken, at implementation of this subclause		N
	All parts remaining live after switching off mains supply to be protected against direct contact with at least IP2X or IPXXB		N
	Such parts marked with warning symbol acc. To cl.17.2		N
	Excepted from this requirement for marking are:		
	- Parts that can be live only due to connection to interlocking circuits, distinguished by colour as potentially live acc. To cl. 14.2.4		N
	- Terminals of supply disconnecting device when latter mounted alone in a separate enclosure		N
	c) opening of doors without use of key or tool and without disconnection of live parts possible only when all live parts are protected against direct contact by IP2X or IPXXB		P
	where protection is provided by barriers, tools required for their removal or		N
	all live parts automatically disconnected when barrier is removed		N
6.2.3	Protection by insulation of live parts:		

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict
	Live parts completely covered with insulation	Complestely covered	P
	insulation can be removed only by destruction	Only removed by destruction	P
	insulation capable to withstand mechanical, chemical, electrical and thermal stress occurring under normal service conditions	CE approved component	P
	Paint, varnish lacquer etc. Not used as insulation	No such materials.	N
6.2.4	Protection of residual voltage:		
	Live parts with residual voltage = 60V after disconnection, to be discharged to = 60V within 5s after disconnection Except are components with charges of = 60 μC		N
	where pins of plugs or similar devices after withdrawal are exposed, discharge time = 1s		N
	such conductors protected against direct contact by at least IP2X or IPXXB		P
	if above requirements cannot be achieved, additional disconnecting devices or appropriate warning devices shall be applied. (see cl. 13.8.4)		N
6.2.5	Protection by barriers acc. To EN 60364-4-41 cl. 412.2		N
6.2.6	Protection by placing out of reach or protection by obstacles acc. To EN 60364-4-41, cl. 412.4 and 412.3)		N
	For collector wire- or bar systems, with protection less than IP2X, see cl. 13.8.1		N
6.3	Protection against indirect contact:		
6.3.2	Measures to prevent the occurrence of a hazardous touch voltage		
6.3.2.2	use of class II electrical devices or apparatus (double insulation, reinforced insulation or by equivalent insulation acc. To EN 60536)	Accessible devices with double insulation and reinforced insulation.	P
	use of switchgear and control gear assemblies with total insulation acc. To EN 60439-1	Compy with requirements	P
	application of supplementary or reinforced insulation acc. To EN 60364-4-41, 413.2	Enough gap used	P
6.3.2.3	Electrical separation of an individual circuit to prevent hazardous touch voltage acc. To EN 60364-4-41, cl. 413.5	Electrical clearance and creepage distance comply relevant requirements	P
6.3.2.4	Protection provided by use of a supply system, where its neutral point is either insulated or of high impedance to earth, so that an earth-fault will not produce a hazardous touch voltage	N point to earth have a >2MΩ insulation resistance. (Limitted >1MΩ)	P

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict

6.3.3	Protection by automatic disconnection of supply:		
	This protective measure comprise both:		
	Connection of all exposed conductive parts to protective earth bonding circuit	Connect the protective bonding circuit See Clause 8	P
	a) Use of protective device for automatic cut-off in the event of an insulation failure in a TN – or TT- system	TN System	P
	b) Use of earth fault detection device to initiate automatic disconnection in an IT-System.	Not used	N
	initiation of warning signal only in case of first occurrence of a fault permitted		N
6.4	Protection by application of PELV circuit which have to fulfil following requirements:		
6.4.1	a) nominal voltage not to exceed 25 AC (r.m.s.) or 60 DC (ripple-free) or		N
	6VAC or 15VDC for all other cases		N
	b) one side of PELV- circuit or one point of source of supply to be connected to PE- circuit	Not contact, power supply Isolation,	N
	c) live parts of PELV- circuits to be electrically separated from other live circuits.		N
	Electrical separation equal as required for safety isolating transformers (see IEC 60742)	>4.0mm basic insulation used for between primaries . >8.0mm double insulation used for between primary and second.	P
	d) conductors of each PELV circuit to be physically separated from those of any other circuit.	Separated from primary circuit by reinforced insulation	P
	If not practicable, insulation provisions acc. To cl. 14.1.3 shall be applied		N
	e) plugs and socket outlets for PELV- circuits shall conform to following requirements:		N
	plugs shall not be able to enter socket outlets of other voltage systems		N
	socket outlets shall not admit plugs of other voltage systems		N
6.4.2	Sources for PELV- circuits to be one of the following:		
	safety isolating transformers		N
	source of current providing a degree of safety, equivalent to safety isolating transformers		N
	electrochemical or other source, independent of circuit with higher voltage		N

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Clause	Requirement – Test	Result - Remark	Verdict
	electronic power supply conforming to appropriate standards		N
7	**PROTECTION EQUIPMENT**		P
7.2	Overcurrent protection:		
7.2.1	Overcurrent protection device provided		P
7.2.2	Supply conductors		
	Overcurrent protective device at incoming feeder to the electrical equipment (see to cl. 7.2.10 and cl. 18.5)	User provided	P
	Electrical equipment supplier state data for overcurrent protective device	See instruction	P
7.2.3	Power circuits:		
	Overcurrent protective devices applied to each live conductors except for neutral earth conductor		P
	Cross section area of neutral conductor to be at least equal to phase conductor, no overcurrent protective/ disconnecting device required	Cross section area for neutral equal to other phase conductor	P
	For neutral earth conductors with cross sections smaller than phase conductors, measures acc. To item b, cl 473.3.2.1 of IEC 60364-4-473 will apply		N
	For IT-systems use of neutral earth conductor (N) is not recommended. Nevertheless if an N-conductor is used, measures acc. To cl. 473.3.2.2 of IEC 60364-4-473 shall apply.		N
7.2.4	Control circuits:		
	Conductors of control circuits directly connected to supply voltage and circuits feeding control voltage transformers protected against overcurrent acc. To cl. 7.2.3		P
	Control circuits fed via transformers of which one end of secondary winding is connected to PE circuit, will require overcurrent protective device only in the other secondary conductor	With Circuit breaker	P
7.2.5	Socket outlets and their associated conductors:		
	Overcurrent protection devices for socket outlets provided for non-earthed live conductors of each circuit feeding such socket outlets	Not such socket outlets	N
7.2.6	Lighting circuits:		
	All unearthed conductors of local lighting circuits protected by overcurrent protective devices		N

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Clause	Requirement – Test	Result - Remark	Verdict
7.2.7	Transformers:		
	Transformers protected against overcurrent acc. To EN 60076-5 or EN 60742		P
	Avoid unnecessary tripping due to overcurrent caused by magnetizing inrush currents		P
	Avoid temperature rise of transformer winding in excess of its permitted of its insulation class of transformer in case of short circuit at secondary terminals		P
	Type and setting of overcurrent protective device acc. To recommendations of transformer manufacturer		P
7.2.8	Location of protective devices:		P
	Overcurrent protective device located at point where conductor is connected to the supply	located at point where conductor is connected to the supply	P
	Current carrying capacity of conductors at least equal to that required for electrical load	Comply with requirement	P
	Each connecting conductor to overcurrent protective devices not longer than 3 meters	No longer than 3 meters	P
	Conductor protected by enclosure or duct	By enclosure	P
7.2.9	Overcurrent protective devices:		
	Rated short-circuit breaking capacity at least equal to prospective fault current at point of installation	Rated short-circuit breaking capacity of circuit breaker used complying with requirement	P
	Current other than those coming from supply side taken into account	complying with requirement	P
	Reduced breaking capacity is permitted, where another protective device is installed at supply side with the necessary breaking capacity		N
	Back-up protection carefully checked, no destruction of conductor or overcurrent protective device may result		N
	Co-ordination with other protective devices in circuit required		N
	Overcurrent protective devices in power circuits include fuses and circuit breakers. Electronic current limiting devices may also be used in protected circuits	Circuit breaker used	P
7.2.10	Rating and setting of overcurrent protective devices:		
	Rated current of fuses or overcurrent setting of other protective devices selected as low as possible, but adequate for anticipated overcurrents.	See above	P

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Clause	Requirement – Test	Result - Remark	Verdict
	Settings of overcurrent protective devices appropriately listed in technical documentation		P
7.3	Overload protection of motors:		P
	Overload protection for all motors provided for ratings of > 0.5 Kw in continuous operation.		P
	Protective device may be omitted for motors which cannot be overloaded		P
	Overload protection achieved by current sensing or limiting devices or temperature sensors.		P
	Current overload detection provided for each live conductor except for neutral conductor		P
	For motors supplied by single phase AC or DC power supply, current detection in one non-earthed live conductor only is permitted		P
	If overload protection is achieved by switching-off device, all live conductors cut from power supply except neutral conductor		P
	For special duty motors, appropriate protective devices are recommended		P
	For motors where cooling can be impaired, a built- in thermal protection is recommended		P
	Automatic restarting of motors prevented after operation of overload protective device, to avoid cause of a hazardous condition		P
7.4	Abnormal temperature protection:		
	Resistance heating or similar devices which cause excessive heat, equipped with suitable overtemperature detection		P
7.5	Protection against supply interruption or voltage reduction and subsequent restoration		
	Undervoltage protection provided for applications where loss of supply or undervoltage causes a hazardous condition		P
	If interruption or reduction of supply voltage is allowed for a short period of time, delayed undervoltage protection provided.		P
	Undervoltage protection not impair any stopping control of the machine		P
	Upon restoration of supply voltage, automatic or unexpected restarting of machine prevented		P

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Clause	Requirement – Test	Result - Remark	Verdict
	Undervoltage protection to initiate appropriate control responses to ensure co-ordination the groups of machines working together		P
7.6	Motor overspeed protection:		
	Overspeed protection provided where overspeeding causes a hazardous condition		P
	Overspeed protection initiates appropriate control response and prevents automatic restarting		P
7.7	Earth fault / residual current protection:		
	To reduce damage to equipment due to earth fault currents below detection level, earth fault/residual protect used		P
	Detection level for earth fault protection set as low as possible		P
7.8	Phase sequence protection:		
	Protection from incorrect phase sequence of supply voltage provided		P
7.9	Protection against overvoltages due to lightning strike or switching action:		
	Protective devices for the suppression of overvoltages caused by lightning strikes or switching surges provided		P
	Devices for suppression of overvoltages due to lightning, connected at incoming terminals of the supply disconnecting device		P
	Devices for suppression of overvoltages due to switching surges connected across terminals of all equipment requiring such protection		P
8	**EQUIPOTENTIAL BONDING**		P
8.2.1	General:		
	On mobile machines with on-board power supplies, protective circuits, exposed conductive parts connected to a protective bonding terminal	Copper used for protective bonding	P
	when mobile machines will be connected to an external incoming power supply, protective bonding terminal (PE) fixed to connecting point for the protective conductor.		N
	All parts of protective bonding circuit capable to withstand max. Thermal and mechanical stress, caused by earth-fault currents		N
	Any structural part of electrical equipment or of a machine used as part of protective bonding circuit		N

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Clause	Requirement – Test	Result - Remark	Verdict
	When an IT distribution system is used, machine structure will be used as part of protective bonding circuit in conjunction with an earth fault supervision system.	No IT system used	N
8.2.2	Protective conductors:		
8.2.2	Identification and marking of protective conductors acc. To cl. 14.2.2	Comply with clause 14.2.2, PE marking used	P
	Copper conductors used as protective conductors	2.5 mm^2 Copper material conductors used	P
	Other conductor materials allowed, if cross section of such conductors is not less than 16 mm^2		N
	Cross-sectional area of protective conductors determined acc. To IEC 60364-5-54, cl. 543 or EN 60439-1, cl. 7.4.3.1.7, table 4		P
	Relationship between cross-section area of phase conductor and PE acc. To table 1	PE used	P
8.2.3	Continuity of protective bonding circuit:		
	All exposed conductive parts of electrical equipment and machine(s) connected to protective bonding circuit.	Connect to protective bonding circuits	P
	In case of removal of parts of PE system, remaining parts not to be interrupted	All metal part are protective earth as double protection	P
	Current-carrying capacity of connections and bonding points not impaired by mechanical, chemical or electrochemical influences	Not impaired by mechanical, chemical or electrochemical influences	P
	Particular consideration should be given if enclosure consists of aluminium and its alloys	No aluminium and its alloys used	P
	Metal ducts and cable sheaths not used as protective conductors and not connected to protective bonding circuit	No such device.	N
	If electrical equipment is mounted on lids, doors or cover plates, continuity of protective bonding circuit ensured		P
	Continuity of protective conductor ensured at cables which are exposed to damage		N
8.2.4	Exclusions of switching devices from protective bonding circuit:		
	Protective bonding circuit not incorporate a switching-/overcurrent protective device nor a means for current detection	Protective bonding circuit not incorporate switching and overcurrent protective devices	P
	Interruption of protective conductors permitted by links, intended to be opened by instructed/skilled persons for test or measurement purposes by using a tool	Screw fixed protective bonding point	P

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Clause	Requirement – Test	Result - Remark	Verdict

8.2.5	Equipment parts that need not to be connected to protective bonding circuit:		
	Parts which cannot be touched on large surfaces or grasped by hand due to its small size (less than approx. 50 x 50 mm), small parts such as screws, rivets, nameplates or		P
	are located in such way, that either contact with live parts or an insulation failure is unlikely	No such live parts	N
8.2.6	Interruption of the protective bonding circuit:		
	PE- circuit shall not be interrupted prior to disconnection of live conductors by means of removable current collectors or plug/socket combinations and re-established prior to reconnection of live conductors	PE circuit not interrupted except for destructing	P
	Metallic housings of plug /socket combinations connected to the protective bonding circuit except where used for PELV circuits		N
	PE conductors connected to protective bonding circuit acc. To cl. 14.1.5		N
8.2.7	Protective conductor connecting points:		
	PE conductor connecting points have no other functions and not used for connection of appliances or other parts	Comply with requirements	P
	Each PE connecting point identified by using the protective earth symbol	Green/yellow are used, PE marking used	P
	Alternatively, terminals for connection of protective conductors identified by bicolour combination GREEN-YELLOW or letter PE	Green/yellow are used, PE letter used	P
8.3	Equipotential bonding connections for functional reasons:		
8.3.2	Connecting of one side of control circuit fed by a transformer to PE-circuit.		N
	PE- connection located at source of control circuit supply		N
	Connection of control devices acc. To cl. 9.1.4		N
8.3.3	Bonding to a common reference potential:		
	Effects of disturbances reduced by using a conductor with low resistance at a low impedance network		N
	Terminals identified by symbol		N
	Bonding to a common reference potential other than PE- circuit allowed (requirements in cl. 6 and 7 fulfilled).		N
	Single point bonding connected close to PE terminal or to its own terminal. Identification by symbol		N

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Clause	Requirement – Test	Result - Remark	Verdict

9	**CONTROL CIRCUITS AND CONTROL FUNCTIONS**		P
9.1.1	Control circuits supplied by transformers have separately isolated windings		N
	If several transformers used, secondary voltages in phase		N
	DC- control circuits connected to PE circuit supplied from a separate winding of the control circuit transformer or supplied from another control circuit transformer		N
	Transformers not mandatory for machines with a single motor starter and maximum of two control devices		N
9.1.2	Nominal voltage not exceed 277VAC when supplied from a transformer		P
9.1.3	Control circuits provided with overcurrent protection Section7.2.4	Circuit breaker	P
9.1.4	Connection of control devices in control circuits with one side connected to PE circuit:		
	one terminal of each operating coil of an electromagnetically operated device or any other control device connected to PE circuit		P
	switching elements of control devices that operate coils of it, connected between other terminal of coil or device and the non-earthed side of the control circuit		N
	Exceptions:		
	Contacts elements of protective devices may be connected between PE- side and coil of such control devices, providing they are in same enclosure and the connections to it are so short, that an earth fault is unlikely		P
	Requirements of cl. 9.4.3.1 are fulfilled		P
9.2	Control functions:		
9.2.1	Start function initiated by energising relevant starting circuit		P
9.2.2	Stop functions:		
	Category 0: Stopping by immediate removal of power to machine actuators		N
	Category 1: A controlled stop with power available to machine actuators. Then removal of power when stop condition has been achieved.		P

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Clause	Requirement – Test	Result - Remark	Verdict
	Category 2: A controlled stop with power left available to machine actuators		N
	With exception for actions in emergency situations and basing on a risk analysis, shut down of power supply can be realised by: Electromechanical devices or Solid state devices		N
9.2.3	Mode of operations of machines:		
	Hazardous condition, resulting from a mode selection, prevented by suitable means		P
	Mode selection does not start up the machine		P
	Separate control action required by operator		P
	Safeguarding means to remain effective for all operating modes		P
	Indication of selected operating mode provided		P
9.2.4	If technical safeguard measures need to be suspended, a mode selection device be provided, capable to be secured in locked position to prevent automatic operation	Not applicable	N
	In addition, one or more of following safety means to be provided:		
	Initiation of a motion by means of a hold to run or similar control device		N
	Portable control station with an emergency stop device and an enabling control device		N
	Initiation of motion possible only from portable control station		N
	Limitation of speed or power of motion		N
	Limitation of range of motion		N
9.2.5	Operation:		
9.2.5.1	Necessary interlocking devices provided for safe operation		N
	Unintended movement of machine prevented after any stopping of machine		N
9.2.5.2	Start of operation possible only when all safeguards are functional, except for conditions stated in cl.9.2.4		N
	For machines where under certain operating conditions no safeguard devices can be applied, manual control of such operations by hold-to- run controls, together with enabling devices		N
	Suitable interlocks provided to secure correct sequential start		N

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Clause	Requirement – Test	Result - Remark	Verdict
	On machines requiring the use of more than one control station to initiate a start:		
	Each control station has a separate, manually actuated start control device	Only one control station	N
	Separate control action required by operator		N
	Safeguarding means to remain effective for all operating modes		N
	Indication of selected operating mode provided		N
	All required conditions for automatic machine operation are fulfilled		N
	All start control devices in released position (OFF), before a start is permitted		N
	All start control devices simultaneously actuated		N
9.2.5.3	Stop functions of categories 0, 1 and/or 2 shall be provided, based on a risk-assessment and functional requirements of the machine		P
	Stop functions of categories 0 and 1 functionally independent of selected operating mode.		P
	Category 0 stop has priority over cat. 1 and 2		P
	Stop functions have priority over start functions		P
	Facilities provided for connection of protective devices / interlocks		N
	If such protective device/ interlock causes a machine stop, it may be necessary to send such condition to the logic of the control system (PLC)		N
	Resetting of stop function must not initiate any hazardous condition		N
9.2.5.4.2	Emergency stop has priority over all other functions and over all modes of operation		P
	Power to machine actuators that can cause hazardous condition(s) removed as quickly as possible without creating other hazards		P
	Resetting must not initiate a restart		P
	Emergency stop acts either as stop of category 0 or as stop of category 1		P
	For determination of category of emergency stop, see risk assessment		P
	If a category 0 stop is used for emergency stop function, it have hard-wired electromechanical components		N
	Operation must not depend on electronic logic control devices (hardware or software) or on transmission of stop commands via communications network or link		P

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Clause	Requirement – Test	Result - Remark	Verdict
	Where a category 1 stop is used for an emergency stop function, final removal of power to machine actuators ensured by means of electromechanical components		N
9.2.5.4.3	Functional aspects of emergency switching-off function are given in IEC 60364-4-46 and should be provided where:		
	Protection against direct contact is achieved only by placing out of reach or by obstacles		N
	There is the possibility of other hazards or damage by electricity		N
	Emergency switching- off is accomplished by disconnecting incoming supply of the machine, effecting in a category 0 stop		N
	When a machine cannot tolerate a category 0 stop, other means of protection is to be provided so that emergency switching-off is not necessary		N
9.2.5.5	Monitoring of command actions:		
	Movement or action of a machine or parts of it, that can result in a hazardous condition be monitored		N
	On manually controlled machines, operators to provide some monitoring		N
	Conditions expected to be unreasonable for monitoring by the operator, require means to monitor such conditions		N
9.2.5.6	Hold-to-run controls (inching switches) require continuous actuation of control devices to achieve operation	No such as controls device.	N
9.2.5.7	Type of two-hand control:		N
	Type I:		
	Two control devices and their and their simultaneous actuation by both hands		N
	Continuous simultaneous actuation during the hazardous condition		N
	Machine operation to cease upon the release of either one or both control devices when the hazardous conditions are still present		N
	Type II:		
	Type I control, requiring release of both control devices before machine operation may be re-initiated		N
	Type III:		
	It shall be necessary to actuate the control de-vices within a certain time limit of each other, not exceeding 0.5 s		N

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Clause	Requirement – Test	Result - Remark	Verdict
	After exceeding this time limit, both controls shall be released before an operation may be re-initiated		N
9.2.5.8	If an enabling device is part of the system, it shall be designed to allow motion when actuated in one position only		N
	In any other position motion shall be stopped		N
	It shall have following features:		
	Connected to a category 0 or to a cat. 1 stop		N
	Designed in consideration with ergonomic principles		N
	Requirements for a two-position type:		
	Position 1: OFF-function of switch (actuator is not operated)		N
	Position 2: enabling function (actuator is operated)		N
	Requirements for a three-position type:		
	Position 1: OFF-function of switch, (actuator is not operated)		N
	Position 2: enabling function of switch, (actuator is operated and in its mid position)		N
	Position 3: OFF-function of switch, (actuator is operated past its mid position)		N
	When returning from position 3 to 2, function not enabled		N
9.2.6	Push-buttons and similar control devices, that when operated, alternately initiate and stop motion use only for functions which cannot produce a hazardous condition		N
9.2.7	Cableless control	Not provided	N
9.2.7.1	Means provided to readily remove or disconnect power supply of operator control station		N
	Means provided as necessary to prevent unauthorised use of operator control station		N
	Each operator control station shall carry an unambiguous indication of which machine is intended to be controlled by that operator control station		N
9.2.7.2	Measures shall be taken to ensure that control commands:		
	Affect intended machine only and		N
	Affect intended functions only		N
	Measures taken to prevent machine from responding signals other than those from intended operator control station(s)		N

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Clause	Requirement – Test	Result - Remark	Verdict
	If necessary, means shall be provided so that machine can be controlled only from operator control stations in one or more predetermined zones or locations		N
9.2.7.3	Operator control station include a separate, clearly identifiable mean to indicate stop function of machine or of all motions which could cause a hazardous condition		N
	Actuating means to indicate this stop function, not marked or labelled as emergency stop device		N
	A machine equipped with cableless control to have means automatically initiating a stop to prevent a hazardous operation for the following situations:		
	a stop signal is received		N
	a fault is detected in the system		N
	a valid signal has not been detected within a certain time, outside of range of cableless control, where no hazardous condition can occur (see annex B)		N
9.2.7.4	Where safety related functions rely on serial data transfer, correct data transfer ensured by applying an error detection method which can cope with up to 3 error bits in any command sequence		N
9.2.7.5	For machines with more than one operator control station, measures taken to ensure, that one control station only can be enabled at a given time		N
	Indication of which operator control station is in control of the machine, provided at suitable locations, as determined by risk assessment of the machine		N
	Exception: stop commands from any one of the control stations shall be effective		N
9.2.7.6	Variation in battery voltage not cause a hazardous condition		N
	Clear warning given to operator of battery powered control stations, if the are controlling one or more potentially hazardous motions when the battery voltage exceeds specified limits		N
	Under those circumstances, operator control station remain functional long enough to bring machine in a non-hazardous condition		N
9.3	Protective interlocks:		
9.3.1	Reclosing or resetting of an interlocking safeguard not to initiate a machine motion or operation which can produce a hazardous condition		N
9.3.2	Where an overtravel causes a hazardous condition, a position sensor or limit switch provided, to initiate appropriate control action		N

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Clause	Requirement – Test	Result - Remark	Verdict
9.3.3	Where non-operation of devices for auxiliary functions causes a hazardous condition, damage to the machine or to the process, appropriate interlocking be provided		N
9.3.4	Interlocks of contactors, relays, etc. Between different operations and for opposite motions, interlocks against such incorrect operation provided		N
	Reversing contactors interlocked in such way, that in normal service no short circuit occurs during switching operation		N
	Where, for safety or for continuous operation, certain functions on the machine are required to be interrelated, proper co-ordination ensured by suitable interlocks		N
	For a group of machines working together in a co-ordinated manner and having more than one controller, provisions made for co-ordination of this controller		N
	If a failure of a mechanical brake actuator can result that the brake, is applied when the associated machine actuator is energised and a hazardous condition results, interlocks be provided to switch off the machine actuator		N
9.3.5	Reverse current breaking on a motor, effective measures taken to avoid motor starting in opposite direction at end of breaking where that reversal causes a hazardous condition, damage to the machine or to the process		P
	Control circuits arranged so, that rotation of a motor shaft, not to result in a hazardous condition		N
9.4	Control functions in the event of failure:		
	Measures to reduce those risks include but are not limited to:		
	protective devices on the machine, (e.g. interlocking guards, trip devices)		N
	protective interlocking of electrical circuit	Safety relay used	P
	use of proven circuit techniques and components (see cl. 9.4.2.)	CE approved component used	P
	provision of partial or complete redundancy (see cl. 9.4.2.2) or diversity (see cl. 9.4.2.3)	Circuit and gas loop used	P
	provision for functional tests (see cl. 9.4.2.4)	Comply with clause 19.6	P
	single failures only are to be considered	Single failure used	P
	for higher levels of risks, it may be necessary to ensure, that more than one failure cannot result in a hazardous condition	No hazard	P
9.4.2	Measures to reduce the risk in case of failure:		

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Clause	Requirement – Test	Result - Remark	Verdict
9.4.2.1	bonding of control circuits to protective circuit for operational purposes (see cl. 9.4.3.1)		P
	connection of control devices in accordance with cl. 9.1.4		P
	stopping by de-energising (see cl. 9.2.2)	Comply with cl.9.2.2	N
	switching of all live conductors to device being controlled (see cl. 9.4.3.1)		N
	use of switching devices having positive (or direct) opening operation (see IEC 60947-5-1)		N
	circuit design to reduce possibility of failures causing undesirable operations		N
9.4.2.2	on-line redundancy for normal operation		N
	off-line redundancy for protective functions, effective only when operating function fails		N
	where off-line redundancy is use, suitable measures taken, to ensure that those control circuits are available when required		N
9.4.2.3	Use of control circuits having different principles of operation or using different types of devices may reduce faults and failures. Examples include:		
	Combination of normally open and normally closed contacts operated by interlocking guards		N
	Use of different types of circuit components in control circuit		N
	Combination of electromechanical and electronic circuits in redundant configurations		N
	Combination of electrical and non-electrical systems (e.g. mechanical, hydraulic, pneumatic) may perform redundant functions and provide diversity		N
9.4.2.4	Automatic functional test carried out by the control system	Comply with clause 19.6	P
	Manual function tests by inspection	Comply with clause 19.6	P
	Tests at start-up and at predetermined intervals or as a	Comply with clause 19.6	P
	Combination as appropriate (see cl.18.2 and 19.6)	Comply with clause 19.6	P
9.4.3	Protection against mal-operation due to earth faults, voltage interruptions and loss of circuit continuity:		
9.4.3.1	Earth faults on any control circuit causes no unintentional starting, potentially hazardous motions or prevent stopping of machine	No such hazard	N
	For fulfilment of this requirement, bonding to PE-circuit provided and correct connection of devices ensured (see cl. 8.2 and cl 9.1.4)		N

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Clause	Requirement – Test	Result - Remark	Verdict
	Control circuits fed from transformer and not connected to PE- circuit provided with an insulation monitoring device		N
	Multi-pole control switches which interrupt all live conductors use for START or STOP functions, which could cause hazardous condition or damage to the machine, in the event of unintentional starting or failure to stop.		N
9.4.3.2	If control system uses a memory device, proper functioning in the event of power failure ensured to prevent any loss of memory that could result in a hazardous condition		N
9.4.3.3	If loss of continuity of safety-related control circuits depending upon sliding contacts which could result in a hazardous condition, appropriate measures be taken	No sliding contact used	N
10	**OPERATOR INTERFACE AND MACHINE-MOUNTED CONTROL DEVICES**		P
10.1.1	Devices to be selected, mounted and identified or coded acc. To EN 60073 and EN 60447		P
10.1.2	Machine-mounted control devices readily accessible for service and maintenance and	Readily accessible for service and maintenance	P
	Mounted to minimise possibility of damage from activities such as material handling	Mounting style have been not influenced by material handling	P
	Actuators of hand-operated control devices selected and installed as follows:		
	Mounted not less than 0.6 m above servicing level, and within easy reach for operator (normal working position)	1.3m service level and easy reach of normal working	P
	Placed so that operator is not exposed to a hazardous situation when operating them	Not place in the hazardous position	P
	Possibility of inadvertent operation is minimised	No possible,see user manual	P
10.1.3	Degree of protection sufficient for expected use against:		
	Effects of aggressive liquids, vapours or gases in environment of machine		P
	Ingress of contaminants		P
	Operator interface control devices have a minimum degree of protection against direct contact of IPXXD		P
10.1.4	Position sensors arranged so, that they will not be damaged in the event of over travel		P
	Position sensors use in circuits with safety-related functions either have positive opening operation or provide similar reliability		P

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Clause	Requirement – Test	Result - Remark	Verdict
10.1.5	Portable or pendant operator control stations and control devices selected or arranged in such way as to minimise possibility of inadvertent machine operations caused by shocks and vibrations		N
10.2.1	Pushbutton actuators colour-coded acc. To table 2		N
10.2.2	Recommendation that pushbuttons are preferably marked directly on actuator with symbols acc. To table 2		N
10.3.1	Colours for indication lights: RED, YELLOW, GREEN, BLUE Colours for confirmation: GREEN and WHITE		P
10.3.2	Unless otherwise agreed between supplier and user, indicator light lenses colour-coded with respect to status of machine acc. To table 3		P
	Alternative meanings may be assigned in accordance to following criteria:		
	safety of persons and environment		P
	state of electrical equipment	state of electrical equipment	P
10.3.3	Flashing lights for further information may be used for following purposes:		P
	to attract attention or	Flash lights used	P
	to request immediate action or		P
	to indicate a discrepancy between command and actual state or		P
	to indicate a change in process (flashing during transition)		P
	higher frequency of flashing lights (pulse/pause ratios) recommended for higher priority of information		P
10.4	Illuminated push-button actuators colour-coded acc. To tables 2 and 3		N
	WHITE colour shall be use, if it is difficult in assigning an appropriate colour		N
	RED colour shall be use, for emergency stop actuators, not depending upon illumination conditions (ON /OFF status) only		N
10.5	Rotary control devices having a rotational member such as potentiometers and selector switches, mounted in such way as to prevent rotation of stationary member		N
10.6	Start devices use to initiate start functions or movement of machine or elements designed and mounted such as to minimise inadvertent operation		N
	Mushroom – type actuators use for two-hand control devices		N
10.7	Devices for emergency stop:		

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Clause	Requirement – Test	Result - Remark	Verdict
10.7.1	Devices for emergency stop readily accessible		N
	Devices for emergency stop located at each operator control station and other locations where initiation of emergency stop is required (see cl. 9.2.7.3 for exception)		N
10.7.2	Types of devices for emergency stop include following elements:		
	push-button operated switch or		N
	pull-cord operated switch or		N
	pedal-operated switch without mechanical guard		N
	Devices be of self- latching type and contacts are of positive (or direct) opening operation		N
10.7.3	It is not possible to restore an emergency stop circuit, until the emergency stop device has been manually reset		P
10.7.4	Actuators of emergency stop devices are coloured RED		P
	Background immediately around actuator is coloured YELLOW		P
	Actuator of pushbutton operated emergency stop device shall be of palm- or mushroom head type		N
10.7.5	Supply disconnecting device may be locally operated to serve as function of emergency stop when:		
	it is readily accessible to operator		N
	it is of type described in cl. 5.3.2 a), b) or c)		N
	Supply disconnecting device shall meet colour requirements of cl. 10.7.4		N
10.8	Devices for emergency switching off:		
10.8.1	Location of emergency switching-off devices normally placed separate from operator control station		N
	Operator control station equipped with separate emergency stop device, since function effects a category 0 emergency stop		N
10.8.2	Types of emergency switching-off devices include: Push-button operated switch or		N
	Pull-cord operated switch		N
	Devices of self-latching type and ensure positive (or direct) opening operation		N
	Push-button operated switch in break-glass enclosure		N
10.8.3	Not possible to restore an emergency switching-off circuit, until device have been manually reset		N

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Clause	Requirement – Test	Result - Remark	Verdict
	Where several emergency switching-off devices are in a circuit, it is not possible to restore that circuit, until all emergency switching-off devices have been reset		N
10.8.4	Actuators of emergency switching-off devices are coloured RED		N
	Background immediately around actuator (push-button) coloured YELLOW		N
	Actuators of push-button operated emergency switching-off devices be of palm- or mushroom-head type		N
10.8.5	When supply disconnecting device is locally operated for emergency switching-off, it shall be readily accessible		N
	Supply disconnecting device locally operated for emergency switching-off, shall meet colour requirement acc. To cl. 10.8.4		N
10.9	Displays selected and installed in such manner as to be visible from normal position of operator	Comply with requirements	P
	If displays are used as warning devices, it is recommended, that are of flashing or rotary type equipped with audible warning device		N
11	**ELECTRONIC EQUIPMENT**		P
11.2.1	Basic requirements: Indication of status of all digital inputs and outputs provided	Label used for input and output	P
11.2.2	All input /output card racks, processor-racks, power supply units etc. Electrically bonded together acc. To suppliers specifications and connected to PE-circuit (see cl. 8.2.3)		N
	If necessary for operation, some equipment be isolated from PE- circuit, such equipment be excluded from this requirement (see cl. 8)		N
11.3.1	PLC's to conform to relevant IEC standards		N
11.3.2	Means provided to prevent memory alteration by unauthorised persons		N
	Requirements of cl.9.4.3.2 shall be fulfilled		N
11.3.3	Equipment using PLC's have means for verifying, that software is in accordance with relevant program documentation		N
11.3.4	PLC equipment not be used for category 0 emergency stop functions (safety-related stop functions)		N

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Clause	Requirement – Test	Result - Remark	Verdict
	The use of hard-wired electromechanical devices is preferred for all other safety-related stop functions		N
	If PLC equipment is used for such functions, then appropriate measures acc. To cl. 9.4 shall be employed		N
	Above requirements not preclude use of PLC equipment for monitoring, testing or back-up functions, but such equipment not prevent the correct operation of those functions		N
12	**CONTROLGEAR: LOCATION, MOUNTING, AND ENCLOSURES**		P
12.1	All control gear located and mounted so, as to cover the following points: facilitate accessibility and maintain ability	All control gear located and mounted are facilitated accessibility and maintain ability	P
	facilitate protection against external influences or operating conditions under which operation is intended	Screw used	P
	facilitate easy access for operation and maintenance of the machine and its associated equipment	Easy accessible	P
12.2	Location and mounting:		
12.2.1	all control-gear components placed and oriented so, that identification is possible without moving them or the associated wiring	Component lane layouted	P
	Components checked for correct operation or possible replacement without dismantling other equipment or parts of the machine	Comply with requirements	P
	Terminals not associated with control gear also to conform to this requirement	Comply with requirements	P
	Operation and maintenance of all control gear possible from front of cabinet		P
	Special tools for removal of electronic devices provided with the equipment		N
	Access for regular maintenance or adjustment to equipment, relevant devices located between 0.4m to 2.0 m above servicing level	At least 1.0m provided	P
	Terminals located at least 0.2 m above servicing level and placed such, that conductors and cables can be easily connected	At least 0.2m above servicing level	P
	No devices mounted on doors, except those for operating, indicating, measuring and cooling purposes on normally removable access-covers of enclosure	No devices mounted on doors	P

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Clause	Requirement – Test	Result - Remark	Verdict
	Plug-in type control devices belonging functionally together, their association made clear by type (shape), marking or reference designation single or in combination (see cl. 14.4.5)	No plug-in type control devices	N
	Plug-in type control devices, that are handled during normal operation, shall be designed with non-interchangeable characteristics, where lack of such facility can result in malfunctioning	No plug-in type control devices	N
	Plug/socket combinations, handled during normal operation, shall be located and mounted so as to provide unobstructed access	No plug/socket combination device	N
	If test points are provided, they should be:		
	mounted so as to provide unobstructed access		N
	clearly marked to correspond with the documentation (see cl. 18.3)		N
	adequately insulated		N
	sufficiently spaced for connection of test equipment or means		N
12.2.2	Non-electrical parts and devices, not directly associated with the electrical equipment, not located within enclosures containing control gear	Comply with requirements	P
	Devices such as solenoid valves separated from other electrical equipment	Not provided	N
	Control devices mounted at same location and connected to the main supply voltage, or to both main supply and control voltage, are grouped separately from those connected to control voltage only	Main supply and control voltage are grouped separately	P
	Terminals separated into groups for: power circuits or	Terminals separated into: power circuits, control circuit, protective bonding	P
	associated control circuits or		P
	other control circuits, fed from external sources		N
	Terminal groups mounted adjacently, providing that each group is readily identified	Clear mark the identified marking	P
	When arranging the location of devices, clearances and creepage distances specified for them shall be maintained, taking into account external influences or physical conditions of its environment	Comply with clearances and creepage distance requirement.	P
12.2.3	Heat generating components located so, that temperature of each component in its vicinity remains within the permitted limits		N
12.3	Degrees of protection:		

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Clause	Requirement – Test	Result - Remark	Verdict
	Protection of control gear against ingress of solid foreign objects and liquids shall be adequate. External influences under which the equipment is intended to operate is to be taken into account and is to be	Enclosure and barriers used	P
	Its protection sufficient against dust, coolants and swarf	Comply with requirement	P
	Enclosures of control gear provide a degree of protection of at least IP22		P
	Exceptions:		
	a) Where an electrical operating area is use as a protective enclosure for an appropriate degree of protection against ingress of solid bodies and liquids		N
	b) Where removable collectors on collector bar systems are use, and IP22 is not achieved but measures of cl. 6.2.5 are applied		N
12.4	Enclosures doors and openings:		
12.4	Enclosures to withstand mechanical, electrical and thermal stress as well as effects of humidity during normal service	Metal used	P
	Fasteners for doors or covers of captive type		N
	Windows for viewing internally mounted indicating devices, made of material suitable to withstand mechanical stress and chemical attack		N
	Doors of enclosure not wider than 0,9 meter		N
	Doors with vertical hinges, preferably lift-off type		N
	Doors with opening angle of at least 95 °		N
	Gaskets of doors, lids, covers and enclosures withstand the chemical effects of aggressive liquids, vapours or gases use on the machine		N
	Means use to maintain degree of protection of an enclosure of doors, lids and covers that require opening or removed for operational or maintenance shall:		
	be securely attached to either door, cover or enclosure		N
	not deteriorate due to removal or replacement of door or cover and so impair degree of protection		N
	all openings in enclosure closed by supplier(s), ensuring degree of protection specified for equipment		N
	openings for cable entries at enclosure to be easily re-opened on site		N
	suitable opening in base of enclosure within the machine provided, as to enable drainage of moisture due to condensation		N

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Clause	Requirement – Test	Result - Remark	Verdict
	no opening between enclosure containing electrical equipment and compartment containing coolant, lubricating or hydraulic fluids		N
	holes in enclosure for mounting purposes not impair required degree of protection	Not impair required degree of protection Hole open to down	P
	If equipment could attain a surface temperature sufficient to cause a risk of fire during normal or abnormal operation:		
	located within an enclosure, that can withstand, without risk of fire or harmful effect, the heat emitted by the equipment or		N
	mounted and located at sufficient distance from adjacent equipment, so as to allow safe dissipation of heat or		N
	otherwise screened by material that can withstand, without risk of fire or harmful effect, the heat emitted by the equipment		N
12.5	Access to control gear:		
	Minimum dimensions of doors and corridors for access to electrical operating areas: at least 0.7 meter wide and 2.0 meter high	Not applicable	N
	Doors open outwards		N
	Doors equipped with means to allow opening from inside without the use of a key or tool		N
13	**CONDUCTORS AND CABLES**		
13.1	Conductors and cables selected so as to be suitable for operating conditions and external influences that are existing	Comply with requirement	P
	Requirements not applicable for integral wiring of assemblies, subassemblies and devices that are manufactured and tested acc. To their relevant standard	Conform to relevant IEC standards	P
13.2	Generally conductors shall be of copper	Copper used	P
	Conductors of other material shall have nominal cross-section area such that, carrying the same current, max. Conductor temperature does not exceed values given in table 4		N
	If aluminium conductors are used, the min. Cross-sectional area to be at least 16 mm^2		N
	Max. Permitted conductor temperatures under normal-/ short circuit conditions will not exceed values given in table 4	PVC insulation, Normal temperature < 40℃, (Limited 70℃)	P

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Clause	Requirement – Test	Result - Remark	Verdict
	All conductors which are subject to frequent movement to be of flexible stranded copper acc. To class 5 or class 6 (see table C.4 in annex C)		N
13.3	Types of insulation include: Polyvinyl chloride (PVC)	PVC used	P
	Rubber, natural and synthetic		N
	Silicone rubber (SiR)		N
	Mineral		N
	Cross-linked Polyethylene (XLPE)		N
	Ethylene Propylene Rubber compound (EPR)		N
	Poly-Tetra-Fluor-Ethylene (PTFE)		N
	Where insulation of conductors or cables can constitute hazards due to propagation of fire or emission of toxic/ corrosive fumes, guidance from cable supplier to be sought		N
	Special attention to integrity of a circuit having a safety-related function		N
	Dielectric strength of insulation adequate for required test voltage with a 5min. of 2000VAC for cables operating with voltages >50VAC or >120 VDC	After 2000VAC for a duration of 5 minutes, insulation not damage	P
	For separate PELV circuits, dielectric strength adequate for test voltage of 500VAC for a duration of 5 minutes	After 500VAC for a duration of 5 minutes, insulation not damage	P
	Mechanical strength and thickness of insulation such that, insulation cannot be damaged during cable laying or in operation	Comply with requirement	P
13.4	Cross-sectional area of a conductor to be such, that under stated conditions, conductor temperature does not exceed the values given in table 4	PVC used Normal temperature <40℃	P
	Current-carrying capacities for PVC insulated wiring between enclosures and individual items of equipment under steady-state conditions according to values given in table 5	Copper used	P
13.5	Voltage drop from point of supply to load not exceeding 5% of nominal voltage under normal operating conditions	Voltage drop < 5%	P
13.6	To ensure adequate mechanical strength, cross-sectional area of conductors not less than values given in table 6.	Copper used	P
13.7.1	Flexible cables have cl. 5 or cl. 6 conductors (see table C.4)	Not applicalbe,user provide	N
	cables exposed to severe duties shall be of adequate construction to protect against:		

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Clause	Requirement – Test	Result - Remark	Verdict
	abrasion due to mechanical handling and dragging across rough surfaces		N
	kinking to operation without cable guides		N
	stress resulting from guide rollers and forced guiding, being wound and re-wound on cable drums		N
13.7.2	Cable handling system of machine designed such, as to keep tensile stress of conductors as low as practicable during machine operation		N
	tensile stress for copper conductors not to exceed 15 N/mm^2 of copper cross section area		N
	where tensile stress of conductors is exceeding 15 N/mm^2 , cables of special design are use		N
	maximum stress for flexible cables agreed with the cable manufacturer		N
13.7.3	Cables wound on drums selected such, as the maximum allowable conductor temperature is not exceeded		N
	cables for circular cross-section area, installed on drums, max. Current-currying capacity in free air as declared acc. To table 7		N
13.8.1	Collector wires, collector bars and slip-ring assemblies:		
	They shall be installed or enclosed in such way, that during normal access to the machine, protection against direct contact is achieved by application by one of the following protective measures:		
	protection by partial insulation of live parts	Comply with requirement	P
	protection by enclosure or barriers provide a degree of protection of at least IP2X		P
	horizontal top surfaces of barriers or enclosures which are readily accessible provide a degree of protection of at least IP4X		N
	if required degree of protection is not achieved, protection by placing live parts out of reach in combination with emergency switching-off acc. To cl. 9.2.5.4.3 applied		N
	collector wires and bares placed such and / or protected as to prevent contact, especially for unprotected wires and bars, with conductive items such as, cords of pull-cord switches, strain-relief devices and drive chains and		N
	prevent damage from a swinging load		N
13.8.2	Where collector wires, collector bars and slip-ring assemblies are installed as part of the PE-circuit, they do not carry current in normal operation	No current through PE circuit	P

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Clause	Requirement – Test	Result - Remark	Verdict
13.8.3	Protective conductors of current collectors have a shape or are designed such, so that they are not interchangeable with other current collectors of the sliding contact type	No interchangeable	N
13.8.4	Removable current collectors with disconnector function are designed such, that PE-circuit is interrupted only after live conductors have been disconnected and the continuity of the PE-circuit is re-established before any live conductor is reconnected		N
13.8.5	Clearances between respective conductors and between adjacent systems of collector wires, bars, slip-ring assemblies and their current collectors designed for operation in pollution degree 3 conditions	Enough clearances Clearance distance >3.0mm Creepage distance >6.3mm	P
13.8.6	Creepage distances suitable for operation in pollution degree 3	pollution degree 3 used Clearance distance >3.0mm Creepage distance >6.3mm	P
	In abnormally dusty, moist or corrosive environments, following creepage distances apply:		
	for unprotected collector wires, bars and slip-ring assemblies equipped with insulators, the minimum creepage distance is 60 mm		N
	for enclosed collector wires, insulated multipole collector bars and insulated individual collector bars, the minimum creepage distance is 30 mm		N
	gradual reduction of insulation values due to unfavourable ambient conditions regarded		N
13.8.7	Suitable design measures taken, in order to prevent energisation of adjacent sections by current collectors themselves		N
13.8.8	Collector wires, collector bar systems and slip-ring assemblies use for power circuits kept separately from those use for control circuit applications	Power circuits kept grouped separately from control circuit applicants	P
	above systems capable of withstanding without damage to mechanical forces and thermal effects of short circuit currents	Comply with requirements	P
	removable covers to above systems, laid underground or under floor, designed that they cannot be opened by one person without the use of a tool		N
	collector bars which are installed in a common metal enclosure, the individual section of it bonded together and earthed at several points depending upon their length		N
	Metal covers of collector bars laid underground or under floor, bonded together end earthed		N

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Clause	Requirement – Test	Result - Remark	Verdict
	Underground and under floor collector bar ducts have drainage facilities		N
14	**WIRING PRACTICES**		P
14.1.1	All connections, especially those of the protective bonding circuit, secured against accidental loosening	Terminal and bonding used for fixing	P
	Means of connection suitable for cross-sectional areas and nature of conductors being terminated	Comply with requirement	P
	For aluminium or aluminium alloy conductors, consideration given due to prevention of problems of electrolytic corrosion (see cl. 13.2)	Not aluminium or aluminium alloy conductor used	N
	Connection of two or more conductors to one terminal only where terminal is designed for that purpose	Press wire terminal used for two or more conductors	P
	Only one PE-conductor connected to one terminal connecting point	Only one PE-conductor connected to one terminal connecting point	P
	Soldered connections only, where terminals are provided which are suitable for soldering connections	No solderd used	N
	Terminals on terminal blocks plainly identified to correspond with markings on wiring diagrams	Marking intended for using	P
	Installation of flexible conduits and cables such, that liquids are drained away from fittings and joints	No liquids	N
	Means to retain stranded conductors together when terminating conductors at terminals/ devices provided	Press wire terminal provided	P
	Solder not use for that purpose		N
	Shielded conductors terminated so, as to prevent fraying of strands and to permit easy disconnection	No shielded conductors used	N
	Identification tags legible, permanent and appropriate for physical environment	Marking legible and permanent	P
	Terminal blocks mounted and wired so, that internal and external wiring does not cross over terminals	No cross	P
14.1.2	Conductors and cables runned from terminal to terminal without splices or joints	Connector used for connecting between terminals	P
	Where it is impracticable to provide terminals in a junction box, splices or joints may be use		N
	Where it is necessary to connect or disconnect cables, sufficient extra length provided for that purpose	Sufficient extra length provided	P
	Terminations of cables adequately supported to prevent mechanical stress at termination points of conductors	Adequately supported	P
	Protective conductor (PE) placed close to associated conductors in order to decrease loop impedance	Close placed	P

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Clause	Requirement – Test	Result - Remark	Verdict
14.1.3	Conductors of different circuits laid side by side and occupy the same duct or be in same multiconductor cable, provided that such arrangement does not impair proper functioning of respective circuits	Conductor for different circuits laid side by side.	P
	Where circuits operate at different voltage levels, conductors separated by suitable barriers or insulated for maximum voltage to which any conductor within the same duct is subjected	Enough insulation provided	P
14.2	Identification of conductors:		
14.2.1	Conductors identifiable at each termination point acc. To technical documentation	Identification at each termination	P
	If colour coding of conductors applies, conductors coded over its full length, either by colouring of insulation or coloured markings	GREEN – AND – YELLOW used	P
	As an acceptable alternative, additional identification at selected locations use		N
	For safety reasons, colour GREEN or colour YELLOW not use where there is a possibility or confusion with the bicolour combination: GREEN – AND – YELLOW	Bicolour combination Green or Yellow used in protective earthing only	P
	GREEN or YELLOW as a single code must not be use, except in bicolour combination GREEN-AND-YELLOW		N
14.2.2	Protective conductor readily distinguishable by shape, location, marking or colour	See below	P
	Bicolour combination GREEN- AND- YELLOW use throughout the length of the conductor	Bicolour combination GREEN- AND- YELLOW used throughout the length of the conductor	P
	This colour identification is strictly reserved for the protective conductor, so that it can be easily identified by its shape	Bicolour combination GREEN- AND- YELLOW used throughout the length of the conductor	P
	Ends or accessible positions of a protective conductor clearly identified by graphical symbol or by bicolour combination GREEN- AND- YELLOW	Ends or accessible positions of a protective conductor clearly identified by graphical symbol	P
14.2.3	Where a circuit includes a neutral conductor identified by colour, the colour is LIGHT BLUE		N
	LIGHT BLUE must not be use for identification of any other conductor where confusion is possible		N

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Clause	Requirement – Test	Result - Remark	Verdict
	Where bare conductors are use as neutral conductors and identification by colour is use, they either be coloured by LIGHT BLUE stripes, 15 to 100 mm wide in each compartment or unit, or at each accessible position		N
	Bare conductor colour coloured LIGHT BLUE over its full length		N
14.2.4	Identification of other conductors by colour, number, alphanumeric or a combination of colour and numbers or alphanumeric	Alphanumeric used Black—ac Red--- ac control circuits	P
	When numbers are use, they are in Arabic writing ; letters are in Roman characters	Arabic writing are used	P
14.3	Panel wiring supported where necessary to keep it in place	Keep in place and modify from front door,and against flame	P
	Non-metallic ducts permitted only when they are of flame-retardant insulating material	Non-metallic ducts no used	N
	Electrical equipment mounted inside cabinets, designed to permit modification of wiring from front of cabinet (see cl. 12.2.1)	Modification of wiring from front of cabinet	P
	Where that is not possible, access, doors or swingout panels provided		N
	Connections to devices mounted on doors or to other movable parts made with flexible conductors (acc. To cl.13.2) to allow for frequent movement of those parts		N
	Conductors be anchored to the fixed part and the movable part, independently of the electrical connection		N
	Conductors and cables that do not run in ducts are adequately supported		N
	Terminal blocks or plug /socket combinations use for control wiring, that extends beyond the enclosure	Incoming supply conductor terminal blocks used	P
	Power cables and cables for measuring-circuits are directly connected to terminals of field located devices		N
14.4	Wiring outside enclosures:		
14.4.1	Introduction of cables- or ducts by means of individual glands, bushings etc. Into an enclosure must not reduce degree of protection of it		N
14.4.2	Conductors and their connections outside of the enclosure, are enclosed in suitable ducts as described in cl. 14.5		N

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Clause	Requirement – Test	Result - Remark	Verdict
	Exempt from above requirements are suitably protected cables, installed without ducts and with or without use of open cable trays or cable supporting means		N
	Fittings use with ducts or multiconductor cables are suitable for the physical environment		N
	Flexible conduit or flexible multiconductor cable is used for flexible connections to pendant push-button stations		N
	Weight of pendant stations is supported by other means than flexible conduits or flexible multicore cables		N
	Flexible conduits or flexible multicore cables use, for connections involving small or infrequent movements		N
	Flexible cables also permitted to complete the connection of normal stationary motors, position switches and other externally mounted devices		P
	Where prewired devices are supplied, the integral cables not enclosed in a duct		N
14.4.3	Connection to moving elements of the machine		N
	Connections to frequently moving elements of the machine, designed acc. To cl. 13.2		N
	Flexible cables and conduits installed so, as to avoid excessive flexing and straining, particularly at the fittings		N
	Cables exposed to movement supported in such way, as to prevent mechanical strain at connecting points		N
	If this is achieved by use of a loop, it has sufficient length to provide for a bending radius of at least 10 times the diameter of the cable		N
	Flexible cables of machines installed or protected in such way, as to minimise the possibility of external damage due to factors, that include the following cable use or potential abuse:		N
	being runned over by the machine itself		N
	being runned over by vehicles or other machines		N
	coming into contact with the machine structure during movements		N
	running in and out of cable baskets or, on / off cable drums		N
	acceleration and wind forces on festoon systems or suspended cables		N
	excessive rubbing by cable collector		N

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Clause	Requirement – Test	Result - Remark	Verdict
	exposure to excessive radiated heat		N
	Cable sheath resistant to normal wear expected from normal movement and effects of atmospheric contaminants		N
	Where cables are close to moving parts, space of at least 25mm maintained between moving parts and cables		N
	Where that distance is not practicable, fixed barriers provided between cables and moving parts		N
	Cable handling system designed such, that lateral cable angle does not exceed 5°, avoiding torsion at the cable when		N
	being wound on and off the cable drums and		N
	approaching and leaving cable guidance's		N
	measures taken to ensure that at least two turns of cable remain on the drum		N
	cable guides designed such, that the inner bending radius is not less than values given in table 8		N
	straight section between two bends at least 20 times the cable diameter		N
	construction and supporting means prevent damage to flexible cable under all operating conditions		N
14.4.4	Interconnection of devices on the machine	Comply with requirements	P
	In case where several sensors or control elements are connected in series, it is recommended to connect them via intermediate terminals	Comply with requirements	P
	Intermediate terminals are adequately protected	Comply with requirements	P
	Intermediate terminals are indicated on the wiring diagram	Comply with requirements	P
	This enables easy access for testing purposes	Comply with requirements	P
14.4.5	Plug/socket combinations		N
	Plug /socket combinations are of adequate size and have sufficient contact pressure plus a wiping action to ensure electrical continuity		N
	Clearances between contacts are adequate for the voltage levels use		N
	Plug/socket combinations of such type and installed in such way, as to prevent unintentional contact with live parts at any time		N
	Plug/socket combinations are designed so, that PE-circuit connection is made before any live connections are made.		N

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Clause	Requirement – Test	Result - Remark	Verdict
	This applies vice versa when the plug/socket combinations are disconnected		N
	Plug /socket combinations rated for 63 A or above are of interlocked type with an appropriate switch		N
	Where more than on plug /socket combination is use for the same electrical equipment, it is clearly marked for identification		N
	Plug /socket combinations in accordance with IEC 60309-1 or of a type use for domestic applications shall not be use in control circuits		N
14.4.6	If wiring needs to be disconnected for shipment, terminals or plug/socket combinations are provided at the disconnecting points	Comply with requirements	P
14.4.7	Additional wiring for maintenance or repair purposes provided	Comply with requirements	P
14.5	Ducts, connection boxes and other boxes:		
14.5.1	Ducts provide a minimum degree of protection of IP33	Comply with requirements	P
	All sharp edges, flash, burrs, rough surfaces or threads which the insulation of conductors may come into contact, removed from ducts and conduits	Comply with requirements	P
	In order to avoid confusion between conduits for electrical installation and those for oil, water or air, either physically separated or suitably identified	Comply with requirements	P
	Ducts or cable trays rigidly supported and positioned at sufficient distance from moving parts	Comply with requirements	P
	Ducts or cable trays mounted at least 2 meters above the working surface in areas where human passage is required		N
	Ducts provided only for mechanical protection (see cl. 8.2.3)	Comply with requirements	P
	Cable trays which are partially covered, not to serve as cable trays or installation trunking	Comply with requirements	P
	Conductors and cables suitable for installation in cable trays	Comply with requirements	P
14.5.2	Cable trays dimensioned or located such, as to enable easy access for installation of additional conductors and cables	Comply with requirements	P
	Consideration given on percentage of filling of such ducts.	Comply with requirements	P
14.5.3	Rigid metal conduits or trays consist of galvanised steel or corrosion-resistant material, suitable for the environmental conditions.		N
	Application of cable trays of different metal avoided, due to electrolytic corrosion		N

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Clause	Requirement – Test	Result - Remark	Verdict
	Installation conduits secured, held in place and supported at each end		N
	Joints and fittings compatible with conduits and appropriate for its application		N
	Conduit-bends fabricated such, as to avoid damage or reduction of internal cross-section		N
14.5.4	Flexible metallic conduits and fittings consist of flexible metal tubing or wire mesh armour.		N
	They are suitable for its application and environmental conditions		N
14.5.5	Flexible non-metallic conduits are resistant to buckling and with similar characteristics as the sheath of multicore cables	Comply with requirements	N
	They shall be suitable for its application and environmental conditions	Comply with requirements	N
	Joints and fittings compatible with conduits and appropriate for its application	Comply with requirements	N
14.5.6	Cable trunking systems outside of enclosures are rigidly supported and kept clear of moving and contaminating parts of the machine		N
	Covers of cable trunking designed such, as to overlap at both sides of cable trunking (see cl. 14.5.6)		N
14.5.7	Installation of cables layed in cable trays with covers permitted within the machine-foundations, providing that they are completely closed and separated from coolant and lubrication systems (see cl. 14.5.6)		N
14.5.8	Cable connection boxes and junction boxes use for wiring purposes are readily accessible for maintenance (see cl. 12.3)	Comply with requirements	P
	They provide protection against ingress of solids or liquids, taking into account external influences during operation of the machine (see cl. 12.3)	Comply with requirements	P
	Junction boxes not have openings for cable entries and are designed so, as to avoid ingress of entrained dust, lubricants and coolant	Comply with requirements	P
14.5.9	Motor terminal boxes use for motor cable connection and for devices attached to the motor		P
15.	**ELECTRIC MOTORS AND ASSOCIATED EQUIPMENT**		P
15.1	Electric motors are conform to EN 60034-1		P
	Electric motors and associated equipment protected against following risks:		
	overcurrent (see cl. 7.2)	See cl. 7.2	P

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Clause	Requirement – Test	Result - Remark	Verdict
	thermal overload (see cl. 7.3)	See cl. 7.3	P
	overspeed (see cl. 7.6)	See cl. 7.6	P
	Compliance ensured with the requirements stated (see clauses 5.3, 5.4, 5.5, 7.5, 7.6 and 9.4)	See clauses 5.3, 5.4, 5.5, 7.5, 7.6 and 9.4	P
	Motor control equipment located and mounted acc. To cl. 12	See cl. 12	P
15.2	Selection of motor enclosure recommended acc. To EN 60034-5		P
	Degree of protection at least IP23		P
	Incorporated motors mounted such, as to provide adequate protection against mechanical damage		P
15.3	Dimensions of motors conform to those given in IEC regulations (see EN 60072-1 and EN 60072-2)		P
15.4	Each motor with associated coupling, belt, pulley or chain mounted such, as to provide adequate protection and easy access for inspection, maintenance, adjustment or alignment, lubrication and replacement		P
	Motors mounted such, as to allow easy access to all terminal boxes		P
	Motors mounted such, as to ensure proper cooling Temperature rise to be within limits of relevant insulation class		P
	Temperature rise within limits of relevant insulation class		P
	If possible, motor compartments stay clean and dry and when required, ventilated directly to the outside of the machine		P
	Motor-vents at an acceptable level and designed such, as to avoid ingress of swarf, dust or water spray		P
	No opening between motor compartment and any other compartment, which does not fulfil the requirement for motor compartments		P
15.5	Electric motors selected acc. To service and environmental conditions		P
	Design criteria for evaluation include: type of motor and		P
	type of duty cycle (see IEC 60034-1) and		P
	fixed speed or variable speed operation and		P
	mechanical vibrations and		P
	type of converter for motor speed control and		P

EN 60204-1			
Clause	Requirement – Test	Result - Remark	Verdict
	influence of the harmonic spectrum of voltage and/or current when supplied from static converter on the temperature rise and		P
	method of starting and possible influence of inrush current		P
	variation of counter torque load with time and speed		P
	influence of loads with large inertia and		P
	influence of constant torque or constant power operation and		P
	possible need of inductive reactors between motor and converter		P
15.6	Operation of overload or overcurrent protective devices for mechanical brake-actuators initiate simultaneous de-energisation(release) of associated machine actuators		P
16.	**ACCESSORIES AND LIGHTING**		P
16.1	Where the machine or its associated equipment is provided with socket-outlets for auxiliary equipment, the following will apply:		
	socket-outlets are conform to regulations	Not applicable	N
	if not possible, they are clearly marked with voltage and current ratings		N
	continuity of protective bonding circuit to be ensured		N
	all unearthed conductors connected to socket-outlets, protected against overcurrent		N
	when required, protection against overload in accordance with cl. 7.2 and cl. 7.3 separately from protection of other circuits		N
	if power supply to socket-outlets is not disconnected, than requirements of cl.5.3.5 apply		N
16.2.1	Connection to PE-circuit acc. To cl. 8.2.2		P
	ON-OFF switch not incorporated in lampholder or in flexible connecting cord		P
	Stroboscopic effects from lights avoided		P
	If fixed lighting is provided in an enclosure, electromagnetic compatibility (EMC) taken into account		P
	Application of EMC requirements acc. To principles stated in cl. 4.4.2		P

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Clause	Requirement – Test	Result - Remark	Verdict
16.2.2	Nominal voltage of local lighting circuits not exceeding 50 V		N
	If higher voltages are applied, value not exceeding 250 V between conductors		N
	Lighting circuits supplied from one of the following sources:		
	from a dedicated isolating transformer connected to load side or		N
	overcurrent protection provided in secondary circuit or		N
	a dedicated isolating transformer connected to line side provided or		N
	source permitted for maintenance purpose or		N
	lighting circuits placed in control enclosures only or		N
	overcurrent protection provided in secondary circuit or		N
	from a machine-circuit with dedicated overcurrent protection or		N
	from an isolating transformer connected to line side of supply disconnecting device, when a dedicated primary disconnecting means and a secondary overcurrent protection are provided or		N
	for an externally supplied lighting circuit, which is only permitted in a control enclosures		N
	where fixed lighting is out of reach for operator during normal operations, provisions of this subclause do not apply		N
16.2.3	local lighting circuits protected		N
16.2.4	adjustable lighting fittings suitable for the physical environment provided		N
	lampholders in accordance with relevant IEC-publications and		N
	designed of an insulating material protecting the lamp cap, as to prevent unintentional contact		N
	reflectors supported by a bracket and not by the lampholder		N
	where fixed lighting is out of reach for operator during normal operations, provisions of this subclause do not apply		N
17.	**MARKING, WARNING SIGNS AND REFERENCE DESIGNATIONS**		
17.1	Electrical equipment marked with supplier's name, trade mark or other identifying symbol and if required with a certification mark	See label	P

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Clause	Requirement – Test	Result - Remark	Verdict
	Warning signs, nameplates, markings- and identification plates of sufficient durability to withstand the physical environment involved	Metal label used	P
17.2	Enclosures which do not clearly show otherwise, that they contain electrical devices, are marked with a black lightning flash on a yellow background within a black triangle		N
	Warning sign plainly visible on the enclosure, door or cover-plate		P
	The warning sign may be omitted for:		
	an enclosures equipped with a supply disconnecting device or		N
	an operator – machine interface or for a control-station or		P
	a single device with its own enclosure		P
17.3	Control devices, visual indicators and displays use for man – machine interfaces clearly and durably marked with regard to their functions either on, or adjacent to it	Marking clear and durable	P
	such markings as agreed between user and supplier		N
	preference given to the use of standard symbols	According to standard	P
17.4	Control equipment legibly and durably marked so that it is plainly visible after equipment installation	On control equipments, marking legible and durable	P
	Nameplates attached to enclosures shall contain the following information:		
	name or trade mark of supplier and	See marking plate	P
	certification mark, when required and	CE mark used	P
	serial number, where applicable and		N
	rated voltage and	See nameplate	P
	number of phases and	See nameplate	P
	frequency (if AC) and	See nameplate	P
	Power or full-load current for each supply	See nameplate	P
	short-circuit interrupting capacity of overcurrent protective device, where furnished as part of device of equipment	See circuit diagram	P
	electrical wiring diagram number(s) or number of index to electrical drawings	See circuit diagram	P
	Full-load current shown on nameplate not less than combined full-load currents of all motors and other electrical loads, that are in operation at the same time under normal conditions of use		N

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Clause	Requirement – Test	Result - Remark	Verdict
	for unusual loads or duty cycles, thermal equivalent current included in full-load current, specified on the nameplate		N
	if a single motor controller is use, that information provided instead, on the machine nameplate		N
17.5	All enclosures, assemblies, control devices and components plainly identified with the same reference designation as shown in technical documentation	See circuit diagram	P
	All enclosures, assemblies, control devices and components in accordance with IEC 61346-1	Comply with requirements	P
	where size or location precludes the use of an individual reference designation, the group reference designation is use		N
	Requirements of above subclause not applicable to machines, on which the equipment comprises a single motor, motor-controller, pushbutton-station(s) and working light(s) only		N
18	**TECHNICAL DOCUMENTATION**		P
18.1	Information necessary for installation, operation and maintenance of electrical equipment for a machine supplied by means of drawings, wiring diagrams, charts, tables and instruction manuals	See instruction	P
	Information provided in an agreed language	English	P
	Equipment supplier make sure, that documentation referred to under cl.18 will be provided with each supplied machine	See instruction	P
18.2	Information provided with electrical equipment shall include:		
	a) A clear, comprehensive description of the equipment, installation and mounting instructions and information regarding connection to the electrical supply(ies)	See instruction	P
	b) Electrical supply requirements	See instruction	P
	c) Information about the physical environment	See instruction	P
	d) Overview (block) diagram(s)	See instruction	P
	e) Circuit / wiring diagram(s)	See circuit diagram	P
	f) information about:		
	1) Software program documentation/ listing		N
	2) Sequence of operation(s)	Provided by manufacturer	P
	3) Frequency of inspection	Provided by manufacturer	P
	4) Frequency and method of functional testing	Provided by manufacturer	P

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Clause	Requirement – Test	Result - Remark	Verdict
	5) Guidance on the adjustment, maintenance and repair, particularly of the protective devices and circuits	See instruction	P
	6) Parts list and recommended spare	See instruction	P
	g) Description of safeguards, interlocking functions and interlocking of separating safeguards for dangerous movements of co-ordinated operating machines	See instruction	P
	h) Description of safeguards and means provided for applications with to suspend the safeguards	See instruction	P
18.3	Documents prepared in accordance with requirements of cl.18.4 to cl.18.10 and relevant parts of EN 61082	See instruction	P
	Reference designation system to be in accordance with EN 61346-1	See instruction	P
	For referencing to different documents, the supplier has to select one of following methods:		
	Each of the documents carry a cross-reference with document numbers of all other documents belonging to the electrical equipment or		N
	All documents to be listed with document numbers and titles in a drawing or document list		P
	The first method use only where the documentation consists of a small number of documents		N
18.4	Technical documentation contains as a minimum, information on the following:		
	Normal operating conditions of electrical equipment incl. Expected conditions of electrical supply and where appropriate about the physical environment	See instruction	P
	Handling, transportation or storage requirements	See instruction	P
	Inappropriate use(s) of the equipment	See instruction	P
	That information presented as a separate document or as part of the installation or operation documentation	See instruction	P
	Documentation also contains information regarding load currents, peak starting currents and permitted voltage drops	See instruction	P
	Above information included either in the system- or circuit-diagram(s)	See instruction	P
18.5	The installation diagram provides all necessary information regarding preliminary work for the setting-up of the machine	See installation diagram	P
	In complex cases, it is necessary to refer to the assembly drawings for details	See installation diagram	P

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Clause	Requirement – Test	Result - Remark	Verdict
	Recommended routing, type and cross-sectional areas for the conductors of the supply cables installed on site clearly indicated	See installation diagram	P
	Necessary data or choosing type, characteristics, rated currents and setting for the overcurrent protective devices for the supply conductors stated (see cl. 7.2.2)	See installation diagram	P
	Detailed information provided about size, purpose and location of any cable ducts within the foundation, that are provided by the user	See installation diagram	P
	Detailed information provided about size, type and purpose of cable ducts, trays or supports between machine and associated equipment	See installation diagram	P
	Diagram to indicate where space is required for removal or servicing of electrical equipment	See installation diagram	P
	Where appropriate, an interconnection diagram or table provided	See installation diagram	P
18.6	Where necessary a block diagram provided for explanation of the principle of operation	See block diagram	P
	Block diagram symbolically represents the electrical equipment with its functional interrelationships without showing all the interconnections	See block diagram	P
	The function diagram use as either part of or addition to the block diagram	See block diagram	P
18.7	Circuit diagrams show the electrical circuits on the machine and its associated electrical equipment	See circuit diagram	P
	Any graphical symbol not shown in EN 60617 and EN 60417-1 must be separately shown and described on the wiring diagrams or supporting documents	See circuit diagram	P
	The symbols and identification of components consistent throughout all documents and on the machine	See circuit diagram	P
	Where appropriate, a diagram provided, showing the interface terminals and connections	See circuit diagram	P
	The diagram shows a reference to the detailed circuit diagram of each unit	See circuit diagram	P
	Switch symbols shown on the circuit diagrams with all supplies turned off and with the machine and its electrical equipment in normal starting condition	See circuit diagram	P
	Conductors identified acc. To cl.14.2	See circuit diagram	P
	Characteristics relating to the function of the control device and components which are not evident from their symbolic representation, included on the diagrams adjacent to the symbol or referenced to a footnote	See circuit diagram	P

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Clause	Requirement – Test	Result - Remark	Verdict
18.8	Technical documentation containing an operating manual, outlining proper procedures for set-up and use of equipment	See instruction	P
	Particular attention given to safety measures provided and the improper methods of operation, that are anticipated	See instruction	P
	Detailed information provided on methods for equipment programming, program verification and additional safety procedures	See instruction	P
18.9	Technical documentation to contain a maintenance manual, detailing proper procedures for adjustment, servicing or preventive inspection and repair	See maintenance instruction	P
	Recommendations regarding maintenance or service records are part of it	See maintenance instruction	P
	Methods for the verification of proper operation provided	See maintenance instruction	P
18.10	The spare parts list comprises as a minimum information for ordering of spares or replacement of parts which are required for preventive or corrective maintenance and recommended spares	See list of critical components	P
	The spare parts list has to provide for each item the following information:		
	reference designation use in documentation and	See appended table 4.2 list of critical components	P
	type designation and	See appended table 4.2 list of critical components	P
	supplier and alternative sources where available and	See appended table 4.2 list of critical components	P
	general characteristics where appropriate	See appended table 4.2 list of critical components	P
19	**TESTING AND VERIFICATION**		P
19.1	Verification, that electrical equipment is in compliance with the technical documentation	See below	P
	The relevant tests for the particular machine type will be given in the dedicated product standard		N
	In case of absence of such product standards, the appropriate tests include the ones listed under cl. 19.2 – 19.6	See below	P
19.2	After completion of installation and electrical connection, continuity of the PE- circuit verified by a loop impedance test	(See appended table 19.2)	P

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Clause	Requirement – Test	Result - Remark	Verdict
	For small or pre-manufactured machines or parts of it, with protective bonding loops not exceeding approx. 30 meters, and where the machine cannot be connected to the power supply for loop impedance tests, following method is appropriate:		
	Verify continuity of the PE-circuit by injecting a current of =10 A with 50Hz or 60Hz supply, derived from a PELV source	10A current, 50Hz applied	P
	Test made between PE- terminal and relevant points of PE-circuit (see cl. 5.2)	Incoming PE an relevant points of PE	P
	Measured voltage between PE-terminal and points of test not exceed values given in table 9	Not exceeding the values in table 9	P
19.3	Insulation resistance measured with 500VDC between power circuit conductors and PE-circuit is to be =1.0 MΩ	(See appended table 19.3)	P
	Insulation value must be = 1.0 MΩ	(See appended table 19.3)	P
	Test made on individual sections of complete electrical installation	(See appended table 19.3)	P
	For certain parts of the electrical equipment, a lower minimum insulation value is permitted, but not less than 50 kΩ		N
19.4	Electrical equipment withstand a test voltage applied for a period of at least 1 second between live conductors of all circuits and the PE-circuit	(See appended table 19.4)	P
	Exempt from above requirements are circuits intended to operate at, or below PELV voltages		N
	The test voltage is defined as having:		
	a value of twice the rated supply voltage of the equipment or 1000 VAC, which ever applies	(See appended table 19.4)	P
	Supplied from a transformer with a min. Output rating of 500VA	100VA Voltage tester applied	P
	a frequency of 50Hz or 60Hz,	50Hz applied	P
	Components not rated to withstand these test voltage are disconnected during testing		N
19.5	Tests for protection against residual voltages are performed to ensure compliance with cl. 6.2.4	Comply with clause 6.2.4	P
19.6	Functions tests of the electrical equipment performed, particularly those related to safety and safeguarding	(See appended table 19.6)	P
19.7	Where a portion of the machine and its associated equipment is changed or modified, that portion is reverified and retested as appropriate (see cl. 19.1)		N

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Clause	Requirement + Test	Result - Remark	Verdict
5	**GENERAL CONDITIONS FOR THE TESTS**		**P**
	Tests performed according to clause 5, e.g. nature of supply, sequence of testing, etc.		P
6	**CLASSIFICATION**		**P**
6.1	Protection against electric shock: Class 0, 0I, I, II, III ....:	Class III	P
	For a class III construction with a detachable power supply part the appliance is classified according to the detachable power supply part	class III	P
6.2	Protection against harmful ingress of water		N/A
7	**MARKING AND INSTRUCTIONS**		**P**
7.1	Rated voltage or voltage range (V) ....:	See label	P
	Symbol for nature of supply, or ....:		N/A
	Rated frequency (Hz) ....:	DC	N/A
	Rated power input (W), or		N/A
	Rated current (A)		P
	Manufacturer's or responsible vendor's name, trademark or identification mark..... .....:	See label	P
	Model or type reference ....:	See label	P
	Symbol IEC 60417-5172, for class II appliances		N/A
	IP number, other than IPX0..... .....:	IP20	N/A
	Symbol IEC 60417-5180, for class III appliances, unless		N/A
	the appliance is operated by batteries only		P
	Symbol IEC 60417-5018, for class II and class III appliances incorporating a functional earth		N/A
	Symbol IEC 60417-5036, for the enclosure of electrically-operated water valves in external hose-sets for connection of an appliance to the water mains, if the working voltage exceeds extra-low voltage		N/A
7.2	Warning for stationary appliances for multiple supply		N/A
	Warning placed in vicinity of terminal cover		N/A
7.3	Range of rated values marked with the lower and upper limits separated by a hyphen		N/A
	Different rated values marked with the values separated by an oblique stroke		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.4	Appliances adjustable for different rated voltages or rated frequencies, the voltage or the frequency setting is clearly discernible		N/A
	Requirement met if frequent changes are not required and the rated voltage or rated frequency to which the appliance is to be adjusted is determined from a wiring diagram		N/A
7.5	Appliances with more than one rated voltage or one or more rated voltage ranges, marked with rated input or rated current for each rated voltage or range, unless		P
	the power input is related to the arithmetic mean value of the rated voltage range		N/A
	Relation between marking for upper and lower limits of rated power input or rated current and voltage is clear		N/A
7.6	Correct symbols used		P
	Symbol for nature of supply placed next to rated voltage		P
	Symbol for class II appliances placed unlikely to be confused with other marking		N/A
	Units of physical quantities and their symbols according to international standardized system		P
7.7	Connection diagram fixed to appliances to be connected to more than two supply conductors and appliances for multiple supply, unless		N/A
	correct mode of connection is obvious		N/A
7.8	Except for type Z attachment, terminals for connection to the supply mains indicated as follows:		N/A
	- marking of terminals exclusively for the neutral conductor (letter N)		N/A
	- marking of protective earthing terminals (symbol IEC 60417-5019)		N/A
	- marking of functional earthing terminals (symbol IEC 60417-5018)		N/A
	- marking not placed on removable parts		N/A
7.9	Marking or placing of switches which may cause a hazard		P
7.10	Indications of switches on stationary appliances and controls on all appliances by use of figures, letters or other visual means ..... :		P

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Clause	Requirement + Test	Result - Remark	Verdict
	This applies also to switches which are part of a control		P
	If figures are used, the off position indicated by the figure 0		P
	The figure 0 indicates only OFF position, unless no confusion with the OFF position		P
7.11	Indication for direction of adjustment of controls		P
7.12	Instructions for safe use provided		P
	Details concerning precautions during user maintenance		P
	The instructions state that:		P
	- the appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction		P
	- children being supervised not to play with the appliance		P
	For a part of class III construction supplied from a detachable power supply unit, the instructions state that the appliance is only to be used with the unit provided		N/A
	Instructions for class III appliances state that it must only be supplied at SELV, unless		N/A
	it is a battery-operated appliance, the battery being charged outside the appliance		N/A
	For appliances for altitudes exceeding 2000 m, the maximum altitude is stated..... .....:	2000 m	N/A
	The instructions for appliances incorporating a functional earth states that the appliance incorporates an earth connection for functional purposes only		N/A
7.12.1	Sufficient details for installation supplied		P
	For an appliance intended to be permanently connected to the water mains and not connected by a hose-set, this is stated		N/A
	If different rated voltages or different rated frequencies are marked, the instructions state what action to be taken to adjust the appliance		P

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Clause	Requirement + Test	Result - Remark	Verdict
7.12.2	Stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III, the instructions state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules		N/A
7.12.3	Insulation of the fixed wiring in contact with parts exceeding 50 K during clause 11; instructions state that the fixed wiring must be protected		N/A
7.12.4	Instructions for built-in appliances:		N/A
	- dimensions of space		N/A
	- dimensions and position of supporting and fixing		N/A
	- minimum distances between parts and surrounding structure		N/A
	- minimum dimensions of ventilating openings and arrangement		N/A
	- connection to supply mains and interconnection of separate components		N/A
	- allow disconnection of the appliance after installation, by accessible plug or a switch in the fixed wiring, unless		N/A
	a switch complying with 24.3		N/A
7.12.5	Replacement cord instructions, type X attachment with a specially prepared cord		N/A
	Replacement cord instructions, type Y attachment		N/A
	Replacement cord instructions, type Z attachment		N/A
7.12.6	Caution in the instructions for appliances incorporating a non-self-resetting thermal cut-out that is reset by disconnection of the supply mains, if this cut-out is required to comply with the standard		N/A
7.12.7	Instructions for fixed appliances stating how the appliance is to be fixed		N/A
7.12.8	Instructions for appliances connected to the water mains:		N/A
	- max. inlet water pressure (Pa)..... :		N/A
	- min. inlet water pressure, if necessary (Pa)..... :		N/A
	Instructions concerning new and old hose-sets for appliances connected to the water mains by detachable hose-sets		N/A
7.13	Instructions and other texts in an official language		P

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Clause	Requirement + Test	Result - Remark	Verdict
7.14	Markings clearly legible and durable:		P
	Signal words WARNING, CAUTION, DANGER in uppercase having a height as specified ....:		P
	Uppercase letter of the text explaining the signal word not smaller than 1,6 mm ....:		P
	Moulded in, engraved, or stamped markings either raised above or have a depth below the surface of at least 0,25 mm, unless		PP
	contrasting colours are used		P
	Markings checked by inspection, measurement and rubbing test as specified		P
7.15	Markings on a main part		P
	Marking clearly discernible from the outside, if necessary after removal of a cover		P
	For portable appliances, cover can be removed or opened without a tool		N/A
	For stationary appliances, name, trademark or identification mark and model or type reference visible after installation		N/A
	For fixed appliances, name, trademark or identification mark and model or type reference visible after installation according to the instructions		N/A
	Indications for switches and controls placed on or near the components. Marking not on parts which can be positioned or repositioned in such a way that the marking is misleading		P
	The symbol IEC 60417-5018 placed next to the symbol IEC 60417-5172 or IEC 60417-5180		P
7.16	Marking of a possible replaceable thermal link or fuse link clearly visible with regard to replacing the link		P
8	**PROTECTION AGAINST ACCESS TO LIVE PARTS**		**N/A**
8.1	Adequate protection against accidental contact with live parts		N/A
8.1.1	Requirement applies for all positions, detachable parts removed		N/A
	Lamps behind a detachable cover not removed, if conditions met		N/A
	Insertion or removal of lamps, protection against contact with live parts of the lamp cap		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Use of test probe B of IEC 61032, with a force not exceeding 1 N: no contact with live parts		N/A
	Use of test probe B of IEC 61032 through openings, with a force of 20N: no contact with live parts		N/A
8.1.2	Use of test probe 13 of IEC 61032, with a force not exceeding 1 N, through openings in class 0 appliances and class II appliances/constructions: no contact with live parts		N/A
	Test probe 13 also applied through openings in earthed metal enclosures having a non-conductive coating: no contact with live parts		N/A
8.1.3	For appliances other than class II, use of test probe 41 of IEC 61032, with a force not exceeding 1 N: no contact with live parts of visible glowing heating elements		N/A
8.1.4	Accessible part not considered live if:		N/A
	- safety extra-low a.c. voltage: peak value not exceeding 42.4 V		N/A
	- safety extra-low d.c. voltage: not exceeding 42.4 V		N/A
	- or separated from live parts by protective impedance		N/A
	If protective impedance: d.c. current not exceeding 2 mA, and		N/A
	a.c. peak value not exceeding 0.7 mA		N/A
	- for peak values over 42.4 V up to and including 450 V, capacitance not exceeding 0,1 μF		N/A
	- for peak values over 450 V up to and including 15 kV, discharge not exceeding 45 μC		N/A
	- for peak values over 15kV, the energy in the discharge not exceeding 350 mJ		N/A
8.1.5	Live parts protected at least by basic insulation before installation or assembly:		N/A
	- built-in appliances		N/A
	- fixed appliances		N/A
	- appliances delivered in separate units		N/A
8.2	Class II appliances and constructions constructed so that there is adequate protection against accidental contact with basic insulation and metal parts separated from live parts by basic insulation only		N/A
	Only possible to touch parts separated from live parts by double or reinforced insulation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9	**STARTING OF MOTOR-OPERATED APPLIANCES**		N/A
	Requirements and tests are specified in part 2 when necessary		N/A
10	**POWER INPUT AND CURRENT**		**P**
10.1	Power input at normal operating temperature, rated voltage and normal operation not deviating from rated power input by more than shown in table 1:	(see appended table)	P
	If the power input varies throughout the operating cycle and the maximum value of the power input exceeds, by a factor greater than two, the arithmetic mean value of the power input occurring during a representative period, the power input is the maximum value that is exceeded for more than 10 % of the representative period		N/A
	Otherwise the power input is the arithmetic mean value		N/A
	Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless		N/A
	the rated power input is related to the arithmetic mean value		N/A
10.2	Current at normal operating temperature, rated voltage and normal operation not deviating from rated current by more than shown in table 2 ..... :	(see appended table)	P
	If the current varies throughout the operating cycle and the maximum value of the current exceeds, by a factor greater than two, the arithmetic mean value of the current occurring during a representative period, the current is the maximum value that is exceeded for more than 10 % of the representative period		P
	Otherwise the current is the arithmetic mean value		P
	Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless		N/A
	the rated current is related to the arithmetic mean value of the range		P
11	**HEATING**		**P**
11.1	No excessive temperatures in normal use		P
11.2	The appliance is held, placed or fixed in position as described.....		N/A
11.3	Temperature rises, other than of windings, determined by thermocouples		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Temperature rises of windings determined by resistance method, unless		N/A
	the windings are non-uniform or it is difficult to make the necessary connections		N/A
11.4	Heating appliances operated under normal operation at 1.15 times rated power input (W) ..... :		P
11.5	Motor-operated appliances operated under normal operation at most unfavourable voltage between 0.94 and 1.06 times rated voltage (V).....:		P
11.6	Combined appliances operated under normal operation at most unfavourable voltage between 0.94 and 1.06 times rated voltage (V)..... :		N/A
11.7	Operation duration corresponding to the most unfavourable conditions of normal use		N/A
11.8	Temperature rises monitored continuously and not exceeding the values in table 3 ..... :	(see appended table)	P
	If the temperature rise of a motor winding exceeds the value of table 3, or		N/A
	if there is doubt with regard to classification of insulation,		N/A
	tests of Annex C are carried out		N/A
	Sealing compound does not flow out		N/A
	Protective devices do not operate, except		N/A
	components in protective electronic circuits tested for the number of cycles specified in 24.1.4		N/A
13	**LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE**		**N/A**
13.1	Leakage current not excessive and electric strength adequate		N/A
	Heating appliances operated at 1.15 times the rated power input (W) ..... :		N/A
	Motor-operated appliances and combined appliances supplied at 1.06 times the rated voltage (V)..... :		N/A
	Protective impedance and radio interference filters disconnected before carrying out the tests		N/A
13.2	For class 0, class II and class III appliances, and class II constructions, leakage current measured by means of the circuit described in figure 4 of IEC 60990		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For class 0I and class I appliances, a low impedance ammeter may be used		N/A
	Leakage current measurements ..... :	(see appended table)	N/A
13.3	The appliance is disconnected from the supply		N/A
	Electric strength tests according to table 4 ..... :	(see appended table)	N/A
	No breakdown during the tests		N/A
14	**TRANSIENT OVERVOLTAGES**		**N/A**
	Appliances withstand the transient over-voltages to which they may be subjected		N/A
	Clearances having a value less than specified in table 16 subjected to an impulse voltage test, the test voltage specified in table 6 ..... :	(see appended table)	N/A
	No flashover during the test, unless		N/A
	of functional insulation if the appliance complies with clause 19 with the clearance short-circuited		N/A
15	**MOISTURE RESISTANCE**		**P**
15.1	Enclosure provides the degree of moisture protection according to classification of the appliance		P
	Compliance checked as specified in 15.1.1, taking into account 15.1.2, followed by the electric strength test of 16.3		P
	No trace of water on insulation which can result in a reduction of clearances or creepage distances below values specified in clause 29		N/A
15.1.1	Appliances, other than IPX0, subjected to tests as specified in IEC 60529 ..... :		N/A
	Water valves containing live parts in external hoses for connection of an appliance to the water mains tested as specified for IPX7 appliances		N/A
15.1.2	Hand-held appliance turned continuously through the most unfavourable positions during the test		N/A
	Built-in appliances installed according to the instructions		N/A
	Appliances placed or used on the floor or table placed on a horizontal unperforated support		N/A
	Appliances normally fixed to a wall and appliances with pins for insertion into socket-outlets are mounted on a wooden board		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For IPX3 appliances, the base of wall mounted appliances is placed at the same level as the pivot axis of the oscillating tube		N/A
	For IPX4 appliances, the horizontal centre line of the appliance is aligned with the pivot axis of the oscillating tube, and		N/A
	for appliances normally used on the floor or table, the movement is limited to two times 90° for a period of 5 min, the support being placed at the level of the pivot axis of the oscillating tube		N/A
	Wall-mounted appliances, take into account the distance to the floor stated in the instructions		N/A
	Appliances normally fixed to a ceiling are mounted underneath a horizontal unperforated support, the pivot axis of the oscillating tube located at the level of the underside of the support, and		N/A
	for IPX4 appliances, the movement of the tube is limited to two times 90° from the vertical for a period of 5 min		N/A
	Appliances with type X attachment fitted with a flexible cord as described		N/A
	Detachable parts subjected to the relevant treatment with the main part		N/A
	However, if a part has to be removed for user maintenance and a tool is needed, this part is not removed		N/A
15.2	Spillage of liquid does not affect the electrical insulation		P
	Spillage solution comprising water containing approximately 1 % NaCl and 0,6 % rinsing agent		P
	Appliances with type X attachment fitted with a flexible cord as described		N/A
	Appliances incorporating an appliance inlet tested with or without an connector, whichever is most unfavourable		N/A
	Detachable parts are removed		N/A
	Overfilling test with additional amount of water, over a period of 1 min (l) ..... :		P
	Steam irons, other than those with a separate water reservoir or boiler, are tested as follows: (IEC 60335-2-3)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- the iron is placed in the filling position according to the instructions and filled with water containing approximately 1% NaCl		N/A
	- a further quantity of 0,1 l is steadily poured into the filling opening over a period of 1 min.		N/A
	- the iron is then placed on its stand and subjected to the electric strength test of 16.3		N/A
	- the iron is left on its stand for 10 min. after which the electric strength test is repeated		N/A
	- the iron, while still filled, is operated at rated power input for 1 min. under normal operation		N/A
	- the iron must then withstand the electric strength test of 16.3		N/A
	Cordless irons are also filled with the saline solution while resting on their stands, if the iron can easily be filled in this position (IEC 60335-2-3)		N/A
	No trace of water on insulation that can result in a reduction of clearances or creepage distances below values specified in clause 29		P
15.3	Appliances proof against humid conditions		P
	Checked by test Cab: Damp heat steady state in IEC 60068-2-78		P
	Detachable parts removed and subjected, if necessary, to the humidity test with the main part		N/A
	Humidity test for 48 h in a humidity cabinet		P
	Reassembly of those parts that may have been removed		N/A
	The appliance withstands the tests of clause 16		P
16	**LEAKAGE CURRENT AND ELECTRIC STRENGTH**		**P**
16.1	Leakage current not excessive and electric strength adequate		P
	Protective impedance disconnected from live parts before carrying out the tests		N/A
	Tests carried out at room temperature and not connected to the supply		P
16.2	Single-phase appliances: test voltage 1.06 times rated voltage (V) ..... :		P
	Three-phase appliances: test voltage 1.06 times rated voltage divided by √3 (V) ..... :		N/A
	Leakage current measurements ..... :	(see appended table)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Limit values doubled if:		N/A
	- all controls have an off position in all poles, or		N/A
	- the appliance has no control other than a thermal cut-out, or		N/A
	- all thermostats, temperature limiters and energy regulators do not have an off position, or		N/A
	- the appliance has radio interference filters		N/A
	With the radio interference filters disconnected, the leakage current do not exceed limits specified..... :	(see appended table)	N/A
16.3	Electric strength tests according to table 7..... :	(see appended table)	P
	Test voltage applied between the supply cord and inlet bushing and cord guard and cord anchorage as specified..... :	(see appended table)	P
	No breakdown during the tests		P
17	**OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS**		**N/A**
	No excessive temperatures in transformer or associated circuits in event of short-circuits likely to occur in normal use..... :	(see appended table)	N/A
	Appliance supplied with 1.06 or 0.94 times rated voltage under the most unfavourable short-circuit or overload likely to occur in normal use (V)..... :		N/A
	Basic insulation is not short-circuited		N/A
	Temperature rise of insulation of the conductors of safety extra-low voltage circuits not exceeding the relevant value specified in table 3 by more than 15 K		N/A
	Temperature of the winding not exceeding the value specified in table 8		N/A
	However, limits do not apply to fail-safe transformers complying with sub-clause 15.5 of IEC 61558-1		N/A
18	**ENDURANCE**		**N/A**
	Requirements and tests are specified in part 2 when necessary		N/A
19	**ABNORMAL OPERATION**		**P**
19.1	The risk of fire, mechanical damage or electric shock under abnormal or careless operation obviated		P
	Electronic circuits so designed and applied that a fault will not render the appliance unsafe	(see appended table)	P
	Appliances incorporating heating elements subjected to the tests of 19.2 and 19.3, and		P

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Clause	Requirement + Test	Result - Remark	Verdict
	if the appliance also has a control that limit the temperature during clause 11 it is subjected to the test of 19.4, and		P
	if applicable, to the test of 19.5		N/A
	Appliances incorporating PTC heating elements are also subjected to the test of 19.6		N/A
	Appliances incorporating motors subjected to the tests of 19.7 to 19.10, as applicable		P
	Appliances incorporating electronic circuits subjected to the tests of 19.11 and 19.12, as applicable		P
	Appliances incorporating contactors or relays subjected to the test of 19.14, being carried out before the tests of 19.11		N/A
	Appliances incorporating voltage selector switches subjected to the test of 19.15		N/A
	Unless otherwise specified, the tests are continued until a non-self-resetting thermal cut-out operates, or		P
	until steady conditions are established		P
	If a heating element or intentionally weak part becomes open-circuited, the relevant test is repeated on a second sample		N/A
	If the control performs more than one function, only that aspect of the control under consideration is rendered inoperative. Other functions of the control may continue to operate normally.		N/A
19.2	Test of appliance with heating elements with restricted heat dissipation; test voltage (V): power input of 0,85 times rated power input..... :		P
19.3	Test of 19.2 repeated; test voltage (V): power input of 1,24 times rated power input..... :		P
19.4	Test conditions as in clause 11, any control limiting the temperature during tests of clause 11 short-circuited		P
19.5	Test of 19.4 repeated on Class 0I and I appliances with tubular sheathed or embedded heating elements. No short-circuiting, but one end of the element connected to the sheath		N/A
	The test repeated with reversed polarity and the other end of the heating element connected to the sheath		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The test is not carried out on appliances intended to be permanently connected to fixed wiring and on appliances where an all-pole disconnection occurs during the test of 19.4		N/A
19.6	Appliances with PTC heating elements tested at rated voltage, establishing steady conditions		P
	The working voltage of the PTC heating element is increased by 5% and the appliance is operated until steady conditions are re-established. The voltage is then increased in similar steps until 1.5 times working voltage or until the PTC heating element ruptures (V) ..... :		P
19.7	Stalling test by locking the rotor if the locked rotor torque is smaller than the full load torque, or		P
	locking moving parts of other appliances		P
	Locked rotor, capacitors open-circuited one at a time		N/A
	Test repeated with capacitors short-circuited one at a time, unless		N/A
	capacitor is of class P2 of IEC 60252-1		N/A
	Appliances with timer or programmer supplied with rated voltage for each of the tests, for a period equal to the maximum period allowed ..... :		N/A
	An electronic timer or programmer that operates to ensure compliance with the test before the maximum period under the conditions of Clause 11 is reached, is a protective electronic circuit		N/A
	Other appliances supplied with rated voltage for a period as specified..... :		P
	Winding temperatures not exceeding values specified in table 8..... :	(see appended table)	P
19.8	Multi-phase motors operated at rated voltage with one phase disconnected		N/A
19.9	Running overload test on appliances incorporating motors intended to be remotely or automatically controlled or liable to be operated continuously		N/A
	Motor-operated and combined appliances for which 30.2.3 is applicable and that use overload protective devices relying on electronic circuits to protect the motor windings, are also subjected to the test		N/A
	Winding temperatures not exceeding values as specified..... :	(see appended table)	N/A
19.10	Series motor operated at 1.3 times rated voltage for 1 min (V) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	During the test, parts not being ejected from the appliance		N/A
19.11	Electronic circuits, compliance checked by evaluation of the fault conditions specified in 19.11.2 for all circuits or parts of circuits, unless		P
	they comply with the conditions specified in 19.11.1		N/A
	Appliances incorporating an electronic circuit that relies upon a programmable component to function correctly, subjected to the test of 19.11.4.8, unless		N/A
	restarting does not result in a hazard		N/A
	Appliances having a device with an off position obtained by electronic disconnection, or a device placing the appliance in a stand-by mode, subjected to the tests of 19.11.4		N/A
	If the safety of the appliance under any of the fault conditions depends on the operation of a miniature fuse-link complying with IEC 60127, the test of 19.12 is carried out		P
	During and after each test the following is checked:		P
	- the temperature of the windings do not exceed the values specified in table 8		P
	- the appliance complies with the conditions specified in 19.13		P
	- any current flowing through protective impedance not exceeding the limits specified in 8.1.4		N/A
	If a conductor of a printed board becomes open-circuited, the appliance is considered to have withstood the particular test, provided both of the following conditions are met:		N/A
	- the base material of the printed circuit board withstands the test of Annex E		N/A
	- any loosened conductor does not reduce clearance or creepage distances between live parts and accessible metal parts below the values specified in clause 29		N/A
19.11.1	Fault conditions a) to g) in 19.11.2 are not applied to circuits or parts of circuits meeting both of the following conditions:		N/A
	- the electronic circuit is a low-power circuit, that is, the maximum power at low-power points does not exceed 15 W according to the tests specified		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- the protection against electric shock, fire hazard, mechanical hazard or dangerous malfunction of other parts of the appliance does not rely on the correct functioning of the electronic circuit		N/A
19.11.2	Fault conditions applied one at a time, the appliance operating under conditions specified in clause 11, but supplied at rated voltage, duration of the tests as specified:		P
	a) short circuit of functional insulation if clearances or creepage distances are less than the values specified in clause 29		P
	b) open circuit at the terminals of any component		P
	c) short circuit of capacitors, unless		P
	they comply with IEC 60384-14		N/A
	d) short circuit of any two terminals of an electronic component, other than integrated circuits		P
	This fault condition is not applied between the two circuits of an optocoupler		P
	e) failure of triacs in the diode mode		P
	f) failure of microprocessors and integrated circuits		P
	g) failure of an electronic power switching device		N/A
	Each low power circuit is short-circuited by connecting the low-power point to the pole of the supply source from which the measurements were made		N/A
19.11.3	If the appliance incorporates a protective electronic circuit which operates to ensure compliance with clause 19, the relevant test is repeated with a single fault simulated, as indicated in a) to g) of 19.11.2		N/A
19.11.4	Appliances having a device with an off position obtained by electronic disconnection, or		N/A
	a device that can be placed in the stand-by mode,		N/A
	subjected to the tests of 19.11.4.1 to 19.11.4.7, the device being set in the off position or in the stand-by mode		N/A
	Appliances incorporating a protective electronic circuit subjected to the tests of 19.11.4.1 to 19.11.4.7, the tests being carried out after the protective electronic circuit has operated, except that		N/A
	appliances operated for 30 s or 5 min during the test of 19.7 are not subjected to the tests for electromagnetic phenomena.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Surge protective devices disconnected, unless		N/A
	They incorporate spark gaps		N/A
19.11.4.1	The appliance is subjected to electrostatic discharges in accordance with IEC 61000-4-2, test level 4		N/A
19.11.4.2	The appliance is subjected to radiated fields in accordance with IEC 61000-4-3, test level 3		N/A
19.11.4.3	The appliance is subjected to fast transient bursts in accordance with IEC 61000-4-4, test level 3 or 4 as specified		N/A
19.11.4.4	The power supply terminals of the appliance subjected to voltage surges in accordance with IEC 61000-4-5, test level 3 or 4 as specified		N/A
	An open circuit test voltage of 2 kV is applicable for the line-to-line coupling mode		N/A
	An open circuit test voltage of 4 kV is applicable for the line-to-earth coupling		N/A
	Earthed heating elements in class I appliances disconnected		N/A
19.11.4.5	The appliance is subjected to injected currents in accordance with IEC 61000-4-6, test level 3		N/A
19.11.4.6	Appliances having a rated current not exceeding 16 A are subjected to the Class 3 voltage dips and interruptions in accordance with IEC 61000-4-11		N/A
	Appliances having a rated current exceeding 16 A are subjected to the Class 3 voltage dips and interruptions in accordance with IEC 61000-4-34		N/A
19.11.4.7	The appliance is subjected to mains signals in accordance with IEC 61000-4-13, test level class 2		N/A
19.11.4.8	The appliance is supplied at rated voltage and operated under normal operation. After 60s the power supply is reduced to a level such that the appliance ceases to respond or parts controlled by the programmable component cease to operate		N/A
	The appliance continues to operate normally, or		N/A
	requires a manual operation to restart		N/A
19.12	If the safety of the appliance for any of the fault conditions specified in 19.11.2 depends on the operation of a miniature fuse-link complying with IEC 60127, the test is repeated, measuring the current flowing through the fuse-link; measured current (A); rated current of the fuse-link (A) ..... :		P

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Clause	Requirement + Test	Result - Remark	Verdict
19.13	During the tests the appliance does not emit flames, molten metal, poisonous or ignitable gas in hazardous amounts		P
	Temperature rises not exceeding the values shown in table 9 ..... :	(see appended table)	P
	Compliance with clause 8 not impaired		P
	If the appliance can still be operated it complies with 20.2		P
	Insulation, other than of class III appliances or class III constructions that do not contain live parts, withstands the electric strength test of 16.3, the test voltage as specified in table 4:		P
	- basic insulation (V) ..... :		P
	- supplementary insulation (V) ..... :		P
	- reinforced insulation (V) ..... :		P
	After operation or interruption of a control, clearances and creepage distances across the functional insulation withstand the electric strength test of 16.3, the test voltage being twice the working voltage		N/A
	The appliance does not undergo a dangerous malfunction, and		P
	no failure of protective electronic circuits, if the appliance is still operable		P
	Appliances tested with an electronic switch in the off position, or in the stand-by mode:		N/A
	- do not become operational, or		N/A
	- if they become operational, do not result in a dangerous malfunction during or after the tests of 19.11.4		N/A
	If the appliance contains lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that:		N/A
	- the lid or door does not move automatically to an open position when the interlock is released, and		N/A
	- the appliance does not start after the cycle in which the interlock was released		N/A
19.14	Appliances operated under the conditions of clause 11, any contactor or relay contact operating under the conditions of clause 11 being short-circuited		N/A
	For a relay or contactor with more than one contact, all contacts are short-circuited at the same time		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A relay or contactor operating only to ensure the appliance is energized for normal use is not short-circuited		N/A
	If more than one relay or contactor operates in clause 11, they are short-circuited in turn		N/A
19.15	For appliances with a mains voltage selector switch, the switch is set to the lowest rated voltage position and the highest value of rated voltage is applied		N/A
20	**STABILITY AND MECHANICAL HAZARDS**		**P**
20.1	Appliances having adequate stability		N/A
	Tilting test through an angle of 10°, appliance placed on an inclined plane/horizontal support, not connected to the supply mains; appliance does not overturn		N/A
	Tilting test repeated on appliances with heating elements, angle of inclination increased to 15°		N/A
	Possible heating test in overturned position; temperature rise does not exceed values shown in table 9		N/A
20.2	Moving parts adequately arranged or enclosed as to provide protection against personal injury		P
	Protective enclosures, guards and similar parts are non-detachable, and		P
	have adequate mechanical strength		P
	Enclosures that can be opened by overriding an interlock are considered to be detachable parts		N/A
	Self-resetting thermal cut-outs and overcurrent protective devices not causing a hazard by unexpected closure		N/A
	Not possible to touch dangerous moving parts with the test probe described		N/A
21	**MECHANICAL STRENGTH**		**P**
21.1	Appliance has adequate mechanical strength and is constructed as to withstand rough handling		P
	The appliance shows no damage impairing compliance with this standard, and		P
	compliance with 8.1, 15.1 and clause 29 not impaired		P
	If doubt, supplementary or reinforced insulation subjected to the electric strength test of 16.3		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If necessary, repetition of groups of three blows on a new sample		N/A
21.2	Accessible parts of solid insulation having strength to prevent penetration by sharp implements		P
	Test not applicable if the thickness of supplementary insulation is at least 1 mm and reinforced insulation at least 2 mm		P
	The insulation is tested as specified, and does withstand the electric strength test of 16.3		P
22	**CONSTRUCTION**		**P**
22.1	Appliance marked with the first numeral of the IP system, relevant requirements of IEC 60529 are fulfilled	IP20	N/A
22.2	Stationary appliance: means to ensure all-pole disconnection from the supply being provided:		N/A
	- a supply cord fitted with a plug, or		N/A
	- a switch complying with 24.3, or		N/A
	- a statement in the instruction sheet that a disconnection incorporated in the fixed wiring is to be provided, or		N/A
	- an appliance inlet		N/A
	Singe-pole switches and single-pole protective devices for the disconnection of heating elements in single-phase, permanently connected class 01 and class I appliances, connected to the phase conductor		N/A
22.3	Appliance provided with pins: no undue strain on socket-outlets		N/A
	Applied torque not exceeding 0.25 Nm		N/A
	Pull force of 50N to each pin after the appliance has being placed in the heating cabinet; when cooled to room temperature the pins are not displaced by more than 1mm		N/A
	Each pin subjected to a torque of 0.4Nm; the pins are not rotating, unless		N/A
	rotating does not impair compliance with this standard		N/A
22.4	Appliance for heating liquids and appliance causing undue vibration not provided with pins for insertion into socket-outlets		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
22.5	No risk of electric shock when touching the pins of the plug, for appliances having a capacitor with rated capacitance equal to or greater than 0,1μF, the appliance being disconnected from the supply at the instant of voltage peak		P
	Voltage not exceeding 34 V (V) ..... :		P
	If compliance relies on the operation of an electronic circuit, the electromagnetic phenomena tests of 19.11.4.3 and 19.11.4.4 are applied		P
	The discharge test is then repeated three times, voltage not exceeding 34 V (V)..... :		P
22.6	Electrical insulation not affected by condensing water or leaking liquid		P
	Electrical insulation of Class II appliances not affected if a hose ruptures or seal leaks		N/A
	In case of doubt, test as described		P
22.7	Adequate safeguards against the risk of excessive pressure in appliances containing liquid or gases or having steam-producing devices		N/A
22.8	Electrical connections not subject to pulling during cleaning of compartments to which access can be gained without the aid of a tool, and that are likely to be cleaned in normal use		N/A
22.9	Insulation, internal wiring, windings, commutators and slip rings not exposed to oil, grease or similar substances, unless		P
	the substance has adequate insulating properties		N/A
22.10	Not possible to reset voltage-maintained non-self-resetting thermal cut-outs by the operation of an automatic switching device incorporated within the appliance, if:		N/A
	- a non-self-resetting thermal cut-out is required by the standard, and		N/A
	- a voltage maintained non-self-resetting thermal cut-out is used to meet it		N/A
	Non-self-resetting thermal motor protectors have a trip-free action, unless		N/A
	they are voltage maintained		N/A
	Reset buttons of non-self-resetting controls so located or protected that accidental resetting is unlikely		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
22.11	Reliable fixing of non-detachable parts that provide the necessary degree of protection against electric shock, moisture or contact with moving parts		P
	Obvious locked position of snap-in devices used for fixing such parts		N/A
	No deterioration of the fixing properties of snap-in devices used in parts that are likely to be removed during installation or servicing		N/A
	Tests as described		P
22.12	Handles, knobs etc. fixed in a reliable manner		P
	Fixing in wrong position of handles, knobs etc. indicating position of switches or similar components not possible		P
	Axial force 15 N applied to parts, the shape being so that an axial pull is unlikely to be applied		N/A
	Axial force 30 N applied to parts, the shape being so that an axial pull is likely to be applied		P
22.13	Unlikely that handles, when gripped as in normal use, make the operator's hand touch parts having a temperature rise exceeding the value specified for handles which are held for short periods only		P
22.14	No ragged or sharp edges creating a hazard for the user in normal use, or during user maintenance		P
	No exposed pointed ends of self-tapping screws or other fasteners, likely to be touched by the user in normal use or during user maintenance		P
22.15	Storage hooks and the like for flexible cords smooth and well rounded		N/A
22.16	Automatic cord reels cause no undue abrasion or damage to the sheath of the flexible cord, no breakage of conductors strands and no undue wear of contacts		N/A
	Cord reel tested with 6000 operations, as specified		N/A
	Electric strength test of 16.3, voltage of 1000 V applied		N/A
22.17	Spacers not removable from the outside by hand or by means of a screwdriver or a spanner		N/A
22.18	Current-carrying parts and other metal parts resistant to corrosion		P
22.19	Driving belts not relied upon to provide the required level of insulation, unless		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	constructed to prevent inappropriate replacement		N/A
22.20	Direct contact between live parts and thermal insulation effectively prevented, unless		P
	material used is non-corrosive, non-hygroscopic and non-combustible		N/A
22.21	Wood, cotton, silk, ordinary paper and fibrous or hygroscopic material not used as insulation, unless		N/A
	impregnated		N/A
	This requirement does not apply to magnesium oxide and mineral ceramic fibres used for the electrical insulation of heating elements		N/A
22.22	Appliances not containing asbestos		N/A
22.23	Oils containing polychlorinated biphenyl (PCB) not used		N/A
22.24	Bare heating elements, except in class III appliances or class III constructions that do not contain live parts, adequately supported		N/A
	In case of rupture, the heating conductor is unlikely to come in contact with accessible metal parts		N/A
22.25	Sagging heating conductors, except in class III appliances or class III constructions that do not contain live parts, cannot come into contact with accessible metal parts		N/A
22.26	For class III constructions the insulation between parts operating at safety extra-low voltage and other live parts complies with the requirements for double or reinforced insulation		N/A
22.27	Parts connected by protective impedance separated by double or reinforced insulation		N/A
22.28	Metal parts of Class II appliances conductively connected to gas pipes or in contact with water, separated from live parts by double or reinforced insulation		N/A
22.29	Class II appliances permanently connected to fixed wiring so constructed that the required degree of access to live parts is maintained after installation		N/A
22.30	Parts serving as supplementary or reinforced insulation fixed so that they cannot be removed without being seriously damaged, or		N/A
	so constructed that they cannot be replaced in an incorrect position, and so that if they are omitted, the appliance is rendered inoperable or manifestly incomplete		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
22.31	Neither clearances nor creepage distances over supplementary and reinforced insulation reduced below values specified in clause 29 as a result of wear		N/A
	Neither clearances nor creepage distances between live parts and accessible parts reduced below values for supplementary insulation if wires, screws etc. become loose		N/A
22.32	Supplementary and reinforced insulation constructed or protected against pollution so that clearances or creepage distances are not reduced below the values in clause 29		N/A
	Supplementary insulation of natural or synthetic rubber resistant to ageing, or arranged and dimensioned so that creepage distances are not reduced below values specified in 29.2		N/A
	Ceramic material not tightly sintered, similar materials or beads alone not used as supplementary or reinforced insulation		N/A
	Ceramic and similar porous material in which heating conductors are embedded is considered to be basic insulation, not reinforced insulation		N/A
	Oxygen bomb test at 70 °C for 96 h and 16 h at room temperature		N/A
22.33	Conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with unearthed accessible metal parts are not in direct contact with live parts, or		N/A
	unearthed metal parts separated from live parts by basic insulation only		N/A
	Electrodes not used for heating liquids		N/A
	For class II constructions, conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with unearthed accessible metal parts, not in direct contact with basic or reinforced insulation, unless		N/A
	the reinforced insulation consists of at least 3 layers		N/A
	For class II constructions, conductive liquids which are in contact with live parts, not in direct contact with reinforced insulation, unless		N/A
	the reinforced insulation consists of at least 3 layers		N/A
	An air layer not used as basic or supplementary insulation in a double insulation system if likely to be bridged by leaking liquid		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
22.34	Shafts of operating knobs, handles, levers etc. not live, unless		P
	the shaft is not accessible when the part is removed		N/A
22.35	For other than class III constructions, handles, levers and knobs, held or actuated in normal use, not becoming live in the event of a failure of basic insulation		P
	Such parts being of metal, and their shafts or fixings are likely to become live in the event of a failure of basic insulation, are either adequately covered by insulation material or their accessible parts are separated from their shafts or fixings by supplementary insulation		N/A
	This requirement does not apply to handles, levers and knobs on stationary appliances and cordless appliances, other than those of electrical components, provided they are reliably connected to an earthing terminal or earthing contact, or separated from live parts by earthed metal		N/A
	Insulating material covering metal handles, levers and knobs withstand the electric strength test of 16.3 for supplementary insulation		N/A
22.36	For appliances other than class III, handles continuously held in the hand in normal use so constructed that when gripped as in normal use, the operators hand is not likely to touch metal parts, unless		P
	they are separated from live parts by double or reinforced insulation		N/A
22.37	Capacitors in Class II appliances not connected to accessible metal parts and their casings, if of metal, separated from accessible metal parts by supplementary insulation, unless		N/A
	the capacitors comply with 22.42		N/A
22.38	Capacitors not connected between the contacts of a thermal cut-out		N/A
22.39	Lamp holders used only for the connection of lamps		N/A
22.40	Motor-operated appliances and combined appliances intended to be moved while in operation, or having accessible moving parts, fitted with a switch to control the motor. The actuating member of the switch being easily visible and accessible		P

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Clause	Requirement + Test	Result - Remark	Verdict
	If the appliance cannot operate continuously, automatically or remotely without giving rise to a hazard, appliances for remote operation being fitted with a switch for stopping the operation. The actuating member of the switch being easily visible and accessible		N/A
22.41	No components, other than lamps, containing mercury		N/A
22.42	Protective impedance consisting of at least two separate components		N/A
	Values specified in 8.1.4 not exceeded if any one of the components are short-circuited or open-circuited		N/A
	Resistors checked by the test of 14.1 a) in IEC 60065		N/A
	Capacitors checked by the tests for class Y capacitors in IEC 60384-14		N/A
22.43	Appliances adjustable for different voltages, accidental changing of the setting of the voltage unlikely to occur		N/A
22.44	Appliances not having an enclosure that is shaped or decorated like a toy		P
22.45	When air is used as reinforced insulation, clearances not reduced below the values specified in 29.1.3 due to deformation as a result of an external force applied to the enclosure		N/A
22.46	For programmable protective electronic circuits used to ensure compliance with the standard, the software contains measures to control the fault/error conditions in table R.1		N/A
	Software that contains measures to control the fault/error conditions specified in table R.2 is to be specified in parts 2 for particular constructions or to address specific hazards		N/A
	These requirements are not applicable to software used for functional purpose or compliance with clause 11		N/A
22.47	Appliances connected to the water mains withstand the water pressure expected in normal use		N/A
	No leakage from any part, including any inlet water hose		N/A
22.48	Appliances connected to the water mains constructed to prevent backsiphonage of non-potable water		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
22.49	For remote operation, the duration of operation is to be set before the appliance can be started, unless		N/A
	the appliance switches off automatically or can operate continuously without hazard		N/A
22.50	Controls incorporated in the appliance take priority over controls actuated by remote operation		N/A
22.51	There is a control on the appliance manually adjusted to the setting for remote operation before the appliance can be operated in this mode		N/A
	There is a visual indication showing that the appliance is adjusted for remote operation		N/A
	These requirements not necessary on appliances that can operate as follows, without giving rise to a hazard:		N/A
	- continuously, or		N/A
	- automatically, or		N/A
	- remotely		N/A
22.52	Socket-outlets on appliances accessible to the user in accordance with the socket-outlet system used in the country in which the appliance is sold		N/A
22.53	Class II appliances and class III appliances that incorporate functionally earthed parts have at least double insulation or reinforced insulation between live parts and the functionally earthed parts		N/A
22.54	Button cells and batteries designated R1 not accessible without the aid of a tool, unless		N/A
	the cover of their compartment can only be opened after at least two independent movements have been applied simultaneously		N/A
23	**INTERNAL WIRING**		**P**
23.1	Wireways smooth and free from sharp edges		P
	Wires protected against contact with burrs, cooling fins etc.		P
	Wire holes in metal well-rounded or provided with bushings		N/A
	Wiring effectively prevented from coming into contact with moving parts		P
23.2	Beads etc. on live wires cannot change their position, and are not resting on sharp edges		N/A
	Beads inside flexible metal conduits contained within an insulating sleeve		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
23.3	Electrical connections and internal conductors movable relatively to each other not exposed to undue stress		N/A
	Flexible metallic tubes not causing damage to insulation of conductors		N/A
	Open-coil springs not used		N/A
	Adequate insulating lining provided inside a coiled spring, the turns of which touch one another		N/A
	No damage after 10 000 flexings for conductors flexed during normal use, or		N/A
	100 flexings for conductors flexed during user maintenance		N/A
	Electric strength test of 16.3, 1000 V between live parts and accessible metal parts		N/A
	Not more than 10% of the strands of any conductor broken, and		N/A
	not more than 30% for wiring supplying circuits that consume no more than 15W		N/A
23.4	Bare internal wiring sufficiently rigid and fixed		N/A
23.5	The insulation of internal wiring subjected to the supply mains voltage withstanding the electrical stress likely to occur in normal use		P
	Basic insulation electrically equivalent to the basic insulation of cords complying with IEC 60227 or IEC 60245, or		P
	no breakdown when a voltage of 2000 V is applied for 15 min between the conductor and metal foil wrapped around the insulation		P
	For class II construction, the requirements for supplementary insulation and reinforced insulation apply,		P
	except that the sheath of a cord complying with IEC 60227 or IEC 60245 may provide supplementary insulation.		P
	A single layer of internal wiring insulation does not provide reinforced insulation		P
23.6	Sleeving used as supplementary insulation on internal wiring retained in position by clamping at both ends, or		P
	be such that it can only be removed by breaking or cutting		P

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Clause	Requirement + Test	Result - Remark	Verdict
23.7	The colour combination green/yellow only used for earthing conductors		P
23.8	Aluminium wires not used for internal wiring		N/A
23.9	Stranded conductors not consolidated by soldering where they are subjected to contact pressure, unless		P
	the contact pressure is provided by spring terminals		N/A
23.10	The insulation and sheath of internal wiring, incorporated in external hoses for the connection of an appliance to the water mains, at least equivalent to that of light polyvinyl chloride sheathed flexible cord (60227 IEC 52)		N/A
24	**COMPONENTS**		**P**
24.1	Components comply with safety requirements in relevant IEC standards		P
	List of components ..... :	(see appended table)	P
	Motors not required to comply with IEC 60034-1, they are tested as part of the appliance		P
	Relays tested as part of the appliance, or		N/A
	alternatively acc. to IEC 60730-1, and meeting the additional requirements in IEC 60335-1		N/A
	The requirements of Clause 29 apply between live parts of components and accessible parts of the appliance		N/A
	Components can comply with the requirements for clearances and creepage distances for functional insulation in the relevant component standard		N/A
	30.2 of this standard apply to parts of non-metallic material in components including parts of non-metallic material supporting current-carrying connections		N/A
	Components that have not been previously tested to comply with the IEC standard for the relevant component are tested according to the requirements of 30.2		N/A
	Components that have been previously tested to comply with the resistance to fire requirements in the IEC standard for the relevant component need not be retested provided the specified conditions are met		P
	If these conditions are not satisfied, the component is tested as part of the appliance.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Power electronic converter circuits not required to comply with IEC 62477-1, they are tested as part of the appliance		N/A
	If components have not been tested and found to comply with relevant IEC standard for the number of cycles specified, they are tested in accordance with 24.1.1 to 24.1.9		N/A
	For components mentioned in 24.1.1 to 24.1.9 no additional tests specified in the relevant component standard are necessary other than those specified in 24.1.1 to 24.1.9		P
	Components not tested and found to comply with relevant IEC standard and components not marked or not used in accordance with its marking, tested under the conditions occurring in the appliance		N/A
	Lampholders and starterholders that have not being tested and found to comply with the relevant IEC standard, tested as a part of the appliance and additionally according to the gauging and interchangeability requirements of the relevant IEC standard		N/A
	No additional tests specified for nationally standardized plugs such as those detailed in IEC/TR 60083 or connectors complying with the standard sheets of IEC 60320-1 and IEC 60309		N/A
24.1.1	Capacitors likely to be permanently subjected to the supply voltage and used for radio interference suppression or for voltage dividing, complying with IEC 60384-14		N/A
	If the capacitors have to be tested, they are tested according to Annex F		N/A
24.1.2	Transformers in associated switch mode power supplies comply with Annex BB of IEC 61558-2-16		N/A
	Safety isolating transformers complying with IEC 61558-2-6		N/A
	If they have to be tested, they are tested according to Annex G		N/A
24.1.3	Switches complying with IEC 61058-1, the number of cycles of operation being at least 10 000		N/A
	If they have to be tested, they are tested according to Annex H		N/A
	If the switch operates a relay or contactor, the complete switching system is subjected to the test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If the switch only operates a motor staring relay complying with IEC 60730-2-10 with the number of cycles of a least 10 000 as specified, the complete switching system need not be tested		N/A
24.1.4	Automatic controls complying with IEC 60730-1 with the relevant part 2. The number of cycles of operation being at least:		N/A
	- thermostats:		N/A
	- temperature limiters: 1 000		N/A
	- self-resetting thermal cut-outs: 300		N/A
	- voltage maintained non-self-resetting thermal cut-outs: 1 000		N/A
	- other non-self-resetting thermal cut-outs:..... 30		N/A
	- timers: 3 000		N/A
	- energy regulators: 10 000		N/A
	The number of cycles for controls operating during clause 11 need not be declared, if the appliance meets the requirements of this standard when they are short-circuited		N/A
	Thermal motor protectors are tested in combination with their motor under the conditions specified in Annex D		N/A
	For water valves containing live parts and that are incorporated in external hoses for connection of an appliance to the water mains, the degree of protection declared for subclause 6.5.2 of IEC 60730-2-8 is IPX7		N/A
	Thermal cut-outs of the capillary type comply with the requirements for type 2.K controls in IEC 60730-2-9		N/A
24.1.5	Appliance couplers complying with IEC 60320-1		N/A
	However, for class II appliances classified higher than IPX0, the appliance couplers complying with IEC 60320-2-3		N/A
	Interconnection couplers complying with IEC 60320-2-2		N/A
24.1.6	Small lamp holders similar to E10 lampholders complying with IEC 60238, the requirements for E10 lampholders being applicable		N/A
24.1.7	For remote operation of the appliance via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is IEC 62151		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
24.1.8	The relevant standard for thermal links is IEC 60691		N/A
	Thermal links not complying with IEC 60691 are considered to be an intentionally weak part for the purposes of Clause 19		N/A
24.1.9	Contactors and relays, other than motor starting relays, tested as part of the appliance		N/A
	They are also tested in accordance with Clause 17 of IEC 60730-1, the number of cycles of operations in 24.1.4 selected according to the contactor or relay function in the appliance..... :		N/A
24.2	Appliances not fitted with:		N/A
	- switches or automatic controls in flexible cords		N/A
	- devices causing the protective device in the fixed wiring to operate in the event of a fault in the appliance		N/A
	- thermal cut-outs that can be reset by soldering, unless		N/A
	the solder has a melding point of at least 230 ˚C		N/A
24.3	Switches intended for all-pole disconnection of stationary appliances are directly connected to the supply terminals and have a contact separation in all poles, providing full disconnection under overvoltage category III conditions		N/A
24.4	Plugs and socket-outlets for extra-low voltage circuits and heating elements, not interchangeable with plugs and socket-outlets listed in IEC/TR 60083 or IEC 60906-1 or with connectors and appliance inlets complying with the standard sheets of IEC 60320-1		P
24.5	Capacitors in auxiliary windings of motors marked with their rated voltage and capacitance, and used accordingly		N/A
	Voltage across capacitors in series with a motor winding does not exceed 1,1 times rated voltage, when the appliance is supplied at 1,1 times rated voltage under minimum load		N/A
24.6	Working voltage of motors connected to the supply mains and having basic insulation that is inadequate for the rated voltage of the appliance, not exceeding 42 V		N/A
	In addition, the motors comply with the requirements of Annex I		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
24.7	Detachable hose-sets for connection of appliances to the water mains comply with IEC 61770		N/A
	They are supplied with the appliance		N/A
	Appliances intended to be permanently connected to the water mains not connected by a detachable hose-set		N/A
24.8	Motor running capacitors in appliances for which 30.2.3 is applicable and that are permanently connected in series with a motor winding, not causing a hazard in event of a failure		N/A
	One or more of the following conditions are to be met:		N/A
	- the capacitors are of class P2 according to IEC 60252-1		N/A
	- the capacitors are housed within a metallic or ceramic enclosure		N/A
	- the distance of separation of the outer surface to adjacent non-metallic parts exceeds 50 mm		N/A
	- adjacent non-metallic parts within 50 mm withstand the needle-flame test of Annex E		N/A
	- adjacent non-metallic parts within 50 mm classified as at least V-1 according to IEC 60695-11-10		N/A
25	**SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS**		**N/A**
25.1	Appliance not intended for permanent connection to fixed wiring, means for connection to the supply:		N/A
	- supply cord fitted with a plug, the current rating and voltage rating of the plug being not less than the corresponding ratings of its associated appliance		N/A
	- an appliance inlet having at least the same degree of protection against moisture as required for the appliance, or		N/A
	- pins for insertion into socket-outlets		N/A
25.2	Appliance not provided with more than one means of connection to the supply mains		N/A
	Stationary appliance for multiple supply may be provided with more than one means of connection, provided electric strength test of 1250 V for 1 min between each means of connection causes no breakdown		N/A
25.3	Appliance intended to be permanently connected to fixed wiring provided with one of the following means for connection to the supply mains:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- a set of terminals allowing the connection of a flexible cord		N/A
	- a fitted supply cord		N/A
	- a set of supply leads accommodated in a suitable compartment		N/A
	- a set of terminals for the connection of cables of fixed wiring, cross-sectional areas specified in 26.6, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support		N/A
	- a set of terminals and cable entries, conduit entries, knock-outs or glands, allowing connection of appropriate types of cable or conduit, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support		N/A
	For a fixed appliance constructed so that parts can be removed to facilitate easy installation, this requirement is met if it is possible to connect the fixed wiring without difficulty after a part of the appliance has been fixed to its support		N/A
25.4	Cable and conduit entries, rated current of appliance not exceeding 16 A, dimension according to table 10 (mm)..... :		N/A
	Introduction of conduit or cable does not reduce clearances or creepage distances below values specified in clause 29		N/A
25.5	Method for assembling the supply cord to the appliance:		N/A
	- type X attachment		N/A
	- type Y attachment		N/A
	- type Z attachment, if allowed in relevant part 2		N/A
	Type X attachment, other than those with a specially prepared cord, not used for flat twin tinsel cords		N/A
	For multi-phase appliances supplied with a supply cord and that are intended to be permanently connected to fixed wiring, the supply cord is assembled to the appliance by type Y attachment		N/A
25.6	Plugs fitted with only one flexible cord		N/A
25.7	Supply cords, other than for class III appliances, being one of the following types:		N/A
	- rubber sheathed (at least 60245 IEC 53)		N/A
	- polychloroprene sheathed (at least 60245 IEC 57)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- polyvinyl chloride sheathed. Not used if they are likely to touch metal parts having a temperature rise exceeding 75 K during the test of clause 11		N/A
	light polyvinyl chloride sheathed cord (60227 IEC 52), for appliances not exceeding 3 kg		N/A
	ordinary polyvinyl chloride sheathed cord (60227 IEC 53), for other appliances		N/A
	- heat resistant polyvinyl chloride sheathed. Not used for type X attachment other than specially prepared cords		N/A
	heat-resistant light polyvinyl chloride sheathed cord (60227 IEC 56), for appliances not exceeding 3 kg		N/A
	heat-resistant polyvinyl chloride sheathed cord (60227 IEC 57), for other appliances		N/A
	Supply cords for class III appliances adequately insulated		N/A
	Test with 500 V for 2 min for supply cords of class III appliances that contain live parts		N/A
25.8	Nominal cross-sectional area of supply cords not less than table 11; rated current (A); cross-sectional area (mm^2) .....:		N/A
25.9	Supply cords not in contact with sharp points or edges		N/A
25.10	Supply cord of class I appliances have a green/yellow core for earthing		N/A
	In multi-phase appliances, the colour of the neutral conductor of the supply cord is blue		N/A
25.11	Conductors of supply cords not consolidated by soldering where they are subject to contact pressure, unless		N/A
	the contact pressure is provided by spring terminals		N/A
25.12	Insulation of the supply cord not damaged when moulding the cord to part of the enclosure		N/A
25.13	Inlet openings so constructed as to prevent damage to the supply cord		N/A
	If it is not evident that the supply cord can be introduced without risk of damage, a non-detachable lining or bushing complying with 29.3 for supplementary insulation provided		N/A
	If unsheathed supply cord, a similar additional bushing or lining is required, unless the appliance is		N/A
	class 0, or		N/A
	a class III appliance not containing live parts		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
25.14	Supply cords moved while in operation adequately protected against excessive flexing		N/A
	Flexing test, as described:		N/A
	- applied force (N)		N/A
	- number of flexings.....		N/A
	The test does not result in:		N/A
	- short-circuit between the conductors, such that the current exceeds a value of twice the rated current		N/A
	- breakage of more than 10% of the strands of any conductor		N/A
	- separation of the conductor from its terminal		N/A
	- loosening of any cord guard		N/A
	- damage to the cord or the cord guard		N/A
	- broken strands piercing the insulation and becoming accessible		N/A
	- loosening of the hose		N/A
	- damage to the hose to such an extent that compliance with this standard is impaired		N/A
	- leakage from the hose		N/A
25.15	For appliances with supply cord and appliances to be permanently connected to fixed wiring by a flexible cord, conductors of the supply cord relieved from strain, twisting and abrasion by use of cord anchorage		N/A
	The cord cannot be pushed into the appliance to such an extent that the cord or internal parts of the appliance can be damaged		N/A
	Pull and torque test of supply cord:		N/A
	- fixed appliances: pull 100 N; torque (not on automatic cord reel) (Nm) .....:		N/A
	- other appliances: values shown in table 12: mass (kg); pull (N); torque (not on automatic cord reel) (Nm) .....:		N/A
	Cord not damaged and max. 2 mm displacement of the cord		N/A
25.16	Cord anchorages for type X attachments constructed and located so that:		N/A
	- replacement of the cord is easily possible		N/A
	- it is clear how the relief from strain and the prevention of twisting are obtained		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- they are suitable for different types of supply cord		N/A
	- cord cannot touch the clamping screws of cord anchorage if these screws are accessible, unless		N/A
	they are separated from accessible metal parts by supplementary insulation		N/A
	- the cord is not clamped by a metal screw which bears directly on the cord		N/A
	- at least one part of the cord anchorage securely fixed to the appliance, unless		N/A
	it is part of a specially prepared cord		N/A
	- screws which have to be operated when replacing the cord do not fix any other component, unless		N/A
	the appliance becomes inoperative or incomplete or the parts cannot be removed without a tool		N/A
	- if labyrinths can be bypassed the test of 25.15 is nevertheless withstood		N/A
	- for class 0, 0I and I appliances they are of insulating material or are provided with an insulating lining, unless		N/A
	failure of the insulation of the cord does not make accessible metal parts live		N/A
	- for class II appliances they are of insulating material, or		N/A
	if of metal, they are insulated from accessible metal parts by supplementary insulation		N/A
	After the test of 25.15, under the conditions specified, the conductors have not moved by more than 1 mm in the terminals		N/A
25.17	Adequate cord anchorages for type Y and Z attachment, test with the cord supplied with the appliance		N/A
25.18	Cord anchorages only accessible with the aid of a tool, or		N/A
	Constructed so that the cord can only be fitted with the aid of a tool		N/A
25.19	Type X attachment, glands not used as cord anchorage in portable appliances		N/A
	Tying the cord into a knot or tying the cord with string not used		N/A
25.20	The conductors of the supply cord for type Y and Z attachment insulated from accessible metal parts		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
25.21	Space for supply cord for type X attachment or for connection of fixed wiring constructed:		N/A
	- to permit checking of conductors with respect to correct positioning and connection before fitting any cover		N/A
	- so there is no risk of damage to the conductors or their insulation when fitting the cover		N/A
	- for portable appliances, so that the uninsulated end of a conductor, if it becomes free from the terminal, prevented from contact with accessible metal parts		N/A
	2 N test to the conductor for portable appliances; no contact with accessible metal parts		N/A
25.22	Appliance inlets:		N/A
	- live parts not accessible during insertion or removal		N/A
	Requirement not applicable to appliance inlets complying with IEC 60320-1		N/A
	- connector can be inserted without difficulty		N/A
	- the appliance is not supported by the connector		N/A
	- not for cold conditions if temp. rise of external metal parts exceeds 75 K during clause 11, unless		N/A
	the supply cord is unlikely to touch such metal parts		N/A
25.23	Interconnection cords comply with the requirements for the supply cord, except that:		N/A
	- the cross-sectional area of the conductors is determined on the basis of the maximum current during clause 11		N/A
	- the thickness of the insulation may be reduced		N/A
	If necessary, electric strength test of 16.3		N/A
25.24	Interconnection cords not detachable without the aid of a tool if compliance with this standard is impaired when they are disconnected		N/A
25.25	Dimensions of pins that are inserted into socket-outlets compatible with the dimensions of the relevant socket-outlet.		N/A
	Dimensions of pins and engagement face in accordance with the dimensions of the relevant plug in IEC/TR 60083		N/A
26	**TERMINALS FOR EXTERNAL CONDUCTORS**		**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
26.1	Appliances provided with terminals or equally effective devices for connection of external conductors		N/A
	Terminals only accessible after removal of a non-detachable cover, except		N/A
	for class III appliances that do not contain live parts		N/A
	Earthing terminals may be accessible if a tool is required to make the connections and means are provided to clamp the wire independently from its connection		N/A
26.2	Appliances with type X attachment and appliances for the connection of cables to fixed wiring provided with terminals in which connections are made by means of screws, nuts or similar devices, unless		N/A
	the connections are soldered		N/A
	Screws and nuts not used to fix any other component, except		N/A
	internal conductors, if so arranged that they are unlikely to be displaced when fitting the supply conductors		N/A
	If soldered connections used, the conductor so positioned or fixed that reliance is not placed on soldering alone, unless		N/A
	barriers provided so that neither clearances nor creepage distances between live parts and other metal parts reduced below the values for supplementary insulation if the conductor becomes free at the soldered joint		N/A
26.3	Terminals for type X attachment and for connection of cables of fixed wiring so constructed that the conductor is clamped between metal surfaces with sufficient contact pressure but without damaging the conductor		N/A
	Terminals fixed so that when the clamping means is tightened or loosened:		N/A
	- the terminal does not become loose		N/A
	- internal wiring is not subjected to stress		N/A
	- neither clearances nor creepage distances are reduced below the values in clause 29		N/A
	Compliance checked by inspection and by the test of subclause 9.6 of IEC 60999-1, the torque applied being equal to two-thirds of the torque specified (Nm) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	No deep or sharp indentations of the conductors		N/A
26.4	Terminals for type X attachment, except those having a specially prepared cord and those for the connection of cables of fixed wiring, no special preparation of conductors such as by soldering, use of cable lugs, eyelets or similar, and		N/A
	so constructed or placed that conductors prevented from slipping out when clamping screws or nuts are tightened		N/A
26.5	Terminals for type X attachment so located or shielded that if a wire of a stranded conductor escapes, no risk of accidental connection to other parts that result in a hazard		N/A
	Stranded conductor test, 8 mm insulation removed		N/A
	No contact between live parts and accessible metal parts and,		N/A
	for class II constructions, between live parts and metal parts separated from accessible metal parts by supplementary insulation only		N/A
26.6	Terminals for type X attachment and for connection of cables of fixed wiring suitable for connection of conductors with cross-sectional area according to table 13; rated current (A); nominal cross-sectional area (mm^2) ..... :		N/A
	If a specially prepared cord is used, terminals need only be suitable for that cord		N/A
26.7	Terminals for type X attachment, except in class III appliances not containing live parts, accessible after removal of a cover or part of the enclosure		N/A
26.8	Terminals for the connection of fixed wiring, including the earthing terminal, located close to each other		N/A
26.9	Terminals of the pillar type constructed and located as specified		N/A
26.10	Terminals with screw clamping and screwless terminals not used for flat twin tinsel cords, unless		N/A
	conductors ends fitted with means suitable for screw terminals		N/A
	Pull test of 5 N to the connection		N/A
26.11	For type Y and Z attachment, soldered, welded, crimped or similar connections may be used		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For Class II appliances, the conductor so positioned or fixed that reliance is not placed on soldering, welding or crimping alone		N/A
	If soldering, welding or crimping alone used, barriers provided so that clearances and creepage distances between live parts and other metal parts are not reduced below the values for supplementary insulation if the conductor becomes free		N/A
27	**PROVISION FOR EARTHING**		**N/A**
27.1	Accessible metal parts of Class 0I and I appliances permanently and reliably connected to an earthing terminal or earthing contact of the appliance inlet		N/A
	Earthing terminals and earthing contacts not connected to the neutral terminal		N/A
	Class 0, II and III appliances have no provision for protective earthing		N/A
	Class II appliances and class III appliances can incorporate an earth for functional purposes		N/A
	Safety extra-low voltage circuits not earthed, unless		N/A
	protective extra-low voltage circuits		N/A
27.2	Clamping means of earthing terminals adequately secured against accidental loosening		N/A
	Terminals for the connection of external equipotential bonding conductors allow connection of conductors of 2.5 to 6 mm², and		N/A
	do not provide earthing continuity between different parts of the appliance, and		N/A
	conductors cannot be loosened without the aid of a tool		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N/A
27.3	For a detachable part having an earth connection and being plugged into another part of the appliance, the earth connection is made before and separated after current-carrying connections when removing the part		N/A
	For appliances with supply cords, current-carrying conductors become taut before earthing conductor, if the cord slips out of the cord anchorage		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
27.4	No risk of corrosion resulting from contact between parts of the earthing terminal and the copper of the earthing conductor or other metal		N/A
	Parts providing earthing continuity, other than parts of a metal frame or enclosure, have adequate resistance to corrosion		N/A
	If of steel, these parts provided with an electroplated coating with a thickness at least 5 µm		N/A
	Adequate protection against rusting of parts of coated or uncoated steel, only intended to provide or transmit contact pressure		N/A
	In the body of the earthing terminal is a part of a frame or enclosure of aluminium or aluminium alloys, precautions taken to avoid risk of corrosion		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N/A
27.5	Low resistance of connection between earthing terminal and earthed metal parts		N/A
	This requirement does not apply to connections providing earthing continuity in the protective extra-low voltage circuit, provided the clearances of basic insulation are based on the rated voltage of the appliance		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N/A
	Resistance not exceeding 0,1 Ω at the specified low-resistance test (Ω) ..... :		N/A
27.6	The printed conductors of printed circuit boards not used to provide earthing continuity in hand-held appliances.		N/A
	They may be used to provide earthing continuity in other appliances if at least two tracks are used with independent soldering points and the appliance complies with 27.5 for each circuit		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N/A
28	**SCREWS AND CONNECTIONS**		**P**
28.1	Fixings, electrical connections and connections providing earthing continuity withstand mechanical stresses		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Screws not of soft metal liable to creep, such as zinc or aluminium		P
	Diameter of screws of insulating material min. 3 mm		P
	Screws of insulating material not used for any electrical connections or connections providing earthing continuity		N/A
	Screws used for electrical connections or connections providing earthing continuity screwed into metal		P
	Screws not of insulating material if their replacement by a metal screw can impair supplementary or reinforced insulation		N/A
	For type X attachment, screws to be removed for replacement of supply cord or for user maintenance, not of insulating material if their replacement by a metal screw impairs basic insulation		N/A
	For screws and nuts; torque-test as specified in table 14 ..... :	(see appended table)	P
28.2	Electrical connections and connections providing earthing continuity constructed so that contact pressure is not transmitted through non-ceramic insulating material liable to shrink or distort, unless		P
	there is resiliency in the metallic parts to compensate for shrinkage or distortion of the insulating material		P
	This requirement does not apply to electrical connections in circuits of appliances for which:		N/A
	30.2.2 is applicable and that carry a current not exceeding 0,5 A		N/A
	30.2.3 is applicable and that carry a current not exceeding 0,2 A		N/A
28.3	Space-threaded (sheet metal) screws only used for electrical connections if they clamp the parts together		N/A
	Thread-cutting (self-tapping) screws and thread rolling screws only used for electrical connections if they generate a full form standard machine screw thread		P
	Thread-cutting (self-tapping) screws not used if they are likely to be operated by the user or installer		N/A
	Thread-cutting, thread rolling and space threaded screws may be used in connections providing earthing continuity provided it is not necessary to disturb the connection:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- in normal use,		P
	- during user maintenance,		N/A
	- when replacing a supply cord having a type X attachment, or		N/A
	- during installation		P
	At least two screws being used for each connection providing earthing continuity, unless		N/A
	the screw forms a thread having a length of at least half the diameter of the screw		P
28.4	Screws and nuts that make mechanical connection secured against loosening if they also make electrical connections or connections providing earthing continuity		P
	This requirement does not apply to screws in the earthing circuit if at least two screws are used, or		N/A
	if an alternative earthing circuit is provided		N/A
	Rivets for electrical connections or connections providing earthing continuity secured against loosening if the connections are subjected to torsion		N/A
29	**CLEARANCES, CREEPAGE DISTANCES AND SOLID INSULATION**		**N/A**
	Clearances, creepage distances and solid insulation withstand electrical stress		N/A
	For coatings used on printed circuits boards to protect the microenvironment (Type 1) or to provide basic insulation (Type 2), Annex J applies ..... :		N/A
	The microenvironment is pollution degree 1 under type 1 protection		N/A
	For type 2 protection, the spacing between the conductors before the protection is applied is not less than the values specified in Table 1 of IEC 60664-3		N/A
	These values apply to functional, basic, supplementary and reinforced insulation..... :		N/A
29.1	Clearances not less than the values specified in table 16, taking into account the rated impulse voltage for the overvoltage categories of table 15, unless..... :	(see appended table)	N/A
	for basic insulation and functional insulation they comply with the impulse voltage test of clause 14		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	However, if the distances are affected by wear, distortion, movement of the parts or during assembly, the clearances for rated impulse voltages of 1500V and above are increased by 0,5 mm and the impulse voltage test is not applicable		N/A
	For appliances intended for use at altitudes exceeding 2 000 m, the clearances in Table 16 is increased according to the relevant multiplier values in Table A.2 of IEC 60664-1		N/A
	Impulse voltage test is not applicable:		N/A
	- when the microenvironment is pollution degree 3, or		N/A
	- for basic insulation of class 0 and class 01 appliances		N/A
	- to appliances intended for use at altitudes exceeding 2 000 m		N/A
	Appliances are in overvoltage category II		N/A
	A force of 2 N is applied to bare conductors, other than heating elements		N/A
	A force of 30 N is applied to accessible surfaces		N/A
29.1.1	Clearances of basic insulation withstand the overvoltages, taking into account the rated impulse voltage		N/A
	The values of table 16 or the impulse voltage test of clause 14 are applicable..... :	(see appended table)	N/A
	Clearance at the terminals of tubular sheathed heating elements may be reduced to 1,0 mm if the microenvironment is pollution degree 1		N/A
	Lacquered conductors of windings considered to be bare conductors		N/A
29.1.2	Clearances of supplementary insulation not less than those specified for basic insulation in table 16:	(see appended table)	N/A
29.1.3	Clearances of reinforced insulation not less than those specified for basic insulation in table 16, using the next higher step for rated impulse voltage ..... :	(see appended table)	N/A
	For double insulation, with no intermediate conductive part between basic and supplementary insulation, clearances are measured between live parts and the accessible surface, and the insulation system is treated as reinforced insulation		N/A
29.1.4	Clearances for functional insulation are the largest values determined from:		N/A
	- table 16 based on the rated impulse voltage ..... :	(see appended table)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- table F.7a in IEC 60664-1, frequency not exceeding 30 kHz		N/A
	- clause 4 of IEC 60664-4, frequency exceeding 30 kHz		N/A
	If values of table 16 are largest, the impulse voltage test of clause 14 may be applied instead, unless		N/A
	the microenvironment is pollution degree 3, or		N/A
	the distances can be affected by wear, distortion, movement of the parts or during assembly		N/A
	However, clearances are not specified if the appliance complies with clause 19 with the functional insulation short-circuited		N/A
	Lacquered conductors of windings considered to be bare conductors		N/A
	However, clearances at crossover points are not measured		N/A
	Clearance between surfaces of PTC heating elements may be reduced to 1mm		N/A
29.1.5	Appliances having higher working voltages than rated voltage, clearances for basic insulation are the largest values determined from:		N/A
	- table 16 based on the rated impulse voltage ..... :		N/A
	- table F.7a in IEC 60664-1, frequency not exceeding 30 kHz		N/A
	- clause 4 of IEC 60664-4, frequency exceeding 30 kHz		N/A
	If clearances for basic insulation are selected from Table F.7a of IEC 60664-1 or Clause 4 of IEC 60664-4, the clearances of supplementary insulation are not less than those specified for basic insulation		N/A
	If clearances for basic insulation are selected from Table F.7a of IEC 60664-1, the clearances of reinforced insulation dimensioned as specified in Table F.7a are to withstand 160% of the withstand voltage required for basic insulation		N/A
	If clearances for basic insulation are selected from Clause 4 of IEC 60664-4, the clearances of reinforced insulation are twice the value required for basic insulation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If the secondary winding of a step-down transformer is earthed, or if there is an earthed screen between the primary and secondary windings, clearances of basic insulation on the secondary side not less than those specified in table 16, but using the next lower step for rated impulse voltage		N/A
	Circuits supplied with a voltage lower than rated voltage, clearances of functional insulation are based on the working voltage used as the rated voltage in table 15		N/A
29.2	Creepage distances not less than those appropriate for the working voltage, taking into account the material group and the pollution degree ..... :	(see appended table)	N/A
	Pollution degree 2 applies, unless		N/A
	- precautions taken to protect the insulation; pollution degree 1		N/A
	- insulation subjected to conductive pollution; pollution degree 3		N/A
	A force of 2 N is applied to bare conductors, other than heating elements		N/A
	A force of 30 N is applied to accessible surfaces		N/A
	In a double insulation system, the working voltage for both the basic and supplementary insulation is taken as the working voltage across the complete double insulation system		N/A
29.2.1	Creepage distances of basic insulation not less than specified in table 17..... :	(see appended table)	N/A
	However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from table 2 of IEC 60664-4, these values being used if exceeding the values in table 17..... :		N/A
	Except for pollution degree 1, corresponding creepage distance not less than the minimum specified for the clearance in table 16, if the clearance has been checked according to the test of clause 14..... :		N/A
29.2.2	Creepage distances of supplementary insulation at least those specified for basic insulation in table 17, or ..... :	(see appended table)	N/A
	Table 2 of IEC 60664-4, as applicable ..... :		N/A
29.2.3	Creepage distances of reinforced insulation at least double those specified for basic insulation in table 17, or ..... :	(see appended table)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Table 2 of IEC 60664-4, as applicable ..... :		N/A
29.2.4	Creepage distances of functional insulation not less than specified in table 18..... :	(see appended table)	N/A
	However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from table 2 of IEC 60664-4, these values being used if exceeding the values in table 18..... :		N/A
	Creepage distances may be reduced if the appliance complies with clause 19 with the functional insulation short-circuited		N/A
29.3	Supplementary and reinforced insulation have adequate thickness, or a sufficient number of layers, to withstand the electrical stresses		N/A
	Compliance checked:		N/A
	- by measurement, in accordance with 29.3.1, or		N/A
	- by an electric strength test in accordance with 29.3.2, or		N/A
	- for insulation, other than single layer internal wiring insulation, by an assessment of the thermal quality of the material combined with an electric strength test, in accordance with 29.3.3, and		N/A
	for accessible parts of reinforced insulation consisting of a single layer, by measurement in accordance with 29.3.4, or		N/A
	- by an assessment of the thermal quality of the material according to 29.3.3 combined with an electric strength test in accordance with 23.5, for each single layer internal wiring insulation touching each other, or		N/A
	- as specified in subclause 6.3 of IEC 60664-4 for insulation that is subjected to any periodic voltage having a frequency exceeding 30 kHz		N/A
29.3.1	Supplementary insulation have a thickness of at least 1 mm		N/A
	Reinforced insulation have a thickness of at least 2 mm		N/A
29.3.2	Each layer of material withstand the electric strength test of 16.3 for supplementary insulation		N/A
	Supplementary insulation consist of at least 2 layers		N/A
	Reinforced insulation consist of at least 3 layers		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
29.3.3	The insulation is subjected to the dry heat test Bb of IEC 60068-2-2, followed by		N/A
	the electric strength test of 16.3		N/A
	If the temperature rise during the tests of clause 19 does not exceed the value specified in table 3, the test of IEC 60068-2-2 is not carried out		N/A
29.3.4	Thickness of accessible parts of reinforced insulation consisting of a single layer not less than specified in table 19 ..... :		N/A
30	**RESISTANCE TO HEAT AND FIRE**		**P**
30.1	External parts of non-metallic material,		P
	parts supporting live parts, and		P
	parts of thermoplastic material providing supplementary or reinforced insulation		P
	sufficiently resistant to heat		P
	Ball-pressure test according to IEC 60695-10-2		P
	External parts tested at 40 °C plus the maximum temperature rise determined during the test of clause 11, or at 75 °C, whichever is the higher; temperature (°C)..... :	(see appended table)	P
	Parts supporting live parts tested at 40°C plus the maximum temperature rise determined during the test of clause 11, or at 125 °C, whichever is the higher; temperature (°C) ..... :	(see appended table)	P
	Parts of thermoplastic material providing supplementary or reinforced insulation tested at 25 °C plus the maximum temperature rise determined during clause 19, if higher; temperature (°C) ..... :	(see appended table)	P
30.2	Parts of non-metallic material resistant to ignition and spread of fire		P
	This requirement does not apply to:		P
	parts having a mass not exceeding 0,5 g, provided the cumulative effect is unlikely to propagate flames that originate inside the appliance by propagating flames from one part to another, or		N/A
	decorative trims, knobs and other parts unlikely to be ignited or to propagate flames that originate inside the appliance		N/A
	Compliance checked by the test of 30.2.1, and in addition:		P
	- for attended appliances, 30.2.2 applies		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- for unattended appliances, 30.2.3 applies		N/A
	For appliances for remote operation, 30.2.3 applies		N/A
	For base material of printed circuit boards, 30.2.4 applies		P
30.2.1	Parts of non-metallic material subjected to the glow-wire test of IEC 60695-2-11 at 550 °C		P
	However, test not carried out if the material is classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 550 °C, or		N/A
	the material is classified at least HB40 according to IEC 60695-11-10		N/A
	Parts for which the glow-wire test cannot be carried out need to meet the requirements in ISO 9772 for material classified HBF		N/A
30.2.2	Appliances operated while attended, parts of non-metallic material supporting current-carrying connections, and		P
	parts of non-metallic material within a distance of 3mm of such connections,		P
	subjected to the glow-wire test of IEC 60695-2-11 with appropriate severity level:	(see appended table 30.2)	P
	- 750 °C, for connections carrying a current exceeding 0,5 A during normal operation		P
	- 650 °C, for other connections		N/A
	Glow-wire applied to an interposed shielding material, if relevant		N/A
	The glow-wire test is not carried out on parts of material classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least:		N/A
	- 750 °C, for connections carrying a current exceeding 0,5 A during normal operation		N/A
	- 650 °C, for other connections		N/A
	The glow-wire test is also not carried out on small parts. These parts are to:		N/A
	- comprise material having a glow-wire flammability index of at least 750 °C, or 650 °C as appropriate, or		N/A
	- comply with the needle-flame test of Annex E, or	(see appended table 30.2/30.4)	N/A
	- comprise material classified as V-0 or V-1 according to IEC 60695-11-10 ..... :		N/A
	Glow-wire test not applicable to conditions as specified ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
30.2.3	Appliances operated while unattended, tested as specified in 30.2.3.1 and 30.2.3.2		N/A
	The tests are not applicable to conditions as specified .....:		N/A
30.2.3.1	Parts of non-metallic material supporting connections carrying a current exceeding 0,2 A during normal operation, and		N/A
	parts of non-metallic material, other than small parts, within a distance of 3 mm,		N/A
	subjected to the glow-wire test of IEC 60695-2-11 with a test severity of 850 °C	(see appended table 30.2)	N/A
	Glow-wire applied to an interposed shielding material, if relevant		N/A
	The glow-wire test is not carried out on parts of material classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 850 °C		N/A
30.2.3.2	Parts of non-metallic material supporting connections, and		N/A
	parts of non-metallic material within a distance of 3mm,		N/A
	subjected to the glow-wire test of IEC 60695-2-11 with appropriate severity level:	(see appended table 30.2)	N/A
	- 750 °C, for connections carrying a current exceeding 0,2 A during normal operation		N/A
	- 650 °C, for other connections		N/A
	Glow-wire applied to an interposed shielding material, if relevant		N/A
	However, the glow-wire test of 750 °C or 650 °C as appropriate, is not carried out on parts of material fulfilling both or either of the following classifications:		N/A
	- a glow-wire ignition temperature according to IEC 60695-2-13 of at least:		N/A
	- 775 °C, for connections carrying a current exceeding 0,2 A during normal operation		N/A
	- 675 °C, for other connections		N/A
	- a glow-wire flammability index according to IEC 60695-2-12 of at least:		N/A
	- 750 °C, for connections carrying a current exceeding 0,2 A during normal operation		N/A
	- 650 °C, for other connections		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The glow-wire test is also not carried out on small parts. These parts are to:		N/A
	- comprise material having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or		N/A
	- comprise material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- comply with the needle-flame test of Annex E, or		N/A
	- comprise material classified as V-0 or V-1 according to IEC 60695-11-10		N/A
	The consequential needle-flame test of Annex E applied to non-metallic parts that encroach within the vertical cylinder placed above the centre of the connection zone and on top of the non-metallic parts supporting current-carrying connections, and parts of non-metallic material within a distance of 3 mm of such connections if these parts are those:		N/A
	- parts that withstood the glow-wire test of IEC 60695-2-11 of 750 °C or 650 °C as appropriate, but produce a flame that persist longer than 2 s, or		N/A
	- parts that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- small parts, that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- small parts for which the needle-flame test of Annex E was applied, or		N/A
	- small parts for which a material classification of V-0 or V-1 was applied		N/A
	However, the consequential needle-flame test is not carried out on non-metallic parts, including small parts, within the cylinder that are:		N/A
	- parts having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or		N/A
	- parts comprising material classified as V-0 or V-1 according to IEC 60695-11-10, or		N/A
	- parts shielded by a flame barrier that meets the needle-flame test of Annex E or that comprises material classified as V-0 or V-1 according to IEC 60695-11-10		N/A
30.2.4	Base material of printed circuit boards subjected to the needle-flame test of Annex E		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test not applicable to conditions as specified ..... :	PCB more than V-1	P
31	**RESISTANCE TO RUSTING**		**P**
	Relevant ferrous parts adequately protected against rusting		P
	Tests specified in part 2 when necessary		N/A
32	**RADIATION, TOXICITY AND SIMILAR HAZARDS**		**P**
	Appliance does not emit harmful radiation or present a toxic or similar hazard due to their operation in normal use		P
	Compliance is checked by the limits or tests specified in part 2, if relevant		N/A
A	**ANNEX A (INFORMATIVE) ROUTINE TESTS**		**P**
	Description of routine tests to be carried out by the manufacturer		P
B	**ANNEX B (NORMATIVE) APPLIANCES POWERED BY RECHARGEABLE BATTERIES**		**P**
	The following modifications to this standard are applicable for appliances powered by batteries that are recharged in the appliance		P
	Three forms of construction covered:		P
	a) Appliance supplied directly from the supply mains or a renewable energy source, the battery charging circuitry and other supply unit circuitry incorporated within the appliance		P
	b) The part of the appliance incorporating the battery is supplied from the supply mains or a renewable energy source, via a detachable supply unit. The battery charging circuitry is incorporated within the part of the appliance containing the battery		P
	c) The part of the appliance incorporating the battery is supplied from the supply mains or a renewable energy source, via a detachable supply unit. The battery charging circuitry is incorporated within the detachable supply unit		P
3.1.9	Appliance operated under the following conditions:		P
	- the appliance, supplied by its fully charged battery, operated as specified in relevant part 2		P
	- the battery is charged, the battery being initially discharged to such an extent that the appliance cannot operate		P

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	-if possible, the appliance is supplied from the supply mains through its battery charger, the battery being initially discharged to such an extent that the appliance cannot operate. The appliance is operated as specified in relevant part 2		P
	- if the appliance incorporates inductive coupling between two parts that are detachable from each other, the appliance is supplied from the supply mains with the detachable part removed		N/A
3.6.2	Part to be removed in order to discard the battery is not considered to be detachable		P
5.B.101	Appliances supplied from the supply mains tested as specified for motor-operated appliances		P
7.1	Battery compartment for batteries intended to be replaced by the user, marked with battery voltage and polarity of the terminals		P
	The positive terminal indicated by symbol IEC 60417-5005 and the negative terminal by symbol IEC 60417-5006		P
	Appliances intending to be supplied from a detachable supply unit marked with symbol IEC 60417-6181 and its type reference along with symbol ISO 7000-0790 (2004-01), or		P
	use only with <model designation> supply unit ...:		P
7.6	Additional symbols		P
7.12	The instructions give information regarding charging		P
	The instructions for appliances incorporating batteries intended to be replaced by the user includes required information		P
	Details about how to remove batteries containing materials hazardous to the environment given		P
	For appliances intending to be supplied from a detachable supply unit for the purposes of recharging the battery, the type reference of the detachable supply unit is stated along with the following:		P
	WARNING: For the purposes of recharging the battery, only use the detachable supply unit provided with this appliance		P
	If the symbol for detachable supply unit is used, its meaning is explained		P
7.15	Markings placed on the part of the appliance connected to the supply mains		P
	The type reference of the detachable supply unit is placed in close proximity to the symbol		P

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.2	Appliances having batteries that according to the instruction may be replaced by the user need only have basic insulation between live parts and the inner surface of the battery compartment		P
	If the appliance can be operated without batteries, double or reinforced insulation required		P
11.7	The battery is charged for the period stated in the instructions or 24 h.....:		P
11.8	Temperature rise of the battery surface does not exceed the limit in the battery manufacturer's specification; measured (K); limit (K) .....:		P
	If no limit specified, the temperature rise does not exceed 20 K; measured (K) .....:		P
19.1	Appliances subjected to tests of 19.B.101, 19.B.102 and 19.B.103		P
19.10	Not applicable		N/A
19.B.101	Appliances supplied at rated voltage for 168 h, the battery being continually charged		P
19.B.102	For appliances having batteries that can be removed without the aid of a tool, short-circuit of the terminals of the battery, the battery being fully charged,		P
19.B.103	Appliances having batteries replaceable by the user supplied at rated voltage under normal operation with the battery removed or in any position allowed by the construction		P
19.13	The battery does not rupture or ignite		P
21.B.101	Appliances having pins for insertion into socket-outlets have adequate mechanical strength		P
	Part of the appliance incorporating the pins subjected to the free fall test, procedure 2, of IEC 60068-2-31, the number of falls being:		P
	- 100, if the mass of the part does not exceed 250 g (g).....:		P
	- 50, if the mass of the part exceeds 250 g.....:		P
	After the test, the requirements of 8.1, 15.1.1, 16.3 and clause 29 are met		P
22.3	Appliances having pins for insertion into socket-outlets tested as fully assembled as possible		P
25.13	An additional lining or bushing not required for interconnection cords in class III appliances or class III constructions operating at safety extra-low voltage not containing live parts		P

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
30.2	For parts of the appliance connected to the supply mains during the charging period, 30.2.3 applies		P
	For other parts, 30.2.2 applies		P
C	**ANNEX C (NORMATIVE) AGEING TEST ON MOTORS**		**N/A**
	Tests, as described, carried out when doubt with regard to the temperature classification of the insulation of a motor winding		N/A
	Test conditions as specified		N/A
D	**ANNEX D (NORMATIVE) THERMAL MOTOR PROTECTORS**		**N/A**
	Applicable to appliances having motors that incorporate thermal motor protectors necessary for compliance with the standard		N/A
	Test conditions as specified		N/A
E	**ANNEX E (NORMATIVE) NEEDLE-FLAME TEST**		**N/A**
	Needle-flame test carried out in accordance with IEC 60695-11-5, with the following modifications:		N/A
7	Severities		N/A
	The duration of application of the test flame is 30 s ± 1 s		N/A
9	Test procedure		N/A
9.1	The specimen so arranged that the flame can be applied to a vertical or horizontal edge as shown in the examples of Figure 1		N/A
9.2	The first paragraph does not apply		N/A
	If possible, the flame is applied at least 10 mm from a corner		N/A
9.3	The test is carried out on one specimen		N/A
	If the specimen does not withstand the test, the test may be repeated on two additional specimens, both withstanding the test		N/A
11	Evaluation of test results		N/A
	The duration of burning not exceeding 30 s		N/A
	However, for printed circuit boards, the duration of burning not exceeding 15 s		N/A
F	**ANNEX F (NORMATIVE) CAPACITORS**		**N/A**

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Capacitors likely to be permanently subjected to the supply voltage, and used for radio interference suppression or voltage dividing, comply with the following clauses of IEC 60384-14, with the following modifications:		N/A
1.5	Terms and definitions		N/A
1.5.3	Class X capacitors tested according to subclass X2		N/A
1.5.4	This subclause is applicable		N/A
1.6	Marking		N/A
	Items a) and b) are applicable		N/A
3.4	Approval testing		N/A
3.4.3.2	Table 3 is applicable as described		N/A
4.1	Visual examination and check of dimensions		N/A
	This subclause is applicable		N/A
4.2	Electrical tests		N/A
4.2.1	This subclause is applicable		N/A
4.2.5	This subclause is applicable		N/A
4.2.5.2	Only table 11 is applicable		N/A
	Values for test A apply		N/A
	However, for capacitors in heating appliances the values for test B or C apply		N/A
4.12	Damp heat, steady state		N/A
	This subclause is applicable		N/A
	Only insulation resistance and voltage proof are checked		N/A
4.13	Impulse voltage		N/A
	This subclause is applicable		N/A
4.14	Endurance		N/A
	Subclauses 4.14.1, 4.14.3, 4.14.4 and 4.14.7 are applicable		N/A
4.14.7	Only insulation resistance and voltage proof are checked		N/A
	No visible damage		N/A
4.17	Passive flammability test		N/A
	This subclause is applicable		N/A
4.18	Active flammability test		N/A
	This subclause is applicable		N/A
G	**ANNEX G (NORMATIVE) SAFETY ISOLATING TRANSFORMERS**		**N/A**

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The following modifications to this standard are applicable for safety isolating transformers:		N/A
7	Marking and instructions		N/A
7.1	Transformers for specific use marked with:		N/A
	-name, trademark or identification mark of the manufacturer or responsible vendor .....:		N/A
	-model or type reference .....:		N/A
17	Overload protection of transformers and associated circuits		N/A
	Fail-safe transformers comply with subclause 15.5 of IEC 61558-1		N/A
22	Construction		N/A
	Subclauses 19.1 and 19.1.2 of IEC 61558-2-6 are applicable		N/A
29	Clearances, creepage distances and solid insulation		N/A
29.1, 29.2, 29.3	The distances specified in items 2a, 2c and 3 in table 13 of IEC 61558-1 apply		N/A
	For insulated winding wires complying with subclause 19.12.3 of IEC 61558-1 there are no requirements for clearances or creepage distances		N/A
	For windings providing reinforced insulation, the distance specified in item 2c of table 13 of IEC 61558-1 is not assessed		N/A
	For safety isolating transformers subjected to periodic voltages with a frequency exceeding 30 kHz, the clearances, creepage distances and solid insulation values specified in IEC 60664-4 are applicable, if greater than the values specified in items 2a, 2c and 3 in table 13 of IEC 61558-1		N/A
H	**ANNEX H (NORMATIVE) SWITCHES**		**N/A**
	Switches comply with the following clauses of IEC 61058-1, as modified below:		N/A
	The tests of IEC 61058-1 carried out under the conditions occurring in the appliance		N/A
	Before being tested, switches are operated 20 times without load		N/A
8	Marking and documentation		N/A
	Switches are not required to be marked		N/A
	However, a switch that can be tested separately from the appliance marked with the manufacturer's name or trade mark and the type reference		N/A
13	Mechanism		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The tests may be carried out on a separate sample		N/A
15	Insulation resistance and dielectric strength		N/A
15.1	Not applicable		N/A
15.2	Not applicable		N/A
15.3	Applicable for full disconnection and micro-disconnection		N/A
17	Endurance		N/A
	Compliance is checked on three separate appliances or switches		N/A
	For 17.2.4.4, the number of cycles declared according to 7.1.4 is 10 000, unless		N/A
	otherwise specified in 24.1.3 of the relevant part 2 of IEC 60335 .....:		N/A
	Switches for operation under no load and which can be operated only by a tool, and		N/A
	switches operated by hand that are interlocked so that they cannot be operated under load,		N/A
	are not subjected to the tests		N/A
	However, switches without this interlock are subjected to the test of 17.2.4.4 for 100 cycles of operation		N/A
	Subclauses 17.2.2 and 17.2.5.2 not applicable		N/A
	The ambient temperature during the test is that occurring in the appliance during the test of Clause 11 in IEC 60335-1		N/A
	The temperature rise of the terminals not more than 30 K above the temperature rise measured in clause 11 of IEC 60335-1 (K).....:		N/A
20	Clearances, creepage distances, solid insulation and coatings of rigid printed board assemblies		N/A
	Clause 20 is applicable to clearances across full disconnection and micro-disconnection		N/A
	It is also applicable to creepage distances for functional insulation, across full disconnection and micro-disconnection, as stated in Table 24		N/A
I	**ANNEX I (NORMATIVE) MOTORS HAVING BASIC INSULATION THAT IS INADEQUATE FOR THE RATED VOLTAGE OF THE APPLIANCE**		**N/A**
	The following modifications to this standard are applicable for motors having basic insulation that is inadequate for the rated voltage of the appliance:		N/A
8	Protection against access to live parts		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.1	Metal parts of the motor are considered to be bare live parts		N/A
11	Heating		N/A
11.3	The temperature rise of the body of the motor is determined instead of the temperature rise of the windings		N/A
11.8	The temperature rise of the body of the motor, where in contact with insulating material, not exceeding values in table 3 for the relevant insulating material		N/A
16	Leakage current and electric strength		N/A
16.3	Insulation between live parts of the motor and its other metal parts is not subjected to the test		N/A
19	Abnormal operation		N/A
19.1	The tests of 19.7 to 19.9 are not carried out		N/A
19.l.101	Appliance operated at rated voltage with each of the following fault conditions:		N/A
	- short circuit of the terminals of the motor, including any capacitor incorporated in the motor circuit		N/A
	- short circuit of each diode of the rectifier		N/A
	- open circuit of the supply to the motor		N/A
	- open circuit of any parallel resistor, the motor being in operation		N/A
	Only one fault simulated at a time, the tests carried out consecutively		N/A
22	Construction		N/A
22.l.101	For class I appliances incorporating a motor supplied by a rectifier circuit, the d.c. circuit being insulated from accessible parts of the appliance by double or reinforced insulation		N/A
	Compliance checked by the tests specified for double and reinforced insulation		N/A
J	**ANNEX J (NORMATIVE) COATED PRINTED CIRCUIT BOARDS**		**N/A**
	Testing of protective coatings of printed circuit boards carried out in accordance with IEC 60664-3 with the following modifications:		N/A
5.7	Conditioning of the test specimens		N/A
	When production samples are used, three samples of the printed circuit board are tested		N/A
5.7.1	Cold		N/A
	The test is carried out at -25 °C		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.7.3	Rapid change of temperature		N/A
	Severity 1 is specified		N/A
5.9	Additional tests		N/A
	This subclause is not applicable		N/A
K	**ANNEX K (NORMATIVE) OVERVOLTAGE CATEGORIES**		**P**
	The information on overvoltage categories is extracted from IEC 60664-1		P
	Overvoltage category is a numeral defining a transient overvoltage condition		P
	Equipment of overvoltage category IV is for use at the origin of the installation		N/A
	Equipment of overvoltage category III is equipment in fixed installations and for cases where the reliability and the availability of the equipment is subject to special requirements		N/A
	Equipment of overvoltage category II is energy consuming equipment to be supplied from the fixed installation		P
	If such equipment is subjected to special requirements with regard to reliability and availability, overvoltage category III applies		N/A
	Equipment of overvoltage category I is equipment for connection to circuits in which measures are taken to limit transient overvoltages to an appropriate low level		N/A
L	**ANNEX L (INFORMATIVE) GUIDANCE FOR THE MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES**		**P**
	Information for the determination of clearances and creepage distances		P
M	**ANNEX M (NORMATIVE) POLLUTION DEGREE**		**P**
	The information on pollution degrees is extracted from IEC 60664-1		P
	Pollution		P
	The microenvironment determines the effect of pollution on the insulation, taking into account the macroenvironment		P
	Means may be provided to reduce pollution at the insulation by effective enclosures or similar		P
	Minimum clearances specified where pollution may be present in the microenvironment		P

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Degrees of pollution in the microenvironment		P
	For evaluating creepage distances, the following degrees of pollution in the microenvironment are established:		P
	- pollution degree 1: no pollution or only dry, non-conductive pollution occurs. The pollution has no influence		N/A
	- pollution degree 2: only non-conductive pollution occurs, except that occasionally a temporary conductivity caused by condensation is to be expected		P
	- pollution degree 3: conductive pollution occurs or dry non-conductive pollution occurs that becomes conductive due to condensation that is to be expected		N/A
	- pollution degree 4: the pollution generates persistent conductivity caused by conductive dust or by rain or snow		N/A
N	**ANNEX N (NORMATIVE) PROOF TRACKING TEST**		**P**
	The proof tracking test is carried out in accordance with IEC 60112 with the following modifications:		P
7	Test apparatus		P
7.3	Test solutions		P
	Test solution A is used		P
10	Determination of proof tracking index (PTI)		P
10.1	Procedure		P
	The proof voltage is 100V, 175V, 400V or 600V ..:	175V	P
	The test is carried out on five specimens		P
	In case of doubt, additional test with proof voltage reduced by 25V, the number of drops increased to 100		N/A
10.2	Report		P
	The report states if the PTI value was based on a test using 100 drops with a test voltage of (PTI-25) V		N/A
O	**ANNEX O (INFORMATIVE) SELECTION AND SEQUENCE OF THE TESTS OF CLAUSE 30**		**P**
	Description of tests for determination of resistance to heat and fire		P
P	**ANNEX P (INFORMATIVE) GUIDANCE FOR THE APPLICATION OF THIS STANDARD TO APPLIANCES USED IN WARM DAMP EQUABLE CLIMATES**		**N/A**

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Modifications applicable for class 0 and 01 appliances having a rated voltage exceeding 150V, intended to be used in countries having a warm damp equable climate and that are marked WDaE		N/A
	Modifications may also be applied to class 1 appliances having a rated voltage exceeding 150V, intended to be used in countries having a warm damp equable climate and that are marked WdaE, if liable to be connected to a supply mains that excludes the protective earthing conductor		N/A
5.7	The ambient temperature for the tests of clauses 11 and 13 is 40 +3/0 °C		N/A
7.1	The appliance marked with the letters WDaE		N/A
7.12	The instructions state that the appliance is to be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA		N/A
	The instructions state that the appliance is considered to be suitable for use in countries having a warm damp equable climate, but may also be used in other countries		N/A
11.8	The values of Table 3 are reduced by 15 K		N/A
13.2	The leakage current for class I appliances not exceeding 0,5 mA		N/A
15.3	The value of t is 37 °C		N/A
16.2	The leakage current for class I appliances not exceeding 0,5 mA (mA):		N/A
19.13	The leakage current test of 16.2 is applied in addition to the electric strength test of 16.3		N/A
Q	**ANNEX Q (INFORMATIVE) SEQUENCE OF TESTS FOR THE EVALUATION OF ELECTRONIC CIRCUITS**		**P**
	Description of tests for appliances incorporating electronic circuits		P
R	**ANNEX R (NORMATIVE) SOFTWARE EVALUATION**		**N/A**
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2 validated in accordance with the requirements of this annex		N/A
R.1	Programmable electronic circuits using software		N/A
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2 constructed so that the software does not impair compliance with the requirements of this standard		N/A
R.2	Requirements for the architecture		N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2 use measures to control and avoid software-related faults/errors in safety-related data and safety-related segments of the software		N/A
R.2.1.1	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.2 have one of the following structures:		N/A
	- single channel with periodic self-test and monitoring		N/A
	- dual channel (homogenous) with comparison		N/A
	- dual channel (diverse) with comparison		N/A
	Programmable electronic circuits requiring software incorporating measures to control the fault/error conditions specified in table R.1 have one of the following structures:		N/A
	- single channel with functional test		N/A
	- single channel with periodic self-test		N/A
	- dual channel without comparison		N/A
R.2.2	Measures to control faults/errors		N/A
R.2.2.1	When redundant memory with comparison is provided on two areas of the same component, the data in one area is stored in a different format from that in the other area		N/A
R.2.2.2	Programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.2 and that use dual channel structures with comparison, have additional fault/error detection means for any fault/errors not detected by the comparison		N/A
R.2.2.3	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, means are provided for the recognition and control of errors in transmissions to external safety-related data paths		N/A
R.2.2.4	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, the programmable electronic circuits incorporate measures to address the fault/errors in safety-related segments and data indicated in table R.1 and R.2 as appropriate		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
R.2.2.5	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, detection of a fault/error occur before compliance with clause 19 is impaired		N/A
R.2.2.6	The software is referenced to relevant parts of the operating sequence and the associated hardware functions		N/A
R.2.2.7	Labels used for memory locations are unique		N/A
R.2.2.8	The software is protected from user alteration of safety-related segments and data		N/A
R.2.2.9	Software and safety-related hardware under its control is initialized and terminates before compliance with clause 19 is impaired		N/A
R.3	Measures to avoid errors		N/A
R.3.1	General		N/A
	For programmable electronic circuits with functions requiring software incorporating measures to control the fault/error conditions specified in table R.1 or R.2, the following measures to avoid systematic fault in the software are applied		N/A
	Software that incorporates measures used to control the fault/error conditions specified in table R.2 is inherently acceptable for software required to control the fault/error conditions specified in table R.1		N/A
R.3.2	Specification		N/A
R.3.2.1	Software safety requirements:	Software Id:	N/A
	The specification of the software safety requirements includes the descriptions listed		N/A
R.3.2.2	Software architecture		N/A
R.3.2.2.1	The specification of the software architecture includes the aspects listed - techniques and measures to control software faults/errors (refer to R.2.2); - interactions between hardware and software; - partitioning into modules and their allocation to the specified safety functions; - hierarchy and call structure of the modules (control flow); - interrupt handling; - data flow and restrictions on data access; - architecture and storage of data; - time-based dependencies of sequences and data	Document ref. No:	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
R.3.2.2.2	The architecture specification is validated against the specification of the software safety requirements by static analysis		N/A
R.3.2.3	Module design and coding		N/A
R.3.2.3.1	Based on the architecture design, software is suitably refined into modules		N/A
	Software module design and coding is implemented in a way that is traceable to the software architecture and requirements		N/A
R.3.2.3.2	Software code is structured		N/A
R.3.2.3.3	Coded software is validated against the module specification by static analysis		N/A
	The module specification is validated against the architecture specification by static analysis		N/A
R.3.3.3	Software validation		N/A
	The software is validated with reference to the requirements of the software safety requirements specification		N/A
	Compliance is checked by simulation of:		N/A
	- input signals present during normal operation		N/A
	- anticipated occurrences		N/A
	- undesired conditions requiring system action		N/A

TABLE R.1 – GENERAL FAULT/ERROR CONDITIONS						
Component [1)]	Fault/error	Acceptable measures [2) 3)]	Definitions	Document reference for applied measure	Document reference for applied test	Ver-dict
1 CPU 1.1 Registers	Stuck at	Functional test, or periodic self-test using either: - static memory test, or - word protection with single bit redundancy	H.2.16.5 H.2.16.6 H.2.19.6 H.2.19.8.2	--	--	N/A
1.2 VOID						

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict

1.3 Programme counter	Stuck at	Functional test, or Periodic self-test, or Independent time-slot monitoring, or Logical monitoring of the programme sequence	H.2.16.5 H.2.16.6 H.2.18.10.4 H.2.18.10.2	--	--	N/A
2 Interrupt handling and execution	No interrupt or too frequent interrupt	Functional test, or time-slot monitoring	H.2.16.5 H.2.18.10.4	--	--	N/A
3 Clock	Wrong frequency (for quartz synchronized clock: harmonics/ sub-harmonics only)	Frequency monitoring, or time slot monitoring	H.2.18.10.1 H.2.18.10.4	--	--	N/A
4. Memory 4.1 Invariable memory	All single bit faults	Periodic modified checksum, or multiple checksum, or word protection with single bit redundancy	H.2.19.3.1 H.2.19.3.2 H.2.19.8.2	--	--	N/A
4.2 Variable memory	DC fault	Periodic static memory test, or word protection with single bit redundancy	H.2.19.6 H.2.19.8.2	--	--	N/A
4.3 Addressing (relevant to variable and invariable memory)	Stuck at	Word protection with single bit redundancy including the address	H.2.19.8.2	--	--	N/A

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict

5 Internal data path	Stuck at DC fault	Word protection with single bit redundancy Comparison of redundant CPUs by either: - reciprocal comparison - independent hardware comparator	H.2.19.8.2 H.2.18.15 H.2.18.3	--	--	N/A
5.1 VOID						
5.2 Addressing	Wrong address	Word protection with single bit redundancy including the address	H.2.19.8.2	--	--	N/A
6 External communication	Hamming distance 3	Word protection with multi-bit redundancy, or CRC – single work, or Transfer redundancy, or Protocol test	H.2.19.8.1 H.2.19.4.1 H.2.18.2.2 H.2.18.14	--	--	N/A
6.1 VOID						
6.2 VOID						
6.3 Timing	Wrong point in time	Time-slot monitoring, or scheduled transmission Time-slot and logical monitoring, or Comparison of redundant communication channels by either: - reciprocal comparison - independent hardware comparator	H.2.18.10.4 H.2.18.18 H.2.18.10.3 H.2.18.15 H.2.18.3	--	--	N/A
	Wrong sequence	Logical monitoring, or time-slot monitoring, or Scheduled transmission (same options as for wrong point in time)	H.2.18.10.2 H.2.18.10.4 H.2.18.18			

IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict

7 Input/output periphery	Fault conditions specified in 19.11.2	Plausibility check Comparison of redundant communication channels by either: - reciprocal comparison - independent hardware comparator	H.2.18.13 H.2.18.15 H.2.18.3	--	--	N/A
7.1 VOID						
7.2 Analog I/O 7.2.1 A/D and D/A-converter	Fault conditions specified in 19.11.2	Plausibility check	H.2.18.13	--	--	N/A
7.2.2 Analog multiplexer	Wrong addressing	Plausibility check	H.2.18.13	--	--	N/A
8 VOID						
9 Custom chips [4] e.g. ASIC, GAL, Gate array	Any output outside the static and dynamic functional specification	Periodic self-test	H.2.16.6	--	--	N/A
NOTE A Stuck-at fault model denotes a fault model representing an open circuit or a non-varying signal level. A DC fault model denotes a stuck-at fault model incorporating short circuit between signal lines.						
[1] For fault/error assessment, some components are divided into their sub-functions. [2] For each sub-function in the table, the Table R.2 measure will cover the software fault/error. [3] Where more than one measure is given for a sub-function, these are alternatives. [4] To be divided as necessary by the manufacturer into sub-functions.						

S	**ANNEX S (NORMATIVE) BATTERY OPERATED APPLIANCES POWERED BY BATTERIES THAT ARE NON-RECHARGEABLE OR NOT RECHARGED IN THE APPLIANCE**		**N/A**
	The following modifications to this standard are applicable for battery-operated appliances where the batteries are either non-rechargeable (primary batteries), or		N/A
	rechargeable batteries (secondary batteries) that are not recharged in the appliance		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.8.1	If the supply terminals for the connection of the battery have no indication of polarity, the more unfavourable polarity is applied		N/A
5.S.101	Appliances intended for use with a battery box are tested with the battery box supplied with the appliance or with the battery box recommended in the instructions		N/A
5.S.102	Appliances are tested as motor-operated appliances.		N/A
7.1	Appliances marked with the battery voltage (V) and the polarity of the terminals, unless..... ..... :		N/A
	the polarity is irrelevant		N/A
	Appliances also marked with:		N/A
	– name, trade mark or identification mark of the manufacturer or responsible vendor .... :		N/A
	– model or type reference .... :		N/A
	– IP number according to degree of protection against ingress of water, other than IPX0 .. .. :		N/A
	– type reference of battery or batteries .... :		N/A
	If relevant, the positive terminal is indicated by the symbol IEC 60417-5005 and the negative terminal by the symbol IEC 60417-5006		N/A
	If appliances use more than one battery, they are marked to indicate correct polarity connection of the batteries		N/A
7.6	Additional symbols		N/A
7.12	The instructions contain the following, as applicable:		N/A
	– the types of batteries that may be used .. .. :		N/A
	– how to remove and insert the batteries		N/A
	– non-rechargeable batteries are not to be recharged		N/A
	– rechargeable batteries are to be removed from the appliance before being charged		N/A
	– different types of batteries or new and used batteries are not to be mixed		N/A
	– batteries are to be inserted with the correct polarity		N/A
	– exhausted batteries are to be removed from the appliance and safely disposed of		N/A
	– if the appliance is to be stored unused for a long period, the batteries are removed		N/A
	– the supply terminals are not to be short-circuited		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
11.5	Appliances are supplied with the most unfavourable supply voltage between		N/A
	– 0,55 and 1,0 times the battery voltage, if the appliance can be used with non-rechargeable batteries		N/A
	– 0,75 and 1,0 times battery voltage, if the appliance is designed for use with rechargeable batteries only		N/A
	The values specified in Table S.101 for the internal resistance per cell of the battery is taken into account		N/A
19.1	The tests are carried out with the battery fully charged unless otherwise specified		N/A
19.13	The battery does not rupture or ignite		N/A
19.S.101	Appliances are supplied with the voltage specified in 11.5. The supply terminals having an indication of polarity are connected to the opposite polarity, unless		N/A
	such a connection is unlikely to occur due to the construction of the appliance		N/A
19.S.102	For appliances with provision for multiple batteries, one or more of the batteries are reversed and the appliance is operated, if reversal of batteries is allowed by the construction		N/A
25.5	The flexible leads or flexible cord used to connect an external battery or battery box in is connected to the appliance by a type X attachment		N/A
25.13	This requirement is not applicable to the flexible leads or flexible cord connecting external batteries or a battery box with an appliance		N/A
25.S.101	Appliances have suitable means for connection of the battery. If the type of battery is marked on the appliance, the means of connection is suitable for this type of battery		N/A
26.5	Terminal devices in an appliance for the connection of the flexible leads or flexible cord connecting an external battery or battery box are so located or shielded that there is no risk of accidental connection between supply terminals		N/A
30.2.3.2	There is no battery in the area of the vertical cylinder used for the consequential needle flame test, unless		N/A
	the battery is shielded by a barrier that meets the needle flame test of Annex E, or		N/A
	that comprises material classified as V-0 or V-1 according to IEC 60695-11-10		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

T	**ANNEX T (NORMATIVE)** **UV-C RADIATION EFFECT ON NON-METALLIC MATERIALS**		**N/A**
	Requirements for non-metallic materials subject to direct or reflected UV-C radiation exposure and whose mechanical and electrical properties are relied upon for compliance with the		N/A
	Does not apply to glass, ceramic and similar materials		N/A
	Tested as specified in ISO 4892-1 and ISO 4892-2, with the following modifications:		N/A
	Modifications to ISO 4892-1:		N/A
5.1.6	The UV-C emitter is a low pressure mercury lamp with a quartz envelope having a continuous spectral irradiance of 10 W/m2 at 254 nm		N/A
	Subclause 5.1.6.1 and Table 1 are not applicable		N/A
5.2.4	The black-panel temperature shall be 63 °C +/- 3 °C		N/A
5.3.1	Humidification of the chamber air is specified in part 2 when necessary		N/A
9	This clause is not applicable		N/A
	Modifications to ISO 4892-2:		N/A
7.1	At least three test specimens are tested		N/A
	Ten samples of internal wiring is tested		N/A
7.2	The specimens are attached to the specimen holders such that they are not subject to any stress		N/A
7.3	Apparatus prepared as specified		N/A
	The test specimens and, if used, the irradiance-measuring instrument are exposed for 1 000 h		N/A
7.4	If used, a radiometer is mounted and calibrated such that it measures the irradiance at the exposed surface of the test specimen		N/A
7.5	Material properties and test methods for parts providing mechanical support or impact resistance as specified in Table T.1		N/A
	Material properties and test method for electrical insulation of internal wiring as specified in Table T.2		N/A
8	This clause is not applicable		N/A
5	**GENERAL CONDITIONS FOR THE TESTS**		**N/A**
5.201	When batteries used, the generally available rechargeable batteries giving the most unfavourable conditions used		N/A
6.1	Battery chargers suitable for outdoor use class III		N/A
	Other battery chargers class II or class III		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

6	**CLASSIFICATION**		**N/A**
6.2	Battery chargers suitable for outdoor use at least IPX7		N/A
6.201	Enclosures classified at least IP3X with regard to protection against ingress of solid foreign objects		N/A
7	**MARKING AND INSTRUCTIONS**		**N/A**
7.1	Symbol 5957 of IEC 60417 or text “For indoor use only” for battery chargers for indoor use		N/A
	IP number		N/A
	Smiling face symbol together with 8+		N/A
7.6	Correct symbols used		N/A
7.12	Instructions for safe use contains:		N/A
	- Warning to only allow children at least 8 years old to use battery charger		N/A
	- Sufficient instructions for safe use of battery charger by a child		N/A
	- Explanation that battery charger is not a toy		N/A
	- Instruction for child not to try and recharge non-rechargeable batteries		N/A
	- Warning to examine battery charger regularly for damage		N/A
	- Warning in case battery charger is damaged		N/A
	Instruction for Class III battery charger to be supplied from transformer for toys		N/A
7.14	Height of symbol marked on the appliance at least 10 mm		N/A
	Height of lettering at least 3 mm		N/A
8	**PROTECTION AGAINST ACCESS TO LIVE PARTS**		**N/A**
8.1.1	Use of test probe B of IEC 61032: no contact with live parts or metal parts separated from live parts by basic insulation only, even after use of a tool to remove parts of enclosure		N/A
10	**POWER INPUT AND CURRENT**		**N/A**
10.101	The output voltage not exceed 42,4 V peak		N/A
11	**HEATING**		**N/A**
11.8	Temperature rises of parts that can be touched by test probe 18 of IEC 61032	(see appended table)	N/A
	- 25 K, if of metal		N/A
	- 35 K, if of other material		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

17	**OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS**		**N/A**
	Temperature rises of parts that can be touched by test probe 18 of IEC 61032	(see appended table)	N/A
	- 45 K, if of metal		N/A
	- 55 K, if of other material		N/A
19	**ABNORMAL OPERATION**		**N/A**
19.13	Temperature rises of parts that can be touched by test probe 18 of IEC 61032	(see appended table)	N/A
	- 45 K, if of metal		N/A
	- 55 K, if of other material		N/A
21	**MECHANICAL STRENGTH**		**N/A**
21.201	Impact test Eha of IEC 60068-2-75, with impact energy of 2 J		N/A
	For rectangular shaped battery chargers, the four sides and four edges are subjected to an impact		N/A
	For other battery chargers, the enclosure is subjected to eight impacts equally spaced over the periphery		N/A
	Free fall test Ed, Procedure 1 of IEC 60068-2-32, from the height of 500 mm		N/A
	Battery charger not damaged to such extend that compliance is impaired, live parts shall not become accessible		N/A
22	**CONSTRUCTION**		**N/A**
22.201	Battery charger with only one rated voltage or rated voltage range		N/A
	Battery charger not incorporate means for manually adjusting output voltage		N/A
22.202	Battery chargers constructed so that reverse charging is prevented, regardless of the state of charge of the battery		N/A
	This applies even if the battery is inserted with the wrong polarity		N/A
24	**COMPONENTS**		**N/A**
24.201	Transformer for toys tested in accordance with sub-clauses 7.2, 20.5.1 and 20.101 and clause 15 of standard IEC 61558-2-7		N/A
25	**SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS**		**N/A**
25.1	Battery charger not provided with an appliance inlet		N/A
25.5	Battery charger provided with type Y or type Z attachment		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Annex EN 62233:2008			
Clause	Requirement + Test	Result - Remark	Verdict
EMF- ELECTROMAGNETICS FIELDS			
	The tested product also complies with the requirements of EN 62233:2008		P
	Limit ……100%	Measured max. : 5,438%	P

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Clause	Requirement + Test	Result - Remark	Verdict

10.1	TABLE: Power Input Deviation				P
Input deviation of/at:	**P rated (W)**	**P measured (W)**	**Δ P**	**Required Δ P**	**Remark**
60VDC	2000	1859	-7%	+15% or 60W	Full battery discharged
Supplementary information:--					

10.2	TABLE: Current deviation				N/A
Current deviation of/at:	**I rated (A)**	**I measured (A)**	**Δ I**	**Required Δ I**	**Remark**
--	--	--	--	--	Normal working
--	--	--	--	--	Normal working
--	--	--	--	--	Normal working
Supplementary information: --					

11.8	TABLE: Heating Test		P
	Test voltage (V)..... :	Full battery discharged	—
	Ambient (°C) ..... :	24.8	—

Thermocouple Locations	Max. temperature rise measured, Δ T (K)	Max. temperature rise limit, Δ T (K)
Appliance DC socket	32	45
PCB	37.8	105
Inner wire	36	50
Battery	18	35
Surface Enclosure	24	50
Switch surface	22	50
Supplementary information:		

11.8	TABLE: Heating test, resistance method		N/A
	Test voltage (V)..... :	--	—
	Ambient, t_1 (°C)..... :	--	—
	Ambient, t_2 (°C)..... :	--	—

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Clause	Requirement + Test	Result - Remark	Verdict

Temperature rise of winding	**R_1 (Ω)**	**R_2 (Ω)**	**ΔT (K)**	**Max. dT (K)**	**Insulation class**
--	--	--	--	--	--
Supplementary information:					

13.2	**TABLE: Leakage current**		N/A
	Heating appliances: 1.15 x rated input (W) .. :	--	—
	Motor-operated and combined appliances: 1.06 x rated voltage (V)..... :	--	—

Leakage current between:	**I (mA)**	**Max. allowed I (mA)**
--	--	--
--	--	--
Supplementary information:		

13.3	**TABLE: Dielectric strength**	P

Test voltage applied between:	**Test potential applied (V)**	**Breakdown / flashover (Yes/No)**
L/N and accessible enclosure	500	No
Supplementary information: --		

14	**TABLE: Transient overvoltages**					N/A
Clearance between:	**Cl (mm)**	**Required Cl (mm)**	**Rated impulse voltage (V)**	**Impulse test voltage (V)**	**Flashover (Yes/No)**	
--	--	--	--	--	--	
Supplementary information: --						

16.2	**TABLE: Leakage current**	P
	Single phase appliances: 1.06 x rated voltage (V) ..... :	—
	Three phase appliances 1.06 x rated voltage divided by √3 (V) ..... :	—

Leakage current between:	**I (mA)**	**Max. allowed I (mA)**
L/N and accessible enclosure	0.05	0.75
Supplementary information: --		

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Clause	Requirement + Test	Result - Remark	Verdict

16.3	TABLE: Dielectric Strength		P
Test voltage applied between:		**Test potential applied (V)**	**Breakdown / flashover (Yes/No)**
L/N and accessible enclosure		500	No
Supplementary information:			

17	TABLE: Overload protection		N/A
Thermocouple locations:		**Max. temperature rise measured, Δ T (K)**	**Max. temperature rise limit, Δ T (K)**
--		--	--
--		--	--
Supplementary information: --			

17	TABLE: Overload protection, resistance method					N/A
	Test voltage (V) ..... :			--		—
	Ambient, t1 (°C) ..... :			24.8		—
	Ambient, t2 (°C) ..... :			24.7		—
Temperature of winding:	**R1 (Ω)**	**R2 (Ω)**	**Δ T (K)**	**T (°C)**	**Max. T (°C)**	
--	--	--	--	--	--	
Supplementary information:						

19	Abnormal operation conditions						P
Operational characteristics			**YES/NO**	**Operational conditions**			
Are there electronic circuits to control the appliance operation?			YES	See table 19.13			
Are there "off" or "stand-by" position?			YES	--			
The unintended operation of the appliance results in dangerous malfunction?			YES	--			
Sub-clause	**Operating conditions description**	**Test results description**	**PEC description**	**EMP 19.11.4**	**Software type required**	**19.11.3 PEC**	**Final result**
19.2	P	No exceed Temperature	N/A	N.A	N/A	N/A	N/A
19.3	P	No exceed	N/A	N.A	N/A	N/A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

		Temperature					
19.4	P	No exceed Temperature	N/A	N.A	N/A	N/A	N/A
19.5	N/A	N/A	N/A	N.A	N/A	N/A	N/A
19.6	N.A	N.A	N.A	N.A	N.A	N.A	N.A
19.7	P	No exceed Temperature	N.A	N.A	N.A	N.A	N.A
19.8	N.A	N.A	N.A	N.A	N.A	N.A	N.A
19.9	N.A	N.A	N.A	N.A	N.A	N.A	N.A
19.10	N.A	N.A	N.A	N.A	N.A	N.A	N.A
19.11.2	N.A	N.A	N.A	N.A	N.A	N.A	N.A
19.11.4.8	N.A	N.A	N.A	N.A	N.A	N.A	N.A
19.10X	N.A	N.A	N.A	N.A	N.A	N.A	N.A
Supplementary information:							

19.7	**TABLE: Abnormal operation, locked rotor/moving parts**					P
	Test voltage (V)..... :	254.4				—
	Ambient, t1 (°C)..... :	24.8				—
	Ambient, t2 (°C)..... :	24.3				—
Temperature of winding:	**R1 (Ω)**	**R2 (Ω)**	**Δ T (K)**	**T (°C)**	**Max. T (°C)**	
Supplementary information:						

19.9	**TABLE: Abnormal operation, running overload**					N/A
	Test voltage (V)..... :	--				—
	Ambient, t1 (°C)..... :	--				—
	Ambient, t2 (°C)..... :	--				—
Temperature of winding:	**R1 (Ω)**	**R2 (Ω)**	**Δ T (K)**	**T (°C)**	**Max. T (°C)**	
--	--	--	--	--	--	
--	--	--	--	--	--	
Supplementary information:						

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Clause	Requirement + Test	Result - Remark	Verdict

19.13	**TABLE: Abnormal operation, temperature rises**		P
Thermocouple locations:		**Max. temperature rise measured, Δ T (K)**	**Max. temperature rise limit, Δ T (K)**
IC short circuit		Unit shutdown immediately, No hazards.	--
Supplementary information:			

21.1	**TABLE: Impact resistance**		**P**
Impacts per surface	**Surface tested**	**Impact energy (Nm)**	**Comments**
Top	3 times	0.5J	Intact
Bottom	3 times	0.5J	Intact
side	3 times	0.5J	Intact
Supplementary information:			

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Clause	Requirement + Test	Result - Remark	Verdict

24.1	TABLE: Critical components information				
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity**
PCB	CHAMPION ASIA HUIZHOU ELECTRONICS CO LTD	F-D	V-0, 130 °C	UL 94 UL 796	UL (E342828)
Alt.	AOSHIKANG PRECISION CIRCUIT (HUIZHOU) CO LTD	K-2	V-0, 130 °C	UL 94 UL 796	UL (E239218)
Alt.	Interchangeable	Interchangeable	V-0, 130 °C	UL 94 UL 796	UL
Battery	Xinxiang hongli Poer Science and Technology Co., Ltd	--	60VDC	IEC 60335-1	Test in appliance
Encosure	YUYAO KAIJIA ELECTRIC APPLIANCE FACTORY	ABS	ABS	IEC 60335-1	Test in appliance

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Clause	Requirement + Test	Result - Remark	Verdict

28.1	TABLE: Threaded Part Torque Test		P
Threaded part identification	**Diameter of thread (mm)**	**Column number (I, II, or III)**	**Applied torque (Nm)**
Fixing screw on enclosure	3.1	II	0.6
Supplementary information:--			

29.1	TABLE: Clearances					N/A
	Overvoltage category..... .... :	I				—
		Type of insulation:				
Rated impulse voltage (V):	**Min. cl (mm)**	**Basic (mm)**	**Supplementary (mm)**	**Reinforced (mm)**	**Functional (mm)**	**Verdict / Remark**
330	0,2* / 0,5 / 0,8**	--	--	--	--	N/A
500	0,2* / 0,5 / 0,8**	--	--	--	--	N/A
800	0,2* / 0,5 / 0,8**	--	--	--	--	N/A
1 500	0,5 / 0,8** / 1,0***	--	--	--	--	N/A
2 500	1,5 / 2,0***	--	--	--	--	N/A
4 000	3,0 / 3,5***	--	--	--		N/A
6 000	5,5 / 6,0***	--	--	--	--	N/A
8 000	8,0 / 8,5***	--	--	--	--	N/A
10 000	11,0 / 11,5***	--	--	--	--	N/A
Supplementary information: *) For tracks on printed circuit boards if pollution degree 1 and 2 **) For pollution degree 3 ***) If the construction is affected by wear, distortion, movement of the parts or during assembly						

29.2	TABLE: Creepage distances, basic, supplementary and reinforced insulation										N/A
Working voltage (V):	**Creepage distance (mm) Pollution degree**										
	1	**2**			**3**			**Type of insulation**			
		Material group			**Material group**						
		I	**II**	**IIIa/IIIb**	**I**	**II**	**IIIa/IIIb***	**B****	**S****	**R****	**Verdict**
≤50	0,18	0,6	0,85	1,2	1,5	1,7	1,9		—	—	N/A

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≤50	0,18	0,6	0,85	1,2	1,5	1,7	1,9	—		—	N/A
≤50	0,36	1,2	1,7	2,4	3,0	3,4	3,8	—	—		N/A
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4		—	—	N/A
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4	—		—	N/A
125	0,56	1,5	2,1	3,0	3,8	4,2	4,8	—	—		N/A
250	0,56	1,25	1,8	2,5	3,2	3,6	4,0	--	—	—	--
250	0,56	1,25	1,8	2,5	3,2	3,6	4,0	—	--	—	--
250	1,12	2,5	3,6	5,0	6,4	7,2	8,0	—	—	--	--
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3		—	—	N/A
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3	—		—	N/A
400	2,0	4,0	5,6	8,0	10,0	11,2	12,6	—	—		N/A
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0		—	—	N/A
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0	—		—	N/A
500	2,6	5,0	7,2	10,0	12,6	14,2	16,0	—	—		N/A
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0		—	—	N/A
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	—		—	N/A
>630 and ≤800	3,6	6,4	9,0	12,6	16,0	18,0	20,0	—	—		N/A
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5		—	—	N/A
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	—		—	N/A
>800 and ≤1000	4,8	8,0	11,2	16,0	20,0	22,0	25,0	—	—		N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0		—	—	N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	—		—	N/A
>1000 and ≤1250	6,4	10,0	14,2	20,0	25,0	28,0	32,0	—	—		N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0		—	—	N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	—		—	N/A
>1250 and ≤1600	8,4	12,6	18,0	25,0	32,0	36,0	40,0	—	—		N/A
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0		—	—	N/A
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	—		—	N/A
>1600 and ≤2000	11,2	16,0	22,0	32,0	40,0	44,0	50,0	—	—		N/A
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0		—	—	N/A
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	—		—	N/A
>2000 and ≤2500	15,0	20,0	28,0	40,0	50,0	56,0	64,0	—	—		N/A
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0		—	—	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	—		—	N/A
>2500 and ≤3200	20,0	25,0	36,0	50,0	64,0	72,0	80,0	—	—		N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0		—	—	N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	—		—	N/A
>3200 and ≤4000	25,0	32,0	44,0	64,0	80,0	90,0	100,0	—	—		N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0		—	—	N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	—		—	N/A
>4000 and ≤5000	32,0	40,0	56,0	80,0	100,0	112,0	126,0	—	—		N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0		—	—	N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	—		—	N/A
>5000 and ≤6300	40,0	50,0	72,0	100,0	126,0	142,0	160,0	—	—		N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0		—	—	N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	—		—	N/A
>6300 and ≤8000	50,0	64,0	90,0	126,0	160,0	180,0	200,0	—	—		N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0		—	—	N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	—		—	N/A
>8000 and ≤10000	64,0	80,0	112,0	160,0	200,0	220,0	250,0	—	—		N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0		—	—	N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	—		—	N/A
>10000 and ≤12500	80,0	100,0	142,0	200,0	250,0	280,0	320,0	—	—		N/A
Supplementary information: *) Material group IIIb is allowed if the working voltage does not exceed 50 V **) B = Basic insulation, S = Supplementary insulation, R = Reinforced insulation											

29.2	**TABLE: Creepage distances, functional insulation**							N/A
Working voltage (V):	**Creepage distance (mm) Pollution degree**							
	1	**2**			**3**			
		Material group			**Material group**			
		I	**II**	**IIIa/IIIb**	**I**	**II**	**IIIa/IIIb***	**Verdict / Remark**
≤10	0,08	0,4	0,4	0,4	1,0	1,0	1,0	N/A
50	0,16	0,56	0,8	1,1	1,4	1,6	1,8	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

125	0,25	0,71	1,0	1,4	1,8	2,0	2,2	N/A
250	0,42	1,0	1,4	2,0	2,5	2,8	3,2	N/A
400	0,75	1,6	2,2	3,2	4,0	4,5	5,0	N/A
500	1,0	2,0	2,8	4,0	5,0	5,6	6,3	N/A
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	N/A
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	N/A
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	N/A
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	N/A
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	N/A

Supplementary information:

*) Material group IIIb is allowed if the working voltage does not exceed 50 V

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Clause	Requirement + Test	Result - Remark	Verdict

30.1	**TABLE: Ball Pressure Test of Thermoplastics**		**N/A**
Allowed impression diameter (mm) ..... :		≤2mm	—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)
--	--	--	--
Supplementary information:--			

30.2	**TABLE: Resistance to heat and fire - Glow wire tests**							**P**
Object/ Part No./ Material	**Manufacturer / trademark**	**Glow wire test (GWT); (°C)**						**Verdict**
		550	**650**		**750**		**850**	
			te	**ti**	**te**	**ti**		
DC socket	--	N/A	N/A	N/A	0	0	N/A	PASS
Object/ Part No./ Material	**Manufacturer / trademark**	**Glow-wire flammability index (GWFI), °C**				**GW ignition temp. (GWIT), °C**		**Verdict**
		550	**650**	**750**	**850**	**675**	**775**	
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
The test specimen passed the glow wire test (GWT) with no ignition [(te – ti) ≤ 2s] (Yes/No) .....:								
If no, then surrounding parts passed the needle-flame test of annex E (Yes/No).....:								
The test specimen passed the test by virtue of most of the flaming material being withdrawn with the glow-wire (Yes/No)? .....:								
Ignition of the specified layer placed underneath the test specimen (Yes/No).....:								
Supplementary information: 550 °C GWT not relevant (or applicable) to parts of material classified at least HB40 or if relevant HBF The GWIT pre-selection option, the 850 °C GWFI pre-selection option, and the 850 °C GWT are not relevant (or applicable) for attended appliances.								

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Clause	Requirement + Test	Result - Remark	Verdict

30.2/30.4	**TABLE: Needle- flame test (NFT)**				**N/A**
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
--	--	--	--	--	--
--	--	--	--	--	--
Supplementary information: **NFT not relevant (or applicable) for Parts of material classified as V-0 or V-1** **NFT not relevant (or applicable) for Base material of PCBs classified as V-0 or if relevant VTM-0**					

PHOTOS

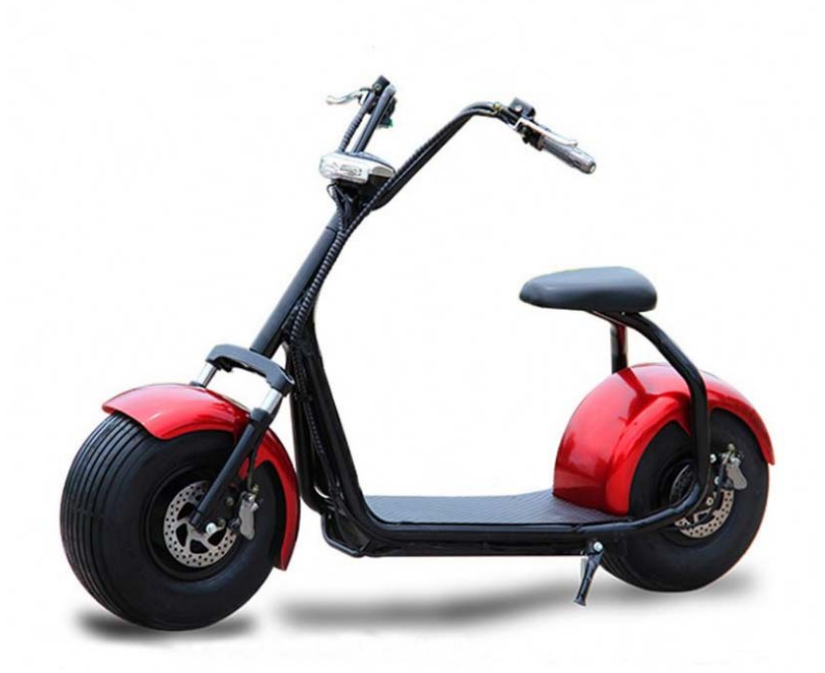
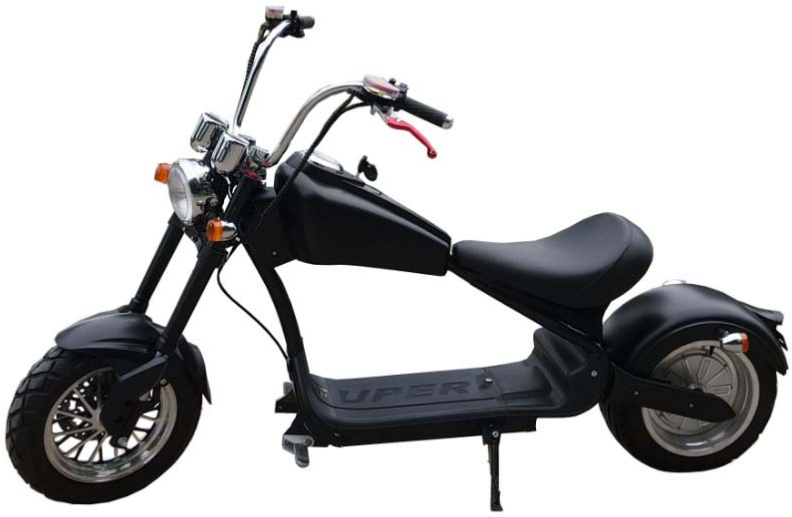
Photo 1	
Photo 2	

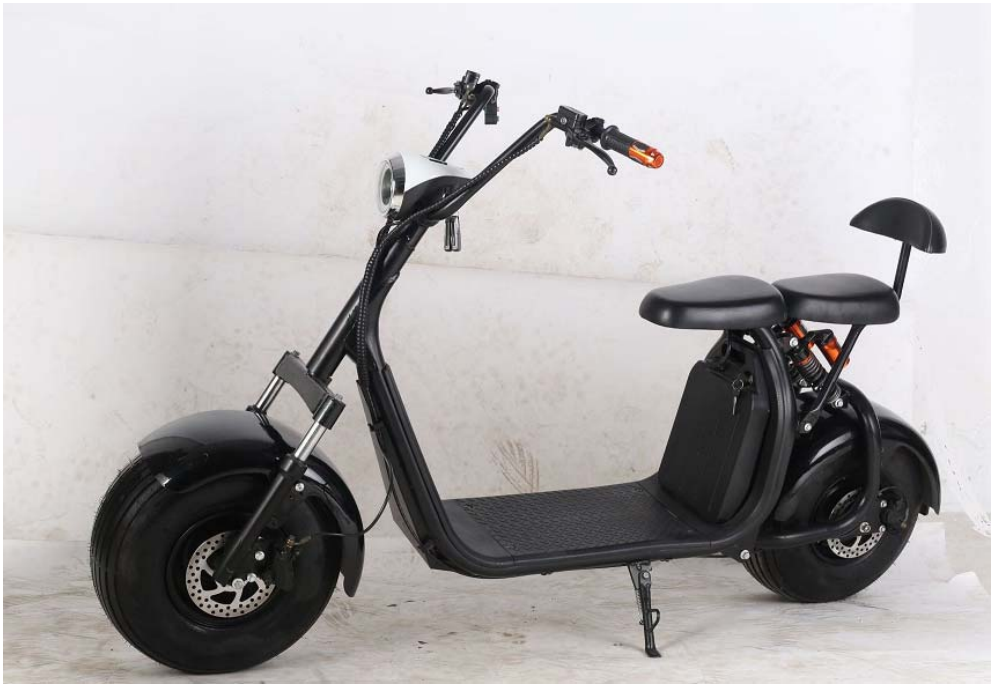
Photo 3	

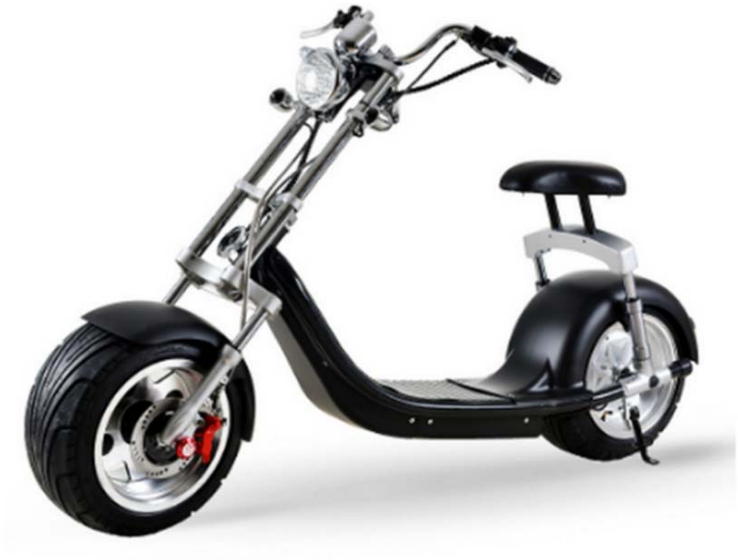
Photo 4	

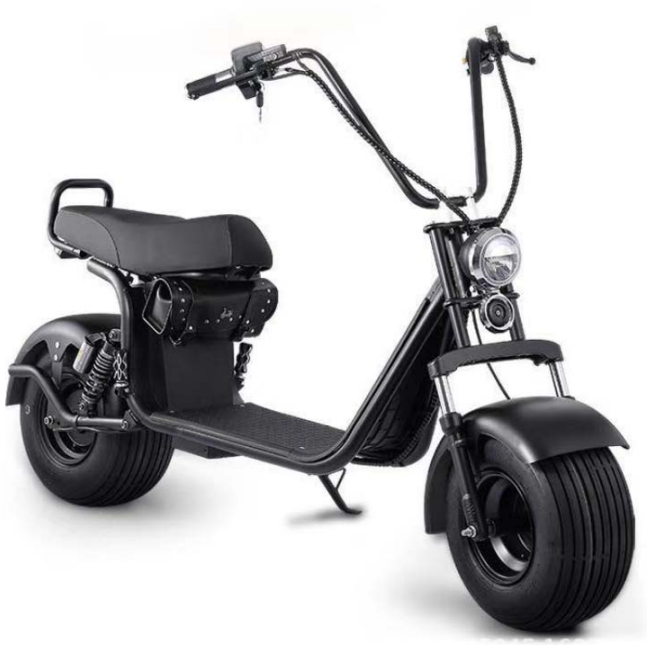
Photo 5	

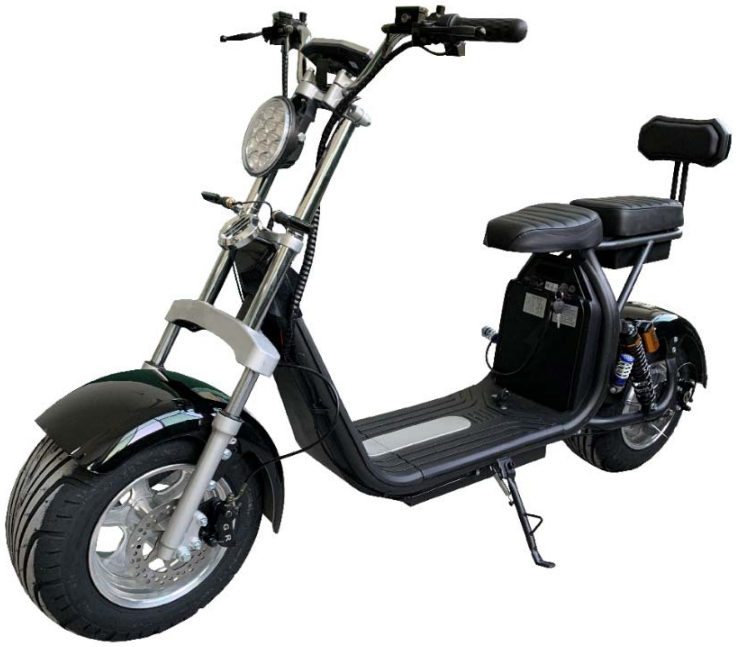
Photo 6	

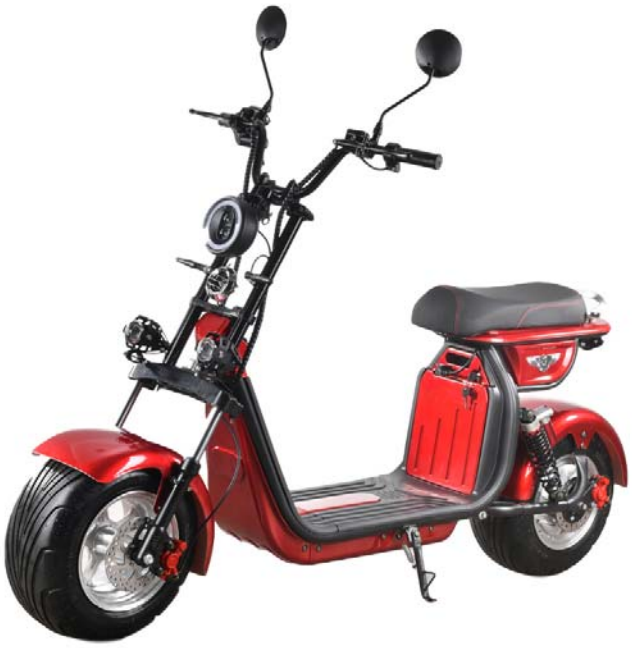
Photo 7	

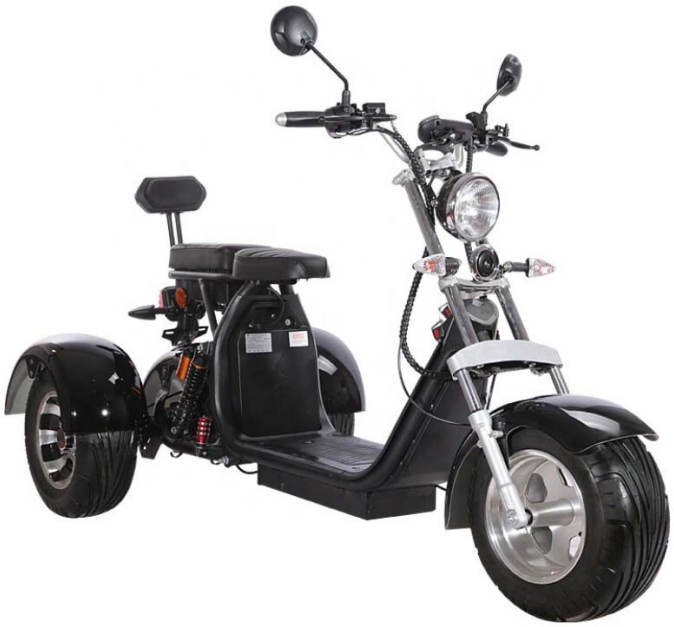
Photo 8	

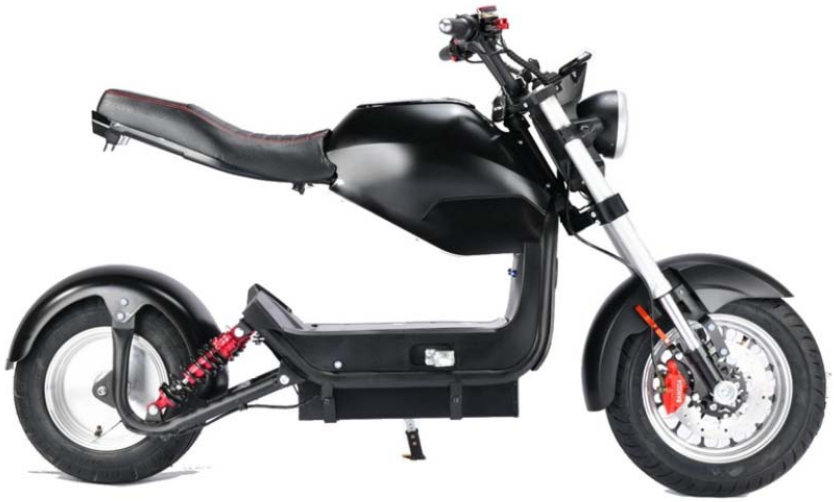
Photo 9	

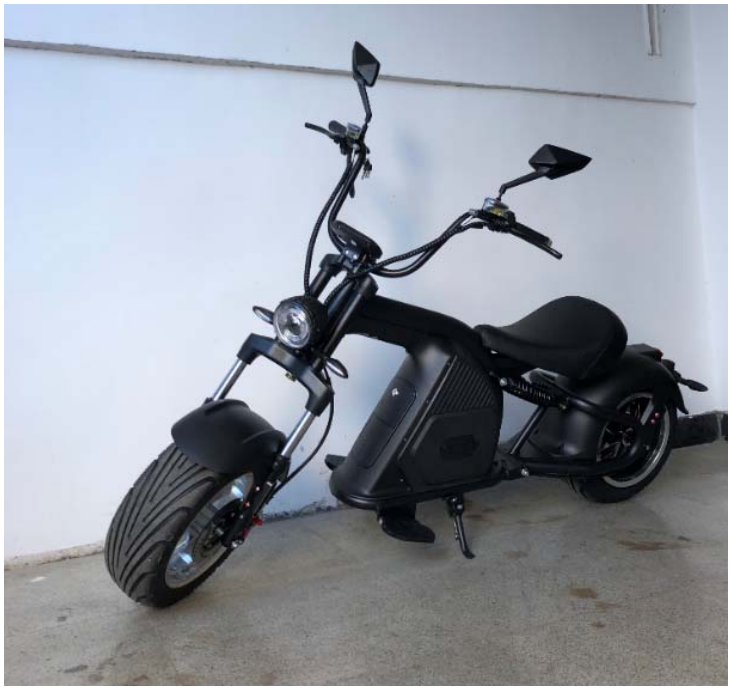
Photo 10	

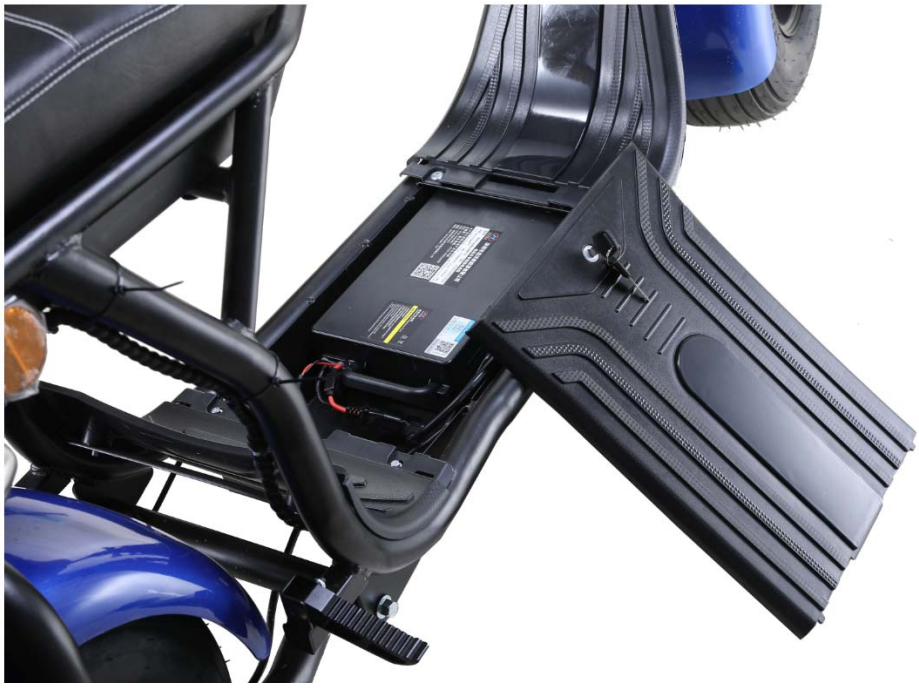
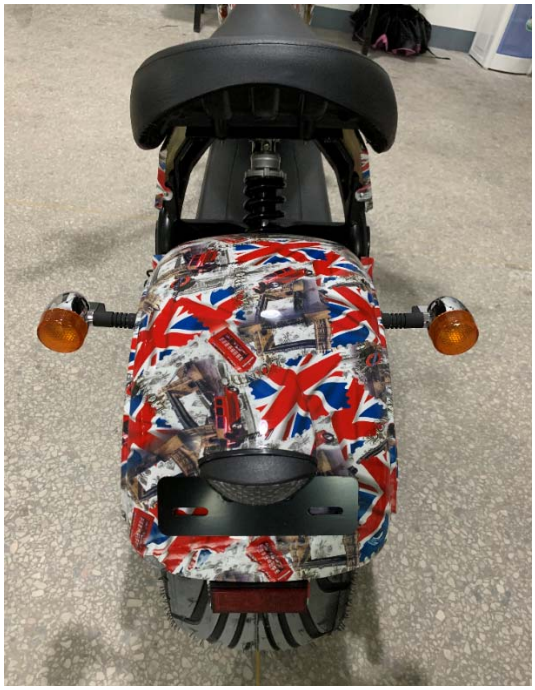
Photo 11	

Photo 12	

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