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TEST REPORT

Product Name : Uninterruptible Power Systems
Model Number : See page 3 for details

Prepared for : Netcon Enterprise Pvt Ltd.
Address : 430A, Kathirvedu, Puzhal, Chennai- 600066, India

Prepared by : EMTEK (SHENZHEN) CO., LTD.
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Report Number : ENS2503110254P00801R

TEST REPORT
IEC 62040-1
Uninterruptible power systems (UPS) –
Part 1: General and safety requirements for UPS

Report Number. .....:	ENS2503110254P00801R
Date of issue .....:	March 27, 2025
Total number of pages.....:	141 pages
Name of Testing Laboratory preparing the Report.....:	EMTEK (Shenzhen) Co., Ltd.
Applicant's name.....:	Netcon Enterprise Pvt Ltd.
Address .....:	430A, Kathirvedu, Puzhal, Chennai- 600066, India
Test specification:	
Standard .....:	EN IEC 62040-1:2019 + A11:2021
Test procedure.....:	Test Report
Non-standard test method.....:	N/A
TRF template used .....:	IECEE OD-2020-F1:2021, Ed.1.4
Test Report Form No.....:	IEC62040_1F
Test Report Form(s) Originator.....:	TÜV Rheinland Japan Ltd.
Master TRF .....:	Dated 2021-08-27

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

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 Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description .....:	Uninterruptible Power Systems
Trade Mark.....:	NETCON
Manufacturer.....:	Netcon Enterprise Pvt Ltd. 430A, Kathirvedu, Puzhal, Chennai- 600066, India
Model/Type reference.....:	NTCS3INT101-RTY, NTCS3EXT101-RTY Battery Bank: NTBR4024C, NTBR6036C
Ratings.....:	See copy of marking plate for details.

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	EMTEK (Shenzhen) Co., Ltd.	
Testing location/ address ..... :		Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China	
Tested by (name, function, signature) ..... :		Alan Zhang / Engineer	Alan Zhang
Approved by (name, function, signature) .. :		Paladin Hu / Manager	Paladin Hu
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address ..... :			
Tested by (name, function, signature) ..... :			
Approved by (name, function, signature) .. :			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address ..... :			
Tested by (name + signature)..... :			
Witnessed by (name, function, signature) . :			
Approved by (name, function, signature) .. :			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address ..... :			
Tested by (name, function, signature) ..... :			
Witnessed by (name, function, signature) . :			
Approved by (name, function, signature) .. :			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment):

- IEC 60884-1: Plugs and socket-outlets for household and similar purposes, Part 1: General requirement (25 pages)
- Photo document (7 pages)

Summary of testing:

From the result of our tests on the submitted samples, we conclude they comply with the requirements of the standards EN IEC 62040-1:2019 + A11:2021.

Tests performed (name of test and test clause):	**Testing location:**
The submitted samples were found to comply with the requirements of: - EN IEC 62040-1:2019 + A11:2021 Note: Vibration test in clause 5.2.6.4 was conducted at Subcontractor's laboratory.	EMTEK (Shenzhen) Co., Ltd. Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China Subcontractor's laboratory: EMTEK (Dongguan) Co Ltd -1&2F., Building 2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No. 9, Xincheng Avenue, Songshanhu High-technology Industrial Development Zone, Dongguan, Guangdong, China (523808)

Summary of compliance with National Differences (List of countries addressed):

N/A

☒ **The product fulfils the requirements of EN IEC 62040-1:2019 + A11:2021.**

Use of uncertainty of measurement for decisions on conformity (decision rule):

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other:… (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

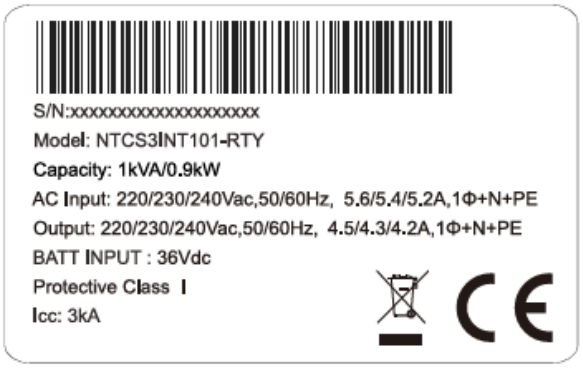
The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

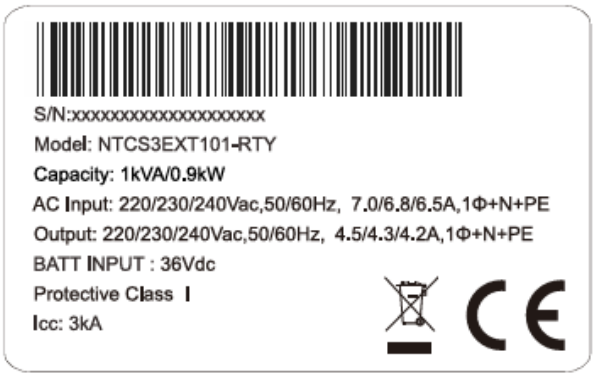
IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Copy of marking plate:

The artwork below may be only a draft.





NETCON

Manufacturer: Netcon Enterprise Pvt Ltd.
Address: 430A, Kathirvedu, Puzhal, Chennai- 600066, India

Importer: xxxxxxxx
Address: xxxxxxxx

Copy of caution mark:

Remark:

- The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
- The CE marking and WEEE symbol should be at least 5.0 mm and 7.0 mm respectively in height.

Test item particulars..... :	
Classification of installation and use..... :	☒ Ordinary Person ☐ Instructed Person ☐ Skilled Person
Supply Connection ..... :	☐ pluggable equipment ☐ type A ☐ type B ☐ permanent connection ☒ detachable power supply cord ☐ non-detachable power supply cord
Environmental category..... :	☒ indoor ☐ unconditional ☐ conditional ☐ outdoor
Equipment mobility ..... :	☐ movable ☐ stationary ☒ for building-in ☐ fixed
Access location..... :	☒ ordinary person accessible ☐ restricted access location
Over voltage category ..... :	☐ OVC I ☒ OVC II ☐ OVC III ☐ OVC IV
Mains supply tolerance (%) ..... :	+/-10% (declared by client)
Tested for power systems	TN
IT testing, phase-phase voltage (V).....	[] Yes [x] No
Class of equipment.....	☒ Class I ☐ Class II ☐ Class III
Considered current rating of protective device as part of the building installation (A).....	16A
Pollution degree (PD)	☐ PD1 ☒ PD2 ☐ PD3
IP protection class.....	IP20
Elevation during operation (m)	Up to 2000m
Elevation of test laboratory (m)	Below 2000m
Mass of equipment (kg)	Approx. 11.5 kg
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	N/A
Date (s) of performance of tests.....:	N/A
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.	

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :	☐ **Yes** ☒ **Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) ..... :	N/A

Description of Change(s):

This report is amended from previous report ENS2411110239P00201R, issued on Nov. 11, 2024, due to below amendments:

- Changed the Applicant, Manufacturer name to Netcon Enterprise Pvt Ltd;

- Changed the Applicant, Manufacturer address to 430A, Kathirvedu, Puzhal, Chennai- 600066, India;

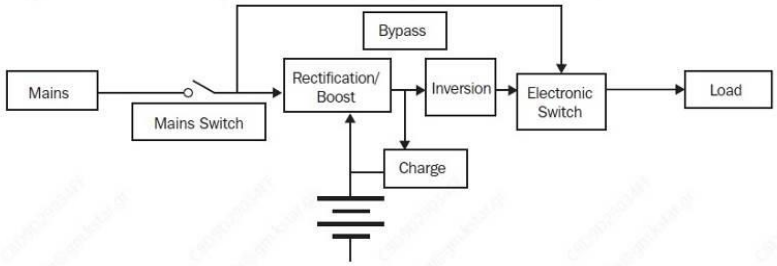
- Changed the Model to NTCS3INT101-RTY, NTCS3EXT101-RTY, Battery Bank: NTBR4024C, NTBR6036C

- Updated the marking plate.

No test was considered necessary on above submitted changes by engineering judgment.

General product information and other remarks:

1. The equipment is an Uninterruptible Power Systems for general use with Uninterruptible power systems equipment.
2. The UPS is designed as primary, therefore, clearances, creepage distances and distances through insulation from input, output, battery, control circuits to the RS232 port and USB port are dimensioned for reinforced insulation and suitable distance through insulation. The test samples are pre-production without any serial number.
3. Suitable backfeed protect device according to operating instruction should be provided before installation.
4. The internal battery is provided with the UPS and suitable insulation to the live parts.
5. The PUD is used as connected the mains and input of the UPS.
6. The product has been tested according to standard EN IEC 62040-1:2019+A11:2021
   - Maximum ambient temperature: 40°C
   - The equipment is designed for altitudes not exceeding 2000m.
   - See below block diagram for details:



7. Note: The CNAS qualifications are not contain the standard IEC 60884-1.

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

4	**Protection against hazards**		P
4.1/RD	General	See the following details	P
4.2 4.2/RD	Fault and abnormal conditions	See Table 4.2/RD to 4.3/RD	P
5.2.4.6/RD	Breakdown of components test (type test)	See Table 4.2/RD to 4.3/RD	P
5.2.4.6.1 /RD	Load conditions	Tested with the UPS at full load or light load whichever creates the more severe condition	P
5.2.4.6.2 /RD	Application of short circuit or open-circuit	The short circuit shall be applied with cable of a cross-section appropriate for the current that normally flows through the component, but not less than 2,5 mm^2. The length of the loop shall be as short as practical to perform the test. Short circuits and open circuits are applied using an appropriate switching device.	P
5.2.4.6.3 /RD	Test sequence	For the breakdown of components test, identified components shall be short circuited or open-circuited, whichever creates the worst hazard, one at a time.	P
4.3	Short-circuit and overload protection	See Table 4.2/RD to 4.3/RD	P
4.3.1/RD	General		P
4.3.2/RD	Specification of input short-circuit withstand strength and output short circuit current ability	See the following details	P
4.3.2.1/RD	General		P
	The interrupting capability of the overcurrent protective device shall be equal or greater than the prospective short circuit current of the mains supply.		P
	For pluggable equipment type A, either the PECS shall be designed so that the building installation provides short circuit backup protection, or additional short circuit backup protection shall be provided as part of the equipment.	Pluggable equipment type A, either the PECS shall be designed so that the building installation provides short circuit backup protection	P
	For permanently connected equipment or pluggable equipment type B, it is permitted for short circuit backup protection to be in the building installation.	See above	N/A
4.3.2.2/RD	Input ports short-circuit withstand strength	See the following details	P

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	For co-ordination and selection of internal or external protective devices, the PECS manufacturer shall specify: - a maximum allowable prospective short circuit current for each input port of the PECS; and -a minimum required prospective short circuit current in order to ensure proper operation of the protective device.	Maximum allowable prospective short circuit current: up to 3kA.	P
	If external protective devices are specified or provided the characteristics of those shall be specified by the manufacturer.		N/A
4.3.2.3/RD	Output short circuit current ability		P
	The output short circuit current ratings apply to a.c. and d.c. power output ports and to other ports for which overcurrent protection is necessary. For all output ports, short circuit evaluation to determine the minimum and maximum output short circuit current shall be performed according to 5.2.4.4/RD and the output short circuit current available from the PECS shall be specified as in 5.2.4.4/RD and 6.2. Internal electronic output short circuit protection is considered acceptable as an output short circuit protection device of the PECS, when compliance is shown by test in 5.2.4.4/RD.	See Table 4.2/RD to 4.3/RD.	P
4.3.2.4/RD	Combined input and output ports	Internal battery provided, no such port with the equipment.	N/A
	For ports which are both input and output ports the applicable requirements of both 4.3.2.1/RD and 4.3.2.3/RD apply.		N/A
4.3.3/RD	Short-circuit coordination (backup protection)		P
	Protective devices provided or specified shall have adequate breaking capability to interrupt the maximum prospective short circuit current specified for the port to which they are connected. If internal protection of the PECS is not rated for the prospective short circuit current, the installation instructions shall specify an upstream protective device, rated for this prospective short circuit current of that port, which shall be used to provide backup protection. Analysis shall ensure the protection coordination between the external and internal protective device.	The interrupting capability of breakers specified in the user manual is greater than the short circuit current of the mains supply up to 3kA.	P
	Compliance shall be checked by inspection and by the tests of 5.2.4.4/RD and 5.2.4.5/RD.	Checked by the tests of 5.2.4.4 and 5.2.4.5	P
4.3.4/RD	Protection by several devices	See the following details	N/A

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Where protective devices that require manual replacement or resetting are used in more than one pole of a supply to a given load, those devices shall be located together. It is permitted to combine two or more protective devices in one component. Compliance shall be checked by inspection.	Only one pole of a supply to a given load	N/A
4.3.101	AC input current	See table 4.3.101, 5.2.3.102 for details	P
4.3.102	Transformer protection	Tested by the transformer with output overload. See table 4.2/RD to 4.3/RD.	P
4.3.103	AC input short-circuit current	Icc≤ 3kA for the UPS manufacturer specified.	P
4.3.104	Protection of the energy storage device	No such device	N/A
4.3.105	Unsynchronized load transfer	No bypass source connected with the equipment	P
4.4	Protection against electric shock	See the following details	P
4.4.1/RD	General	See above	P
4.4.2/RD	Decisive voltage class	See the following details	P
4.4.2.1/RD	General	See the following details	P
4.4.2.2/RD	Determination of decisive voltage class	DVC A circuit is considered in the equipment.	P
4.4.2.2.1 /RD	General	See above	P
	For protection against the ventricular fibrillation body reaction, DVC can be selected from Table 2.	DVC A circuit is considered in the equipment.	P
4.4.2.2.2 4.4.2.2.2 /RD	Selection tables for contact area and skin humidity condition	a) body contact area: "Hand" (Table 3) b) skin humidity condition: "Dry" (Table 4)	P
4.4.2.2.3 /RD	Limits of the working voltage for the DVC	30 V RMS, 42.4V peak or 60 V DC	P
4.4.2.3/RD	Requirements for protection against electric shock	Basic insulation between DVC C circuits to PE, DVC C circuit to DVC A circuit.	P
4.4.3/RD	Provision for basic protection	See the following details	P
4.4.3.1/RD	General	See the following details	P
4.4.3.2/RD	Protection by means of basic insulation of live parts	See the following details	P
	Live parts shall be completely surrounded with insulation if their working voltage is greater than DVC As or if they do not have protective separation from adjacent circuits of DVC C.	Live part is completely restricted inside the equipment.	P

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Basic insulation may be provided by solid insulation or air clearance.	Basic insulation is provided by air clearance and solid insulation.	P
	The insulation shall be rated according to the impulse voltage, temporary overvoltage or working voltage (see 4.4.7.2.1/RD), whichever gives the most severe requirement. It shall not be possible to remove the insulation without the use of a tool or key.	Considered.	P
4.4.3.3	Openings	Checked by inspection as per 5.2.2.2 in this document	P
4.4.3.4/RD	Protection by means of limitation of touch current and charge	Tested on detective resistance for basic insulation.	P
	The limitation of touch current and discharge energy shall not exceed: - a value of 3,5 mA a.c. or 10 mA d.c. for the limitation of touch current; and - a value of 50 µC for the limitation of discharge energy.		P
4.4.3.5/RD	Protection by means of limited voltage	See the following details	P
	The voltage between simultaneously accessible parts shall not be greater than DVC As as determined in 4.4.2.2/RD.	Internal circuits include examples of A.2, A.3 and A.4	P
4.4.4/RD	Provision for fault protection	See the following details	P
4.4.4.1/RD	General	See below	P
	Fault protection shall be provided by one or more of the following measures: • Protective equipotential bonding in 4.4.4.2/RD in combinations with the PE conductor in 4.4.4.3/RD; • Automatic disconnection of supply in 4.4.4.4/RD; • Supplementary insulation in 4.4.4.5/RD; • Simple separation between circuits in 4.4.4.6/RD; • Electrically protective screening in 4.4.4.7/RD. Fault protection shall be independent and additional to those for basic protection.	See sub-clauses for details	P
4.4.4.2/RD	Protective equipotential bonding	See the following details	P
4.4.4.2.1 /RD	General	See above	P

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Protective equipotential bonding shall be provided between accessible conductive parts of the equipment and the means of connection for the PE conductor, except: a) accessible conductive parts that are protected by one of the measures in 4.4.6.4/RD; or b) when accessible conductive parts are separated from live parts using double or reinforced insulation.	Accessible metal chassis connected to PE conductor	P
	Electrical contact to the means of connection of the PE conductor shall be achieved by one or more of the following means: • through direct metallic contact; • through other accessible conductive parts or other metallic components which are not removed when the PECS is used as intended; • through a dedicated protective equipotential bonding conductor.	All means considered.	P
4.4.4.2.2 /RD	Rating of protective equipotential bonding	a) considered and comply	P
	Protective equipotential bonding shall either be: a) sized in accordance with the requirements for the PE conductor in 4.4.4.3/RD and the means of connection for the PE conductor in 4.4.4.3.2/RD to ensure no voltage drop exceeding the values from 4.4.2.2.3/RD during a fault; or b) sized • to withstand the highest stresses that can occur to the PECS item(s) concerned when they are subjected to a fault connecting to accessible conductive parts; and • to remain effective for as long as a fault to the accessible conductive parts persists or until an upstream protective device removes power from the part; and • to ensure no voltage drop exceeding the values from 4.4.2.2.3/RD during normal operation and during a fault. Compliance shall be checked with the type tests in 5.2.3.11/RD	See above	P
4.4.4.3/RD	PE conductor	See the following details	P
4.4.4.3.1 /RD	General	See below	P

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	A PE conductor shall be connected at all times when power is supplied to the PECS, unless the PECS complies with the requirements of protective class II (see 4.4.6.3/RD) or protective class III. Unless local wiring regulations state otherwise, the PE conductor cross-sectional area shall be determined from Table 7 or by calculation according to 543.1 of IEC 60364-5-54:2011.	The PE conductor of the AC inlet is connected at all times when power is supplied to the PECS.	P
	If the PE conductor is routed through a plug and socket, or similar means of disconnection, it shall not be possible to disconnect it unless power is simultaneously removed from the part to be protected.	The PE conductor is routed through the AC inlet.	P
	The cross-sectional area of every PE conductor that does not form part of the supply cable or cable enclosure shall, in any case, be not less than: • 2,5 mm^2 if mechanical protection is provided; or • 4 mm^2 if mechanical protection is not provided.	No such supply cable or cable enclosure.	N/A
	Provisions within cord-connected equipment shall be made so that the PE conductor in the cord shall, in the case of failure of the strain-relief mechanism, be the last conductor to be interrupted. For special system topologies, the PECS designer shall verify the PE conductor cross-section required.	No such connection	N/A
4.4.4.3.2 /RD	Means of connection for the PE conductor	See below	P
	PECS shall have a means of connection for the PE conductor, located near the terminals for the respective live conductors. The means of connection shall be corrosion-resistant and shall be suitable for the connection of conductors according to Table 7 and of cables in accordance with the wiring rules applicable at the installation. The means of connection for the PE conductor shall not be used as a part of the mechanical assembly of the equipment or for other connections. Connection and bonding points shall be designed so that their current-carrying capacity is not impaired by mechanical, chemical, or electrochemical influences. Where enclosures and/or conductors of aluminium or aluminium alloys are used, particular attention should be given to the problems of electrolytic corrosion. Compliance shall be checked by inspection.	Checked by inspection	P
4.4.4.3.3 /RD	Touch current in case of failure of PE conductor	The touch current can be shown to be less than the limits specified in 4.4.3.4	N/A

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	For all other PECS, one or more of the following measures shall be applied, unless the touch current can be shown to be less than the limits specified in 4.4.3.4: a) Use of a fixed connection and • a cross-section of the PE conductor of at least 10 mm^2 Cu or 16 mm^2 Al; or • automatic disconnection of the supply in case of discontinuity of the PE conductor; or • provision of an additional terminal for a second PE conductor of the same cross-sectional area as the original PE conductor; or b) Use of a pluggable type B connection with a minimum PE conductor cross-section of 2,5 mm^2 as part of a multi-conductor power cable. Adequate strain relief shall be provided.		N/A
	Compliance is checked by inspection and by test of 5.2.3.7/RD.		N/A
4.4.4.4/RD	Automatic disconnection of supply	No such components.	N/A
	For automatic disconnection of supply: • a protective equipotential bonding system shall be provided; and • a protective device operated by the fault current shall disconnect one or more of the line conductors supplying the equipment, system or installation, in case of a failure of basic insulation. The protective device shall interrupt the fault current within a time as specified in Figure 1, Figure 2 or Figure 3 in 4.4.2.2.3/RD.		N/A
4.4.4.5/RD	Supplementary insulation	The insulation sheet between live parts of the PCB and metal enclosure is considered as supplementary insulation	P
4.4.4.6/RD	Simple separation between circuits		N/A
	If any component is connected between the separated circuits, that component shall withstand the electric stresses specified for the insulation which it bridges. If any component is connected between a circuit and a circuit connected to earth, its impedance shall limit the current flow through the component to the steady-state touch current values indicated in 4.4.3.4/RD.		N/A
4.4.4.7/RD	Electrically protection		N/A

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Electrically protective screening interposed between hazardous live parts of a PECS, shall consist of a conductive screen connected to the protective equipotential bonding of the PECS whereby the screen is separated from live parts by at least simple separation. The protective screen and the connection to the protective equipotential bonding system of the PECS and that interconnection shall comply with the requirements of 4.4.4.2/RD.		N/A
4.4.5/RD	Enhanced protection	See the following details	P
4.4.5.1/RD	General	See the following details	P
	Enhanced protection shall provide both basic and fault protection and can be achieved by means of: • Reinforced insulation in 4.4.5.2/RD; • Protective separation between circuits in 4.4.5.3/RD; • Protection by means of in 4.4.5.4/RD.	Refer to 4.4.5.2/RD, 4.4.5.3/RD, 4.4.5.4/RD	P
4.4.5.2/RD	Reinforced insulation	Complied	P
	Reinforced insulation shall be so designed as to be able to withstand electric, thermal, mechanical and environmental stresses with the same reliability of protection as provided by double insulation. (basic insulation and supplementary insulation, see 4.4.3.2/RD and 4.4.4.5/RD)	Complied	P
4.4.5.3/RD	Protective separation between circuits		P
	Protective separation between a circuit and other circuits shall be achieved by one of the following means: • double insulation (basic insulation and supplementary insulation in 4.4.3.2/RD and 4.4.4.5/RD); • reinforced insulation in 4.4.5.2/RD; • electrically protective screening in 4.4.4.7/RD; • a combination of these provisions.	Primary circuits and plastic button are considered reinforced insulation in 4.4.5.2/RD	P
	If conductors of the separated circuit are contained together with conductors of other circuits in a multi-conductor cable or in another grouping of conductors, they shall be insulated, individually or collectively, for the highest voltage present, so that double insulation is achieved. If any component is connected between the separated circuits, that component shall comply with the requirements for protective impedance devices (see 4.4.5.4/RD)		N/A
4.4.5.4/RD	Protection by means of protective impedance	See table 4.2/RD to 4.3/RD for details.	P

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Protective impedance shall be arranged so that under both normal and single fault conditions the current and discharge energy available shall be limited according to 4.4.3.4/RD.		P
	The protective impedances shall be designed and tested to withstand the impulse voltages and temporary overvoltages for the circuits to which they are connected. See 5.2.3.2/RD and 5.2.3.4/RD for tests.		P
	Compliance with the requirement for the limitation of touch current is checked by test of 5.2.3.6/RD.		P
	Compliance with the requirement for the discharge energy shall be checked by performing calculations and/or measurements to determine the voltage and capacitance. NOTE A protective impedance designed according to this subclause is not considered to be a galvanic connection.		P
4.4.6/RD	Protective measures		P
4.4.6.1/RD	General		P
4.4.6.2/RD	Protective measures for protective class I equipment		P
	Protective class I equipment shall meet the requirements for: • basic protection in 4.4.3/RD; and • fault protection in 4.4.4.2/RD and 4.4.4.3/RD with respect to equipotential bonding and PE conductor.		P
4.4.6.3/RD	Protective measures for protective class II equipment	Class I equipment.	N/A

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Protective class II equipment shall meet the requirements for enhanced protection according to 4.4.5/RD and the enclosure shall meet the requirement for basic protection in 4.4.3/RD with respect to accessibility to hazardous live parts. Protective class II equipment shall not have means of connection for the PE conductor. This does not apply if a PE conductor is passed through the equipment to equipment series-connected beyond it. In the latter case the PE conductor and its means for connection shall be separated from: ·accessible surface of the equipment; and ·circuits which employ protective separation with at least simple separation according to the requirement in 4.4.4.6/RD. The simple separation shall be designed according to the rated voltage of the series-connected equipment. Equipment of protective class II may have provision for the connection of an earthing conductor for functional reasons or for the damping of overvoltages. In this case, the functional earthing conductor shall be separated from: ·accessible surface of the equipment; and ·circuits which employ protective separation according to 4.4.5.3/RD with at least protective separation according to the requirement in 4.4.5.3/RD. Equipment of protective class II shall be marked according to 6.3.7.3.3/RD. Compliance is checked by inspection.		N/A
4.4.6.4/RD	Protective measures for protective class III equipment or circuits	Class I equipment.	N/A
4.4.6.4.1 /RD	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Protective measures shall be achieved by protective separation by one of the following means: • basic insulation and supplementary insulation (double insulation) according to 4.4.3.2/RD and 4.4.4.5/RD; • reinforced insulation according to 4.4.5.2/RD; • electrically protective screening and simple separation according to 4.4.4.7/RD; or • a combination of these provisions; used in combination with one of the following means: • protective impedance according to 4.4.5.4/RD comprising limitation of discharge energy and of current; or • limitation of voltage according to 4.4.3.5/RD.		N/A
	The protective separation shall be fully and effectively maintained under all conditions of intended use of the PECS.		N/A
4.4.6.4.2 /RD	Connection to PELV and SELV circuits		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If a port is intended for connection of an external PELV or SELV circuit with a higher voltage than DVC As: • measures to limit the voltage to that of DVC As shall be taken (see Annex A); or • basic protection shall be provided. For connectors containing pins with very small contact area (< 1 mm²), the next higher voltage level for DVC As, of Table 5, is permitted. Example: if DVC A1 is DVC As, then DVC A2 is permitted at pins of signal connectors. The connection of external PELV or SELV circuits to an internal circuit is permitted with the following consideration: • without measures: only if the DVC of the PELV and SELV voltage are lower than or equal to the DVC selected from Table 5 for the internal circuit under consideration; and • with measures: if the DVC of the PELV and SELV voltage are higher than the DVC selected from Table 5 for the internal circuit under consideration. The possibility of an addition of the voltages of the circuits under consideration to a higher level under fault conditions shall be considered. For marking, see 6.3.7.1/RD. Consideration needs to be given to factors such as whether the circuits involved are earthed or not, what the voltages involved are, whether or not direct contact with live parts is possible, single faults in either equipment or the interconnections, etc.		N/A
4.4.7/RD	Insulation		P
4.4.7.1/RD	General		P
4.4.7.1.1 4.4.7.1.1 /RD	Influencing factors		P
	This subclause gives minimum requirements for insulation, based on the principles of IEC 60664.		P
	Insulation shall be selected after consideration of the following influences: - pollution degree; - overvoltage category; - supply system earthing; - impulse withstand voltage, temporary overvoltage and working voltage; - location of insulation; - type of insulation.	See sub-clauses 4.4.7.1.2 to 4.4.7.1.7 for details.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Verification of insulation shall be made according to 5.2.2.1/RD, 5.2.3.2/RD, 5.2.3.4/RD and 5.2.3.5/RD. The working voltage can also be measured in accordance with Annex A.		P
4.4.7.1.2 4.4.7.1.2 /RD	Pollution degree	PD2	P
	Insulation, especially when provided by clearances and creepage distances, is affected by pollution which occurs during the expected lifetime of the PECS. The micro-environmental conditions for insulation shall be applied according to Table 8.		P
	The pollution degree shall be determined according to the environmental condition for which the product is specified. See Table 18 for selection of pollution degree according to environmental classification of the installation.		P
	The insulation may be determined according to pollution degree 2 if one of the following applies: a) instructions are provided with the PECS indicating that it shall be installed in a pollution degree 2 environment; or b) the specific installation application of the PECS is known to be a pollution degree 2 environment; or c) the PECS enclosure or coatings applied within the PECS according to 4.4.7.8.4.2/RD or 4.4.7.8.6/RD provide adequate protection against what is expected in pollution degree 3 and 4 (conductive pollution and condensation).	Pollution degree 2 considered	P
	The PECS manufacturer shall state in the documentation the pollution degree for which the PECS has been designed.		N/A
	If operation in a pollution degree 4 environment is required, protection against conductive pollution shall be provided by means of a suitable enclosure.		N/A
	Unless otherwise specified by the UPS manufacturer, the UPS shall be suitable for installation in environments in which the pollution degree is 2 (PD2), see IEC 62477-1: 2012, Table 8.		P
4.4.7.1.3 4.4.7.1.3 /RD	Overvoltage category (OVC)	OVC II	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Four categories are considered. • Equipment of overvoltage category IV (OVC IV) is for use at the origin of the installation. • Equipment of overvoltage category III (OVC III) is equipment in fixed installations and for cases where the reliability and the availability of the equipment are subject to special requirements. • Equipment of overvoltage category II (OVC II) is energy-consuming equipment to be supplied from the fixed installation. • Equipment of overvoltage category I (OVC I) is equipment for connection to circuits in which measures are taken to limit transient overvoltages to an appropriately low level.	See above	P
	The measures for reduction of the impulse voltage shall ensure that the temporary overvoltages that could occur are sufficiently limited so that their peak value does not exceed the relevant rated impulse voltage of Table 9 and shall meet the requirement of 4.4.7.2.2/RD, 4.4.7.2.3/RD and 4.4.7.3/RD as applicable.		N/A
	As a minimum, the UPS shall be suitable for installation in environments presenting overvoltage categories listed in Table 102. For UPS units designed to be part of a parallel configuration, the current to be considered in Table 102 is that provided by the parallel configuration.		P
	If measures are provided to reduce impulses of overvoltage category III to values of category II, or values of category II to values of category I, appropriate insulation may be designed to the reduced values, provided that following a single failure, e.g. of the reduction measure, at least the basic insulation requirements for the original overvoltage category shall be fulfilled.		N/A
4.4.7.1.4 /RD	Supply system earthing		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The following three basic types of system earthing are described in IEC 60364-1. • TN system: has one point directly earthed, the accessible conductive parts of the installation being connected to that point by protective conductors. Three types of TN system, TN-C, TN-S and TN-C-S, are defined according to the arrangement of the neutral and protective conductors. • TT system: has one point directly earthed, the accessible conductive parts of the installation being connected to earth electrodes electrically independent of the earth electrodes of the power system. • IT system: has all live parts isolated from earth or one point connected to earth through an impedance, the accessible conductive parts of the installation being earthed independently or collectively to the system earthing.	TN system	P
4.4.7.1.5 /RD	Determination of impulse withstand voltage and temporary overvoltage		P
	Table 9 uses the system voltage (see 4.4.7.1.6/RD) and overvoltage category of the circuit under consideration to determine the impulse withstand voltage. The system voltage is also used to determine the temporary overvoltage. A PECS having more than one input or output shall be evaluated according to the input or output which gives the most severe requirements.	2500V considered	P
4.4.7.1.6 /RD	Determination of the system voltage	See the following details	P
4.4.7.1.6.1 /RD	For mains supply	Max. 240Vac between a phase and earth considered for all models.	P
4.4.7.1.6.2 /RD	For non-mains supply	Internal batteries considered.	P
	For PSCS supplied by non-mains a.c. or d.c., the system voltage is the r.m.s. value of the supply voltage between phases.	The voltage between the positive and negative terminals of the battery, see copy of marking plate	P
4.4.7.1.7 4.4.7.1.7 /RD	Components bridging insulation		P
	Components bridging insulation shall comply with the requirements of the level of insulation (e.g. basic, reinforced, double) they are bridging.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	A capacitor connected between two line conductors in a primary circuit, or between one line conductor and the neutral conductor or between the primary circuit and protective earth shall comply with one of the subclasses of IEC 60384-14 or with the requirement of 4.4.7.1.7 of IEC 62477-1: 2012 and shall be used in accordance with its rating for voltage and current	X2 and Y1 or Y2 capacitors complied with IEC 60384-14	P
	For equipment to be connected to IT power distribution systems components connected between line and earth shall be rated for the line-to-line voltage. However, capacitors rated for the applicable line-to-neutral voltage are permitted in such applications if they comply with subclass Y1, Y2 or Y4 of IEC 60384-14	No such construction	N/A
4.4.7.2/RD	Insulation to the surroundings	See the following details	P
4.4.7.2.1 /RD	General	See above	P
4.4.7.2.2 4.4.7.2.2 /RD	Circuits connected to mains supply	See above	P
	Insulation between the surroundings and circuits which are connected directly to the mains supply shall be designed according to the impulse withstand voltage, temporary overvoltage, or working voltage, whichever gives the most severe requirement.	See above	P
4.4.7.2.3 /RD	Circuits connected to non-mains supply	No such connection	P
	Insulation between the surroundings and circuits supplied from a non-mains supply shall be designed according to: • the impulse withstand voltage determined from Table 9 using the system voltage; • the working voltage; • the temporary overvoltage if known to exist due to the nature of the supply; whichever gives the more severe requirement.		P
	Temporary overvoltage on a non-mains supply shall be determined as follows: • Without detailed knowledge of the temporary overvoltage, it shall be according to Table 9. • If the temporary overvoltage is known this value shall be used.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	By the determination of temporary overvoltages on non-mains supply, following situations should be considered: • loss of the neutral in a non-mains low-voltage system; • accidental earthing of a non-mains low voltage IT system; and • short circuit in the non-mains low voltage installation.		P
4.4.7.2.4 /RD	Insulation between circuits		P
	Insulation between two circuits shall be designed according to the circuit having the more severe requirement. For the design of simple and protective separation between circuits the insulation shall be designed according to: • the circuit having the more severe requirement; or • the working voltage between the circuits; whichever gives the most severe requirement.		P
4.4.7.3/RD	Functional insulation		P
	If the failure of functional insulation does not produce a hazard (electrical, thermal, fire), no specific requirements apply for the dimensioning of functional insulation. In other cases the following requirements apply. Testing is not required, except where the circuit analysis required by 4.2/RD shows that failure of the insulation could result in a hazard. For parts or circuits that are significantly affected by external transients, functional insulation shall be designed according to the impulse withstand voltage of overvoltage category II, except that overvoltage category III shall be used when the PECS is connected at the origin of the installation. Where measures are provided that reduce transient overvoltages within the circuit from category III to values of category II, or values of category II to values of category I, functional insulation may be designed for the reduced values. Where the circuit characteristics can be shown by testing (see 5.2.3.2/RD) to reduce impulse voltages, functional insulation may be designed for the highest impulse voltage occurring in the circuit during the tests. For parts or circuits that are not significantly affected by external transients, functional insulation shall be designed according to the working voltage across the insulation.		P

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Clause	Requirement + Test	Result - Remark	Verdict
4.4.7.4/RD	Clearance distance		P
4.4.7.4.1 /RD	Determination	See Table 4.4.7.4/RD	P
	Clearances for functional, basic and supplementary insulation shall be dimensioned according to Table 10 (see Annex D for examples of the evaluation of clearance distances). Interpolation is permitted, when clearance is determined from temporary overvoltage or working voltage. Clearances for reinforced insulation shall be dimensioned to withstand an impulse voltage one step higher than the impulse withstand voltage, or 1,6 times the peak temporary overvoltage or peak working voltage, required for basic insulation. Clearance distances for use in altitudes between 2 000 m and 20 000 m shall be calculated using a correction factor according to Table A.2 of IEC 60664-1:2007, which is reproduced as Table E.1. A correction factor selected from Table F.2 is also used for determination of clearance distances for approximately homogenous fields when frequencies are greater than 30 kHz, as given in Annex F.	See Table 4.4.7.4/RD	P
	Compliance shall be checked by visual inspection (see 5.2.2.1/RD) or by performing the impulse voltage test of 5.2.3.2/RD and the a.c. or d.c. voltage test of 5.2.3.4/RD.		P
4.4.7.4.2 /RD	Electric field homogeneity		N/A
	The dimensions in Table 10 correspond to the requirements of an inhomogeneous electric field distribution across the clearance, which are the conditions normally experienced in practice. If a homogeneous electric field distribution is known to exist, the clearance distance for basic or supplementary insulation may be reduced to not less than that required by Table F.2 (Case B) of IEC 60664-1:2007. In this case, however, the impulse voltage test of 5.2.3.2/RD shall be performed across the considered clearance. If the withstand against steady state voltages, recurring peak or temporary overvoltages according to Table 10 is decisive for the dimensioning of clearance and if these clearances are smaller than the values of Table 10 then an a.c. or d.c. voltage test according to 5.2.3.4/RD is required. Clearance distances for reinforced insulation shall not be reduced for homogeneous fields.		N/A
4.4.7.4.3 /RD	Clearance to conductive enclosure		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The clearance between any non-insulated live part and the walls of a metal enclosure shall be in accordance with 4.4.7.4.1/RD during and following the deflection tests of 5.2.2.4.2/RD.		P
	Compliance is checked by inspection and by test of 5.2.2.4.2/RD.		P
	If the design clearance distance is at least 12,7 mm and the clearance distance required by 4.4.7.4.1/RD does not exceed 8 mm, the deflection tests may be omitted.		N/A
4.4.7.5/RD	Creepage distances		P
4.4.7.5.1 /RD	Insulating material groups	Material group IIIb is assumed to be used.	P
	Creepage distance requirements for PWBs exposed to pollution degree 3 environmental conditions shall be determined based on Table 11 pollution degree 3 under “Other insulators”.		N/A
	For inorganic insulating materials, for example glass or ceramic, which do not track, the creepage distance may equal the associated clearance distance, as determined from Table 10.		P
4.4.7.5.2 /RD	Determination	See Table 4.4.7.5/RD	P
	Creepage distances for functional, basic and supplementary insulation shall be dimensioned according to Table 11. Interpolation is permitted. Creepage distances for reinforced insulation shall be twice the distances required for basic insulation.		P
	When the creepage distance requirement determined from Table 11 is less than the clearance distance required by 4.4.7.4.1/RD or the clearance distance determined by impulse testing (see 5.2.3.2/RD), then the creepage distance shall be increased to the clearance distance.		P
	Compliance of creepage distances shall be checked by measurement or inspection (see 5.2.2.1/RD) (see Annex D for examples of the evaluation of creepage distances).		P
4.4.7.6/RD	Coating	No such consideration	N/A
	A coating may be used to provide insulation, to protect a surface against pollution, and to allow a reduction in creepage and clearance distances (see 4.4.7.8.4.2/RD and 4.4.7.8.6/RD)		N/A
4.4.7.7 4.4.7.7/RD	PWB spacings for functional insulation		P
	Spacings for functional insulation shall comply with the requirement of 4.4.7.4/RD and 4.4.7.5/RD.	See 4.2/RD	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Decreased spacing for components mounted on PWB or decreased spacing on PWB are permitted when all the following are satisfied: • the PWB has flammability rating of V-0 (see IEC 60695-11-10); • the PWB base material has a minimum CTI of 100; • the equipment complies with the PWB short circuit test (see 5.2.4.7/RD). Decreased spacings for components assembled on PWB are permitted when used in: • pollution degree 1 or 2 environment; and • not more than overvoltage category I. In this case the manufacture specification may be used. Compliance is checked by inspection and by test of 5.2.4.7/RD if applicable.	No such consideration	N/A
4.4.7.8/RD	Solid insulation	See the following details	P
4.4.7.8.1 /RD	General		P
	Materials selected for solid insulation shall be able to withstand the stresses occurring. These include mechanical, electrical, thermal, climatic and chemical stresses which are to be expected in normal use. Insulation materials shall also be resistant to ageing during the expected lifetime of the PECS. Tests shall be performed on components and sub-assemblies using solid insulation, in order to ensure that the insulation performance has not been compromised by the design or manufacturing process.		P
4.4.7.8.2 /RD	Material requirements		P
	The insulating material shall have a CTI of 100 or greater. The insulating material shall be suitable for the maximum temperature it attains as determined by the temperature rise test of 5.2.3.10/RD. Consideration shall be given as to whether or not the insulating material additionally provides mechanical strength and whether or not the part can be subject to impact during use.	Complied	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The insulating material in contact with live parts higher than DVC As shall comply with: • the glow-wire test described in 5.2.5.3/RD at a test temperature of 850 °C; or • the glow-wire test described in 5.2.5.3/RD, at a lower test temperature, but not less than 550 °C, depending on the classification of the use of the PECS, according to Table A.1 of IEC 60695-2-11:2011; or • the alternative hot wire ignition test of 5.2.5.4/RD	Approved AC outlet, AC connector and AC inlet by UL	P
	Thermoplastic insulating materials used in contact with live parts higher than DVC As or used as part of the enclosure shall comply with the ball pressure test as abnormal heat test according to IEC 60695-10-2.		N/A
	Where an insulating material is used in a PECS that incorporates switching contacts, and is within 12,7 mm of the contacts, it shall comply with the high current arcing ignition test of 5.2.5.2/RD.		N/A
	In case the manufacturer of the insulating material provides data to demonstrate compliance with the above requirements no further testing is required. No further evaluation is required when generic materials are used according to Table 12.		N/A
	Compliance is checked by inspection and by test of 5.2.3.10/RD and 5.2.5.3/RD or 5.2.5.2/RD.		N/A
4.4.7.8.3 /RD	Thin sheet or tape material		P
4.4.7.8.3.1 /RD	General	See Table 4.4.7.8.3.2/RD	P
	4.4.7.8.3/RD applies to the use of thin sheet or tape materials in assemblies such as wound components and bus-bars. Insulation consisting of thin (less than 0,75 mm) sheet or tape materials is permitted, provided that it is protected from damage and is not subject to mechanical stress under normal use. Where more than one layer of insulation is used, there is no requirement for all layers to be of the same material. NOTE 1 One layer of insulation tape wound with more than 50 % overlap is considered to constitute two layers. NOTE 2 Basic, supplementary and double insulation can be applied as a pre-assembled system of thin materials.	See the following details	P
4.4.7.8.3.2 /RD	Material thickness equal to or more than 0,2 mm		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Basic or supplementary insulation shall consist of at least one layer of material, which will meet the requirements of 4.4.7.8.1/RD and 4.4.7.10.1/RD.		P
	Double insulation shall consist of at least two layers of material, each of which will meet the requirements of 4.4.7.8.1/RD, 4.4.7.10.1/RD, and the partial discharge requirements of 4.4.7.10.2/RD, and both layers together will meet the impulse and a.c. or d.c. voltage requirements of 4.4.7.10.2/RD.		N/A
	Reinforced insulation shall consist of a single layer of material, which will meet the requirements of 4.4.7.8.1/RD and 4.4.7.10.2/RD.		N/A
	NOTE The requirements of this subclause indicate that double insulation can be at least 0,4 mm thick, while reinforced insulation is permitted to be 0,2 mm thick.		N/A
4.4.7.8.3.3 /RD	Material thickness less than 0,2 mm		N/A
	Basic or supplementary insulation shall consist of at least two layers of material, which will meet the requirements of 4.4.7.8.1/RD and 4.4.7.10.1/RD.		N/A
	Double insulation shall consist of at least three layers of material. Each layer shall meet the requirements of 4.4.7.8.1/RD and 4.4.7.10.1/RD, and any two layers together shall meet the requirements of 4.4.7.10.2/RD.		N/A
	Reinforced insulation consisting of a single layer of material is not permitted.		N/A
4.4.7.8.3.4 /RD	Compliance	See table 4.4.7.10 /RD, 5.2.3/RD for details.	P
	Compliance shall be checked by the tests described in 5.2.3.1/RD to 5.2.3.5/RD. When a component or sub-assembly makes use of thin sheet insulating materials, it is permitted to perform the tests on the component rather than on the material.		P
4.4.7.8.4 /RD	Printed wiring boards (PWBs)		P
4.4.7.8.4.1 /RD	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Insulation between conductor layers in double-sided single-layer PWBs, multi-layer PWBs and metal core PWBs, shall meet the requirements of 4.4.7.8.1/RD. Basic, supplementary, double and reinforced insulation shall meet the appropriate requirements of 4.4.7.10.1/RD or 4.4.7.10.2/RD. Functional insulation in PWBs shall meet the requirements of 4.4.7.7/RD. For the inner layers of multi-layer PWBs, the insulation between adjacent tracks on the same layer shall be treated as either: • a creepage distance for pollution degree 1 and a clearance as in air (see Example D.14); or • solid insulation, in which case it shall meet the requirements of 4.4.7.8.1/RD and 4.4.7.10/RD.	Single-layer PWBs used, 4.4.7.8.1/RD, 4.4.7.10.1/RD and 4.4.7.10.2/RD considered.	P
4.4.7.8.4.2 /RD	Use of coating materials	No coated printed boards.	N/A
	A coating material used to provide functional, basic, supplementary and reinforced insulation shall meet the requirement as specified below.		N/A
	Type 1 protection (as defined in IEC 60664-3) improves the microenvironment of the parts under protection. The clearance and creepage distance of Table 10 and Table 11 for pollution degree 1 apply under the protection. Between two conductive parts, it is a requirement that one or both conductive parts, together with all the spacing between them, are covered by the protection.		N/A
	Type 2 protection is considered to be similar to solid insulation. Under the protection, the requirements for solid insulation specified in 4.4.7.8/RD are applicable, including the coating material itself, and spacings shall not be less than those specified in Table 1 of IEC 60664-3:2003. The requirements for clearance and creepage in Table 10 and Table 11 do not apply. Between two conductive parts, it is a requirement that both conductive parts, together with the spacing between them, are covered by the protection so that no air gap exists between the protective material, the conductive parts and the printed boards.		N/A
	The coating material used to provide Type 1 and Type 2 protection shall be designed to withstand the stresses anticipated to occur during the expected lifetime of the PECS. A type test on representative PWBs shall be conducted according to Clause 5 of IEC 60664-3:2003. For the cold test (5.7.1 of IEC 60664-3:2003), a temperature of -25 °C shall be used, and for the rapid change of temperature test (5.7.3 of IEC 60664-3:2003): -25 °C to +125 °C. No routine test is required.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.4.7.8.5 /RD	Wound components		N/A
	Varnish or enamel insulation of wires shall not be used for basic, supplementary, double or reinforced insulation. Wound components shall meet the requirements of 4.4.7.8.1/RD and 4.4.7.10/RD. The component itself shall pass the requirements given in 4.4.7.8.1/RD and 4.4.7.10.2/RD. If the component has reinforced or double insulation, the a.c. or d.c. voltage test of 5.2.3.4/RD shall be performed as a routine test.		N/A
4.4.7.8.6 /RD	Potting materials	No potting materials used.	N/A
	A potting material may be used to provide solid insulation or to act as a coating to protect against pollution.		N/A
	If used as solid insulation, it shall comply with the requirements of 4.4.7.8.1/RD and 4.4.7.10/RD.		N/A
	If used to protect against pollution, the requirements for Type 1 protection in 4.4.7.8.4.2/RD apply.		N/A
4.4.7.9/RD	Connection of parts of solid insulation (cemented joints)		N/A
	The creepage and clearance path in the presence of a cemented joint between two insulating parts, are determined as follows. • Type 1 or type 2 protection as described in 4.4.7.8.4.2/RD apply. • A cemented joint that is not evaluated as providing protection of type 1 or type 2, is neither considered solid insulation nor to reduce pollution degree. The clearance and creepage distances of Table 10 and Table 11 apply for the pollution degree of the environment around the joint. See 5.2.5.7/RD for test.		N/A
4.4.7.10 /RD	Requirements for electrical withstand capability		P
4.4.7.10.1 /RD	Basic or supplementary insulation	See Table 4.4.7.10/RD	P
	Test with impulse withstand voltage according to 5.2.3.1/RD		P
	Test with a.c. or d.c. voltage according to 5.2.3.4/RD		P
4.4.7.10.2 /RD	Double or reinforced insulation	See Table 4.4.7.10/RD	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Double or reinforced insulation shall be tested as follows: • Test with impulse withstand voltage according to 5.2.3.2/RD; and • Test with a.c. or d.c. voltage according to 5.2.3.4/RD.		P
	For solid insulation, the partial discharge test according to 5.2.3.5/RD shall be performed in addition to the above tests, if the recurring peak working voltage across the insulation is greater than 750 V and the voltage stress on the insulation is greater than 1 kV/mm. The partial discharge test shall be performed as a type test on all components, sub-assemblies and PWB. In addition, a sample test shall be performed if the insulation consists of a single layer of material.	No solid insulation used on the recurring peak working voltage across the insulation is greater than 750 V and the voltage stress on the insulation is greater than 1 kV/mm.	N/A
	Double insulation shall be designed so that failure of the basic insulation or of the supplementary insulation will not result in reduction of the insulation capability of the remaining part of the insulation.		N/A
4.4.7.11 /RD	Insulation requirements above 30kHz		N/A
4.4.8/RD	Compatibility with residual current-operated protective devices (RCD)	No such device used	N/A
	To ensure the intended work of an RCD provided by the installation PECS shall satisfy one of the following conditions. a) A Pluggable Type A single-phase PECS, shall be designed so that, under normal and fault conditions any resulting d.c. component of the current in the PE conductor does not exceed the d.c. current withstand requirements in IEC 60755 for RCD of type A. b) For PECS that are Pluggable Type B or intended for permanent connection, d.c. current in the PE conductor is not limited if the information and marking requirements of 6.3.7.4/RD are complied with.		N/A
	Compliance with RCD provided by the installation shall be checked by simulation or calculation of current in the PE conductor under normal and single fault conditions according to the guideline provided in Annex H/RD.		N/A
4.4.9 4.4.9/RD	Capacitor discharge		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For protection against shock hazard, capacitors within a PECS shall be discharged to a voltage less than DVC As, or to a residual charge less than 50 µC, after the removal of power from the PECS: • for pluggable UPS type A, the discharge time shall not exceed 1 s or the hazardous live parts shall be protected against direct contact by at least IPXXB (see 4.4.3.3); • for pluggable UPS type B, the discharge time shall not exceed 5 s or the hazardous live parts shall be protected against direct contact by at least IPXXB (see 4.4.3.3); • for permanently connected UPS, the discharge time shall not exceed 15 s. For pluggable PECS type A and B and permanently connected PECS, which do not meet the above requirements, access shall only be possible by means of a tool or key and the information and marking requirements of 6.5.2/RD apply. Compliance is checked by test of 5.2.3.8/RD.	For pluggable UPS type A limit value 1s considered. The equipment does not meet the above requirements, access shall only be possible by means of a tool or key and the information and marking requirements of 6.5.2/RD apply. See the details of 6.5.2/RD.	P
4.5	Protection against electrical energy hazards		P
4.5.1/RD	Operator access areas		P
4.5.1.1/RD	General		P
	Equipment shall be so designed that there is no risk of electrical energy hazard in operator access areas from accessible circuits by fulfilling requirement of 4.2/RD. A risk of injury due to an electrical energy hazard exists if it is likely that two or more bare parts (one of which may be earthed) between which a hazardous energy level exists, will be bridged by a metallic object. The likelihood of bridging the parts under consideration is determined by means of the test finger of Figure 1 of IEC 60529:1989, in a straight position. If it is possible to bridge the parts with this test finger, a hazardous energy level shall not exist. Barriers, guards, and similar means preventing unintentional contact may be provided as an alternative to limiting the energy.	IP20 considered.	P
	Compliance is checked by inspection or test of 5.2.2.2/RD.		P
4.5.1.2/RD	Determination of hazardous electrical energy level		P

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Clause	Requirement + Test	Result - Remark	Verdict
	A hazardous electrical energy level is considered to exist if: • the voltage is 2 V or more; and • power available exceeds 240 VA after 60 s; or • the energy exceeds 20 J. Compliance shall be checked with the test in 5.2.3.9/RD or by calculation.		P
4.5.2 4.5.2/RD	Service access areas	No such area	N/A
	Capacitors within a PECS shall be discharged to an energy level less than 20 J, as in 4.5.1.2, within 5 s after the removal of power from the PECS. If this requirement is not achievable for functional or other reasons, the information and marking requirements of 6.5.2/RD apply.		N/A
	This requirement does not apply to terminals covered by 4.4.9. In a service access area, the following requirements apply. Bare parts at hazardous voltage shall be located or guarded so that unintentional contact with such parts is unlikely during service operations involving other parts of the equipment. Bare parts at hazardous voltage shall be located or guarded so that accidental shorting to parts at non-hazardous potentials (for example, by tools or test probes used by a service person) is unlikely.		N/A
	If the capacitor discharge time cannot be accurately calculated, the discharge time shall be measured.		N/A
4.6	Protection against fire and thermal hazards		P
4.6.1/RD	Circuits representing a fire hazard		P
	The following types of circuits are considered a fire hazard: - circuits directly connected to the mains - circuits that are not directly connected to the mains but exceed the limits for limited power sources in 4.6.5/RD - components having unenclosed arcing parts		P
4.6.2/RD	Components representing a fire hazard		P
4.6.2.1/RD	General		P
	Compliance with 4.6.2/RD and 4.6.3/RD shall be confirmed by inspection of component and material data sheets and, where necessary, by test.		P
4.6.2.2 4.6.2.2/RD	Components within a circuit representing a fire hazard		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Inside fire enclosures, materials for components and other parts and all materials in contact with such parts shall comply with flammability class V-2 as classified in IEC 60695-11-10 or flammability class HF-2 as classified in ISO 9772 or better.		P
	The above requirement does not apply to any of the following: • electrical components which do not present a fire hazard under abnormal operating conditions when tested according to 5.2.4.6/RD; • materials and components within an enclosure of 0,06 m3 or less, consisting totally of metal and having no ventilation openings, or within a sealed unit containing an inert gas; • electronic components, such as integrated circuit packages, opto-coupler packages, capacitors and other small parts that are mounted on material of flammability class V-1 or better; • wiring, cables and connectors insulated with PVC, TFE, PTFE, FEP, neoprene or polyimide; • the following parts, provided that they are separated from electrical parts (other than insulated wires and cables) which under fault conditions are likely to produce a temperature that could cause ignition, by at least 13 mm of air or by a solid barrier of material of flammability class V-1 or better: – other small parts which would contribute negligible fuel to a fire, including, labels, mounting feet, key caps, knobs and the like; – tubing for air or any fluid systems, containers for powders or liquids and foamed plastic parts, provided that they are of flammability class HB.		P
	Batteries shall have a flammability class HB or better.		P
4.6.2.3/RD	Components within a circuit not representing a fire hazard		P
	For components within a circuit not representing a fire hazard 4.6.2/RD does not apply.		P
4.6.3/RD	Fire enclosure		P
4.6.3.1 4.6.3.1/RD	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Fire enclosures are used to reduce the risk of fire to the environment, independent of the location where they are installed. A fire enclosure shall be provided for all UPS unless: • circuits inside of an enclosure are within the limits of limited power sources in 4.6.5 of this document; or • there is an agreement between the user and the manufacturer; or • the UPS is intended to be used only in areas without combustible materials and is marked according to 6.3.5/RD.	With having the following components: a) Components in primary circuits c) Insulated wiring Semiconductor devices, transistors, diodes, integrated circuits d) Resistors, capacitors, inductors The fire enclosure is required.	P
4.6.3.2/RD	Flammability of enclosure materials		P
	Materials used for fire enclosures of PECS shall meet the flammability test requirements of 5.2.5.5/RD, except for those portions of the enclosure that enclose only circuits not representing a fire hazard.		N/A
	Materials are considered to comply without test if, in the minimum thickness used, the material is of flammability class 5VA or better, according to IEC 60695-11-20.	Approved 5VA class material enclosure by UL.	P
	Metals, ceramic materials, and glass which is heat-resistant tempered, wired or laminated, are considered to comply without test.	Metal enclosure provided also.	P
	Materials for components that fill an opening in a fire enclosure shall: • be of at least V-1 class material and no larger than 100 mm in any dimension; or • be of at least V-2 class material and either – not larger than 25 mm in any dimension; or – not larger than 100 mm in any dimension and located at least 100mm from any part that is a source of fire hazard; or • be of at least V-2 class material and there is a barrier or device(s) that forms a barrier made of a V-0 class material between the part and a source of fire hazard; or • comply with a relevant IEC component standard that includes flammability requirements for components that are intended to form part of, or fill openings in, a fire enclosure.	PCB rated V-1 or better. See appended table “Critical components information” for details. Internal components except small parts are V-2 or better.	P
	Polymeric materials that serve as the outer enclosure and have surface area greater than 1 m^2 or a single dimension larger than 2 m, shall have a maximum flame spread index of 100 as determined by ASTM E162 or ANSI/ASTM E84.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer may provide data from the fire enclosure material supplier to demonstrate compliance with the above requirements. In this case, no further testing is required.		N/A
	Compliance shall be checked by visual inspection and, where necessary, by test.		P
4.6.3.3/RD	Openings in fire enclosure		P
4.6.3.3.1 /RD	General		P
4.6.3.3.2 4.6.3.3.2 /RD	Openings in the top and side if fire enclosures		P
	Openings in the top surfaces of fire enclosures shall be designed to prevent an external object falling vertically or at up to 5° from vertically from entering the enclosure in an area that could lead to a fire hazard. This requirement applies to all sides of moveable equipment with no defined top and bottom, unless top and bottom surfaces can be suitably demonstrated in the installation instructions. The test requirements are found in 5.2.2.2 of this document.	No external object falling vertically or at up to 5° from vertically from entering the enclosure in an area that could lead to a fire hazard.	P
	Openings in the top surfaces of fire enclosures not located vertically above or within 5° from vertical of a circuit representing a fire hazard as defined in 4.6.1/RD are not subject to the test of 5.2.2.2/RD and can be of any construction if the construction prevents access to parts greater than DVC As with the IP2X probe as detailed in 4.4.3.3/RD. Where a portion of the side of a fire enclosure falls within the area traced out by the 5° angle in Figure 6, the limitations in 4.6.3.3.3/RD regarding openings in bottoms of fire enclosures also apply to this portion of the side. Compliance shall be checked by visual inspection.		P
4.6.3.3.3 /RD	Openings in the bottom of a fire enclosure	No bottom openings	N/A
	Compliance is checked by inspection or with the hot flaming oil test in 5.2.5.6/RD, in case the fire enclosure is designed differently than as described in this subclause.		N/A
4.6.3.3.4 /RD	Doors or covers in fire enclosures	No such doors or covers	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If part of a fire enclosure consists of a door or a cover leading to an operator access area, it shall comply with one of the following requirements: • the door or cover shall be provided with a safety interlock; or • a door or cover, intended to be routinely opened by the user, shall comply with both of the following conditions: – it shall not be removable from other parts of the fire enclosure by the user; and – it shall be provided with a means to keep it closed during normal operation. A door or cover intended only for occasional use by an installer, such as for the installation of accessories, is permitted to be removable provided that the equipment instructions include directions for correct removal and reinstallation of the door or cover. Compliance is checked by inspection.		N/A
4.6.4/RD	Temperature		P
4.6.4.1 4.6.4.1/RD	Internal parts	See table 4.6.4/RD	P
	Equipment and its component parts shall not attain temperatures in excess of those in Table 14 when tested in normal mode in accordance with the ratings of the equipment. Magnetic components shall not attain temperatures in excess of those in Table 103 when tested in stored energy mode in accordance with the ratings of the equipment. Compliance is checked by test of 5.2.3.10/RD.		P
4.6.4.2/RD	Accessible parts		P
	When surface temperatures of the PECS, close to mounting surfaces, exceed the limit of Table 15, a warning according to 6.3.5/RD shall be provided.		P
4.6.5 4.6.5/RD	Limited power sources	See below	P
	Where a limited power source is required, the source shall comply with Table 16 or Table 17 as applicable. Compliance to both the maximum allowed current and maximum apparent power available from the power source is required.	See table 4.6.5/RD for details.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	A limited power source shall comply with one of the following requirements: a) the output is inherently limited in compliance with Table 16; or b) a linear or non-linear impedance limits the output in compliance with Table 16. If a positive temperature coefficient device (PTC) is used, it shall pass the tests specified in IEC 60730-1, Clauses 15, 17, J.15 and J.17; or c) a regulating network limits the output in compliance with Table 16, both with and without a single fault in the regulating network; or d) an overcurrent protective device is used and the output is limited in compliance with Table 17.		N/A
	Compliance to determine the maximum available power is checked by test of 5.2.3.9/RD.	See table 4.6.5/RD for details.	P
4.7	Protection against mechanical hazards		P
4.7.1/RD	General		P
	Failure of any component within the PECS shall not release sufficient energy to lead to a hazard, for example, expulsion of material into an area occupied by personnel.		P
4.7.2/RD	Specific requirements for liquid cooled PECS	No such liquid cooled PECS.	N/A
4.7.2.1/RD	General		N/A
4.7.2.2/RD	Coolant		N/A
	Coolant temperature in operation shall not exceed the limit specified in Table 14.		N/A
	Compliance is checked by inspection and test of 5.2.3.10/RD.		N/A
4.7.2.3/RD	Design requirements		N/A
4.7.2.3.1 /RD	General		N/A
	The liquid containment system components shall be compatible with the liquid to be used. Equipment using liquids shall be so constructed that it is unlikely that either a dangerous concentration of these materials or a hazard in the meaning of this standard will be created by condensation, vaporization, leakage, spillage or corrosion during normal operation, storage, filling or emptying. Compliance is checked by inspection. The flexible hoses should be made of material free of conductive contaminants such as carbon.		N/A
4.7.2.3.2 /RD	Corrosion resistance		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	All cooling system components shall be suitable for use with the specified coolant. They shall be corrosion resistant and shall not corrode as a result of prolonged exposure to the coolant and/or air. Compliance is checked by inspection.		N/A
4.7.2.3.3 /RD	Tubing, joints and seals		N/A
	Cooling system tubing, joints and seals shall be designed to prevent leakage during excursions of pressure over the life of the equipment. The entire cooling system including tubing shall satisfy the requirements of the hydrostatic pressure test of 5.2.7/RD.		N/A
4.7.2.3.4 /RD	Provision for condensation		N/A
	Where internal condensation occurs during normal operation or maintenance, measures shall be taken to prevent degradation of insulation. In those areas where such condensation is expected, clearance and creepage distances of Table 10 and Table 11 shall be evaluated at least for a pollution degree 3 environment (see Table 8), and provision shall be made to prevent accumulation of water (for example by providing a drain). Compliance is checked by inspection.		N/A
4.7.2.3.5 /RD	Leakage of coolant		N/A
	During a leakage measures has to ensure that coolant will not result in wetting of live parts or electrical insulation.		N/A
4.7.2.3.6 /RD	Loss of coolant		N/A
	Loss of coolant form the cooling system shall not result in thermal hazards, explosion, or shock hazard. The requirements of the Loss of coolant test of 5.4.3.9.4/RD shall be satisfied.		N/A
4.7.2.3.7 /RD	Conductivity of coolant		N/A
	When the coolant is intentionally in contact with live parts (for example non-earthed heatsinks), the conductivity of the coolant shall be continuously monitored and controlled, in order to avoid hazardous current flow through the coolant.		N/A
4.7.2.3.8 /RD	Insulation requirements for coolant hoses		N/A

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	When the coolant is intentionally in contact with live parts (for example non-earthed heatsinks), the coolant hoses form a part of the insulation system. Depending on the location of the hoses, the requirements of 4.4.7/RD for functional or simple or protective separation shall be applied where relevant.		N/A
4.7.101	Protection in service access area	No such area	N/A
4.8	Equipment with multiple sources of supply	Internal battery considered the dc source.	P
4.8.101	General		P
4.8.102	Backfeed protection		P
4.9 4.9/RD	Protection against environmental stresses		P
	The manufacturer has to specify the following conditions for operation, storage and transportation according to IEC 60721: - Coolant temperature (min/max); - Ambient temperature (min/max); - Humidity (min/max) - Pollution degree; - Vibration; - U.V. resistance; - Over voltage category (OVC); - Altitude for thermal consideration, if rated for operation above 1000 m; - Altitude for insulation coordination considerations, if rated for operation above 2000 m.	Relevant information specified in user manual.	P
	The manufacturer shall state the environmental service condition for the PECS according to Table 18. The UPS, as a minimum, shall comply with the following indoor conditions: climatic, pollution degree, and humidity condition of the skin as part of the environmental service condition 3K2 of Table 18 of IEC 62477-1:2012. The manufacturer may elect to comply with environmental service conditions more onerous than 3K2 subject to the UPS being marked accordingly (see 6.2).	Relevant information specified in user manual.	P
4.10	Protection against sonic pressure hazards		P
4.11	Wiring and connections		P
4.11.1/RD	General		P

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	The wiring and connections between parts of the equipment and within each part shall be protected from mechanical damage during installation. The insulation, conductors and routing of all wires of the equipment shall be suitable for the electrical, mechanical, thermal and environmental conditions of use. Conductors which are able to contact each other shall be provided with insulation rated for the DVC requirements of the relevant circuits. The compliance with 4.11.2/RD to 4.11.8/RD shall be checked by inspection (see 5.2.1/RD) of the overall construction and datasheets if applicable.		P
4.11.2/RD	Routing		P
	A hole through which insulated wires pass in a sheet metal wall within the enclosure of the equipment shall be provided with a smooth, well-rounded bushing or grommet or shall have smooth, well-rounded surfaces upon which the wires bear to reduce the risk of abrasion of the insulation.		P
	Wires shall be routed away from sharp edges, screw threads, burrs, fins, moving parts, drawers, and similar parts, which abrade the wire insulation. The minimum bend radius specified by the wire manufacturer shall not be violated.		P
	Clamps and guides, either metallic or non-metallic, used for routing stationary internal wiring shall be provided with smooth, well-rounded edges. The camping action and bearing surface shall be such that abrasion or deformation of the insulation does not occur. If a metal clamp is used for conductors having thermoplastic insulation less than 0,8 mm thick, non-conduction mechanical protection shall be provided.		P
4.11.3/RD	Colour coding		P
	Insulated conductors, other than those which are integral of ribbon cable or multi-cord signal cable, identified by the colour green with or without one or more yellow stripes shall only be used for protective bonding.		P
4.11.4/RD	Splices and connections		P

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	All splices and connections shall be mechanically secured and shall provide electrical continuity. Electrical connections shall be soldered, welded, crimped, or otherwise securely connected. A soldered joint, other than a component on a PWB, shall additionally be mechanically secured. NOTE Stranded wire should not be consolidated with solder where secured in a terminal that relies on pressure for contact or equivalent When stranded internal wiring is connected to a wire-binding screw, the construction shall be such that loose strands of wire do not contact: • other uninsulated live parts not always of the same potential as the wire; • de-energized metal parts. When screw terminal connections are used, the resulting connections may require routine maintenance (tightening). Appropriate reference shall be made in the maintenance manual (see 6.5.1/RD).		P
4.11.5/RD	Accessible connections		N/A
	In addition to measures given in 4.4.6.4/RD it shall be ensured that neither insertion error nor polarity reversal of connectors can lead to a voltage on an accessible connection higher than the maximum of DVC As. This applies for example to plug-in sub-assemblies or other plug-in devices which can be plugged in without the use of a tool or key or which are accessible without the use of a tool or key. This does not apply to equipment intended to be installed in restricted access areas. If relevant, non-interchangeability and protection against polarity reversal of connectors, plugs and socket outlets shall be confirmed by inspection and trial insertion.		N/A
4.11.6/RD	Interconnection between parts of the PECS		P

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	In addition to complying with the requirements given in 4.11.1/RD to 4.11.5/RD, the means provided for the interconnection between parts of the PECS shall comply with the following requirements or those of 4.11.7/RD. Cable assemblies and flexible cords provided for interconnection between sections of equipment or between units of a system shall be suitable for the service or use involved. Cables shall be protected from physical damage as they leave the enclosure and shall be provided with mechanical strain relief. Misalignment of male and female connectors, insertion of a multipin male connector in a female connector other than the one intended to receive it, and other manipulations of parts which are accessible to the operator shall not result in mechanical damage or a risk of thermal hazards, electric shock, or injury to persons. When external interconnecting cables terminate in a plug which mates with a receptacle on the external surface of an enclosure, no risk of electric shock shall exist at accessible contacts of either the plug or receptacle when disconnected. NOTE An interlock circuit in the cable to de-energize the accessible contacts whenever an end of the cable is disconnected meets the intent of these requirements.		P
4.11.7/RD	Supply connections		P
	The connection points provided shall be of appropriate construction to preclude the possibility of loose strands reducing the spacing between conductors when careful attention is paid to installation.		P
4.11.8/RD	Terminals	No such terminal provided.	N/A
4.11.8.1 /RD	Construction requirements		N/A

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength. Terminal connections shall be such that the conductors can be connected by means of screws, springs or other equivalent means so as to ensure that the necessary contact pressure is maintained. Terminals shall be so constructed that the conductors can be clamped between suitable surfaces without any significant damage either to conductors or terminals. Terminals shall not allow the conductors to be displaced or be displaced themselves in a manner detrimental to the operation of equipment and the insulation shall not be reduced below the rated values. The requirements of this subclause are met by using terminals complying with IEC 60947-7-1 or IEC 60947-7-2, as appropriate.		N/A
4.11.8.2 4.11.8.2 /RD	Connecting capacity		N/A
	Terminals shall be provided which accommodate the conductors specified in the installation and maintenance manuals (see 6.3.6.4/RD) and cables in accordance with the wiring rules applicable at the installation. The terminals shall meet the temperature rise test of 5.2.3.10/RD.		N/A
	Information regarding the permitted wire sizes shall be given in the installation manual.		N/A
	The UPS manufacturer shall indicate whether the terminals are suitable for connection of copper or aluminium conductors, or both. The terminals shall be such that the external conductors may be connected by a means (screws, connectors, etc.) which ensures that the necessary contact pressure corresponding to the current rating, the short-circuit strength of the apparatus and the circuit are maintained.		N/A
	In the absence of a special agreement between the UPS manufacturer and the purchaser, terminals shall be capable of accommodating copper conductors from the smallest to the largest cross-sectional areas corresponding to the appropriate rated current (see Annex AA). Compliance is checked by inspection, by measurement and by fitting at least the smallest and largest cross-sectional areas of the appropriate range in Annex AA.		N/A
4.11.8.3 /RD	Connection		N/A

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Terminals for connection to external conductors shall be readily accessible during installation. Sets of terminals for connection to the same input or output shall be grouped together and shall be located in proximity to each other and to the main protective earthing terminal, if any. If the installation instructions provide detail on the proper earthing of the system, the protective earthing terminal need not be placed in proximity to the terminals. Clamping screws and nuts shall not serve to fix any other component although they may hold the terminals in place or prevent them from turning.		N/A
4.11.8.4 /RD	Wire bending space for wires 10 mm^2 and greater		N/A
	The distance between a terminal for connection to the main supply, or between major parts of the PECS (for example a transformer), and an obstruction toward which the wire is directed upon leaving the terminal shall be at least that specified in Table 19.		N/A
4.11.101	Non-detachable cords		N/A
4.11.101.1	Cord guard		N/A
4.11.101.2	Cord anchorages and strain relief		N/A
4.12/RD	Enclosures		P
4.12.1/RD	General		P
4.12.2/RD	Handle and manual controls		N/A
	Handles, knobs, grips, levers and the like shall be reliably fixed so that they will not work loose in normal use, if this could result in a hazard. Sealing compounds and the like, other than self-hardening resins, shall not be used to prevent loosening. If handles, knobs and the like are used to indicate the position of switches or similar components, it shall not be possible to fix them in a wrong position if this could result in a hazard.		N/A
4.12.3/RD	Cast metal		N/A

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Die-cast metal, except at threaded holes for conduit, where a minimum of 6,4 mm thickness is required, shall be: • not less than 2,0 mm thick for an area larger than 155 cm^2 or having any dimension larger than 150 mm; • not less than 1,2 mm thick for an area of 155 cm^2 or less and having no dimension larger than 150 mm. The area under evaluation may be bounded by reinforcing ribs subdividing a larger area. Malleable iron or permanent-mould cast aluminium, brass, bronze, or zinc, except at threaded holes for conduit, where a minimum of 6,4 mm thickness is required, shall be: • at least 2,4 mm thick for an area greater than 155 cm^2 or having any dimension more than 150 mm; • at least 1,5 mm thick for an area of 155 cm^2 or less having no dimension more than 150 mm. A sand-cast metal enclosure shall be a minimum of 3,0 mm thick except at locations for threaded holes for conduit, where a minimum of 6,4 mm is required.		N/A
4.12.4/RD	Sheet metal		N/A
4.12.5/RD	Stability test for enclosure		N/A
	Under conditions of normal use, units and equipment shall not become physically unstable to the degree that they could become a hazard to an operator or to a service person. If units are designed to be fixed together on site and not used individually, the stability of each individual unit is exempt from the requirements of 4.12.5/RD. The requirements of 4.12.5/RD are not applicable if the installation instructions for a unit specify that the equipment is to be secured to the building structure before operation. Under conditions of operator use, a stabilizing means, if needed, shall be automatic in operation when drawers, doors, etc., are opened. During operations performed by a service person, the stabilizing means, if needed, shall either be automatic in operation, or a marking shall be provided to instruct the service person to deploy the stabilizing means. Compliance is checked by test of 5.2.2.5/RD.		N/A
4.101	UPS isolation and disconnect device	See the following details	P
4.101.1	Emergency switching (disconnect) device	No such device used	N/A
4.101.2	Normal disconnect devices	AC inlet is considered as disconnect device	P

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
4.102	Stored energy source	See the following details	P
4.102.1	General	Maintenance free batteries used inside the UPS. The batteries are connected by quick connect terminals (no necessary tightening).	P
4.102.2	Accessibility and maintainability		P
4.102.3	Distance between battery cells	The temperature of the electrolyte and the gas emission are within the limits of this standard	P
4.102.4	Case insulation		P
4.102.5	Electrolyte spillage	Sealed maintenance free batteries provided with an unlikely emission of electrolyte (VRLA type).	P
4.102.6	Ventilation and hydrogen concentration	For the ventilation of the lead-acid battery refer to table Annex CC.	P
4.102.7	Charging voltages	See table 4.2/RD to 4.3/RD	P
4.102.8	Battery circuit protection	Approved battery fuse (F1, F2, F3)	P
4.102.8.1	Overcurrent and earth fault protection		P
4.102.8.2	Location of protective device	Mounted on the PCB marked F3, F4	P
4.102.8.3	Rating of protective devices	DC 30A	P
4.103	UPS connection to telecommunication lines		N/A

5	**Test requirements**		P
5.1/RD	General		P
5.1.1/RD	Test objectives and classification		P
5.1.2/RD	Selection of test samples		P
5.1.3/RD	Sequence of tests		P
5.1.4/RD	Earthing conditions	Neutral to earth Neutral to earth through high impedance	P
5.1.5/RD	General conditions for tests		P
5.1.5.1/RD	Application of tests		P
	Unless otherwise stated, upon conclusion of the tests, the equipment need not be operational.		P
5.1.5.2/RD	Test samples		P
5.1.5.3 5.1.5.3/RD	Operating parameters for tests		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.1.6/RD	Compliance		P
5.1.7	Test overview		P
5.1.101	UPS test overview		P
5.2	Test specification		P
5.2.1/RD	Visual inspections (type test, sample test and routine test)		P
	Before type testing, a check shall be made that the PECS delivered for the test is as expected with respect to supply voltage, input and output ranges, etc.		P
5.2.2/RD	Mechanical tests		P
5.2.2.1/RD	Clearance and creepage distance test (type test)		P
	It shall be verified by measurement or visual inspection that the clearance and creepage distances comply with 4.4.7.4/RD and 4.4.7.5/RD.		P
	Where this verification is impossible to perform, an impulse voltage test (see 5.2.3.2/RD) shall be performed between the considered circuits.		P
5.2.2.2	Non-accessibility test (type test)		P
5.2.2.3/RD	Ingress protection test (IP rating)(type test)	IP20	P
	The claimed IP rating of the enclosure shall be verified. This test shall be performed as a type test of the enclosure of a PSCS as specified in IEC 60529 for the enclosure classification.	IP20	P
5.2.2.4/RD	Enclosure integrity test (type test)		P
5.2.2.4.1 /RD	General		P
	The integrity tests apply to PSCS, and also where PSCS are intended for operation without a further enclosure in restricted access areas. After completion of the integrity test, the PSCS shall pass the tests of 5.2.3.2/RD and 5.2.3.4/RD and shall be inspected to confirm that:		P
	- no degradation of any safety-relevant component of the PSCS has occurred.		P
	- live parts have not become accessible (see 4.4.3.3/RD).		P
	- enclosures show no cracks or openings which could cause a hazard.		P
	- clearances are not less than their minimum permitted values and other insulation is undamaged.		P
	- barriers have not been damaged or loosened.		N/A
	- no moving parts which could cause a hazard are exposed.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The integrity tests shall be performed at the worst case point on representative accessible face(s) of the enclosure.		P
	The PSCS is not required to be operational after testing and the enclosure may be deformed to such an extent that its original IP rating is not maintained.		P
5.2.2.4.2 /RD	Deflection test (type test)		P
5.2.2.4.2.1 /RD	General		P
5.2.2.4.2.2 /RD	Stead force test, 30N		N/A
5.2.2.4.2.3 /RD	Stead force test, 250N	250 N applied to outer enclosure.	P
5.2.2.4.3 /RD	Impact test (type test)	No hazard as result from drop test.	P
5.2.2.4.4	Drop test		N/A
5.2.2.4.5 /RD	Stress relief test	Tested at temperature of 70 °C. No distortion of enclosure observed and no hazards.	P
5.2.2.5/RD	Stability test	The UPS do not overturn when: - tilted to an angle of 10°	P
5.2.2.6	Wall, ceiling or rack mounted equipment test	See the following details.	P
5.2.2.6.101	Wall and ceiling mounted equipment test	Not wall and ceiling mounted equipment	N/A
5.2.2.6.102	Rack mounted equipment test	See Annex GG	P
5.2.2.7/RD	Handle and manual controls securement test	Pull values for handles applied for 200N, pull values for manual control applied for 100N	P
5.2.2.101	Cord guard test		N/A
5.2.3/RD	Electrical tests	See table 4.4.7.10 /RD, 5.2.3/RD.	P
5.2.3.1/RD	General		P
	The electrical tests described in 5.2.3.2/RD to 5.2.3.5/RD are applicable to basic, supplementary and reinforced insulation. Before performing these tests, preconditioning according to 5.2.6.3.1/RD and 5.2.6.3.2/RD is required.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	When performing electrical and preconditioning tests, the preferred procedure is to test the entire equipment; however it is acceptable to test the components or sub-assemblies providing the basic and reinforced insulation. When components or sub-assemblies are tested, test conditions shall simulate the least favourable conditions occurring inside the equipment at the place of installation.		P
5.2.3.2/RD	Impulse voltage test (type test and sample test)	2500V between primary live parts to PE See Table 4.4.7.10/RD 5.2.3/RD	P
5.2.3.3/RD	Alternative to impulse voltage test (type test and sample test)		N/A
	An a.c. or d.c. voltage test according to 5.2.3.4/RD may be used as an alternative method to the impulse voltage test of 5.2.3.2/RD.		N/A
	For an a.c. voltage test the peak value of the a.c. test voltage shall be equal to the impulse test of Table 25 and applied for three cycles of the a.c. test voltage.		N/A
	For a d.c. voltage test the average value of the d.c. test voltage shall be equal to the impulse test voltage of Table 25 and applied three times for 10 ms in each polarity.		N/A
	See IEC60664-1 clause 6.1.2.2.2/RD for further information.		N/A
5.2.3.4/RD	Ac or d.c. voltage test (type test and routine test)	See Table 4.4.7.10/RD 5.2.3/RD	P
5.2.3.4.1 /RD	Purpose of test		P
	The test is used to verify that the clearances and solid insulation of components and of assembled PSCS has adequate dielectric strength to resist temporary overvoltage conditions.		P
5.2.3.4.2 /RD	Value and type of test voltage		P
	The values of the test voltage for circuits connected to mains supply are determined from column 2 or 3 of Table 26. The voltage test shall be performed with a sinusoidal voltage at 50 Hz or 60 Hz. If the circuit contains capacitors the test may be performed with a d.c. voltage of a value equal to the peak value of the specified a.c. voltage.		P
5.2.3.4.3 /RD	Performing the voltage test		P

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Test (1) between accessible conductive part 8connected to earth) and each circuit sequentially (except DVC As circuits). Test voltage according to Table 26, or Table 27, column 2, corresponding to voltage of considered circuit under test. Test (2) between accessible surface (nonconductive or conductive but not connected to earth9 and each circuit sequentially (except DVC As circuits). Test voltage according to Table 26 or Table 27, column 3 (for type test) or column 2 (for routine test), corresponding to voltage of considered circuit under test.		P
	b) Test between each considered circuit sequentially and the other adjacent circuits connected together. Test voltage according to Table 26 or Table 27, column 2, corresponding to voltage of considered circuit under test.		P
	c) Test between DVC As circuit and each adjacent circuit sequentially. Test voltage according to Table 26 or Table 27, column 3 (for type test) or column 2 (for routine test), corresponding to the circuit with the higher voltage. Either the adjacent circuit or the DVC As circuit may be earthed for this test. It is necessary to test functional insulation between PELV and SELV circuits, but it is not necessary to test functional insulation between adjacent PELV or adjacent SELV circuits.		N/A
5.2.3.4.4 /RD	Duration of the a.c. or d.c. voltage test		P
	The duration of the test shall be at least 60 s for the type test and 1 s for the routine test. The test voltage may be applied with increasing and/or decreasing ramp voltage but the full voltage shall be maintained for 60 s and 1 s respectively for type and routine tests.	60s for type test; 1s for routine test.	P
5.2.3.4.5 /RD	Verification of the a.c. or d.c. voltage test		P
	The test is successfully passed if no electrical breakdown occurs during the test.		P
5.2.3.5/RD	Partial discharge test (type test, sample test)	The recurring peak working voltage across the insulation is less than 750V and the voltage stress on the insulation is less than 1kV/mm.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The partial discharge test shall confirm that the solid insulation (see 4.4.7.8/RD) used in components and subassemblies for protective separation of electrical circuits remains partial-discharge-free within the specified voltage range (see Table 28).		N/A
	This test shall be performed as a type test and a sample test. It may be omitted for insulating materials which are not degraded by partial discharge, for example ceramics. The partial discharge inception and extinction voltage are influenced by climatic factors (e.g. temperature and moisture), equipment self-heating, and manufacturing tolerance. These influencing variables can be significant under certain conditions and shall therefore be taken into account during type testing.		N/A
5.2.3.6/RD	Protective impedance test (type test and routine test)	Tested on detective resistance for basic insulation.	P
	A type test shall be performed to verify that the current through a protective impedance under normal operating or single-fault conditions does not exceed the values given in 4.4.3.4/RD. The test shall be performed using the circuit of IEC 60990:1999, Figure 4. NOTE IEC 60990 states that the use of a single network for the measurement of a.c. combined with d.c. has not been investigated, but no suggestion is made for measurement in such cases. The value of the protective impedance shall be verified as a routine test.		P
5.2.3.7/RD	Touch current measurement test (type test)	See Table 4.4.4.3.3 /RD	P
	The touch current shall be measured to determine if the measures of protection need not be taken (see 4.4.4.3.3/RD). The PECS shall be set up in an insulated state without any connection to the earth and shall be operated at rated voltage. Under these conditions, the touch current shall be measured between the means of connection for the PE conductor and the PE conductor itself with the test circuit of Figure 4 of IEC 60990:1999.		P
	• For a PSCS to be connected to an earthed neutral system, the neutral of the mains of the test site shall be directly connected to the protective earthing conductor.		P
	• For a PSCS to be connected to an earthed neutral system, the neutral shall be connected through a resistance of 1 kΩ to the protective earthing conductor which shall be connected to each input phase in turn. The highest value will be taken as the definitive result.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	• For a PSCS to be connected to a corner earthed system, the protective earthing conductor shall be connected to each input phase in turn. The highest value will be taken as the definitive result.		P
	• For a PSCS with a particular earthing system, this system shall operate as intended during the test.		P
	• If a PSCS is intended to be connected to more than one system network, each of these different system networks (or the worst-case, if that can be determined) shall be used to make the touch current measurement.		P
5.2.3.8/RD	Capacitor discharge test (type test)	See table 4.4.9/RD.	P
	The capacitor discharge time as required by 4.4.3.4/RD may be verified by a type test and/or by calculation taking into account the relevant tolerances.		P
5.2.3.9	Limited power source test (type test)	See table 4.6.5/RD	P
5.2.3.10 5.2.3.10 /RD	Temperature rise test (type test)	See table 4.6.4/RD.	P
	If possible the PECS must operate in the worst conditions of the rated power and the output current.		P
	Equipment, in which the heating or cooling quantity depends on the temperature, the temperature measurement must be carried out under the most unfavourable conditions of ambient temperature within the range specified by the manufacturer.		P
	The PECS shall be tested with at least 1,2 m of wire attached to each field wiring terminal. The wire shall be of the smallest size intended to be connected to the PECS as specified by the manufacturer for installation. When there is only provision for the connection of bus-bars to the PECS, they shall be of the minimum size intended to be connected to the PECS as specified by the manufacturer, and they shall be at least 1,2 m in length.		P
	The test shall be maintained until thermal stabilization has been reached. That is, when three successive readings, taken at intervals of 10 % of the previously elapsed duration of the test and not less than 10 min. intervals, indicate no change in temperature, defined as ± 1 °C between any of the three successive readings, with respect to the ambient temperature.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The temperature of an electrical insulation (other than that of windings) is measured on the surface of the insulation at a point close to the heat source, if a failure of this insulation could cause a hazard. If temperatures of windings are measured by the thermocouple method, the thermocouple shall be located on the surface of the winding assuming the hottest part due to surrounding heat emitting components. See also notes in Table 14.		P
	The maximum temperature attained shall be corrected to the rated ambient temperature of the PSCS by adding the difference between the ambient temperature during the test and the maximum rated ambient temperature.		P
	No corrected temperature of the material or component shall exceed the temperature in Table 14 in IEC 62477-1: 2012 or Table 103 as applicable.		P
	During the test, thermal cut-out, overload detection functions and devices shall not operate.		P
5.2.3.11 /RD	Protective equipotential bonding tests (type tests and routine test)		P
5.2.3.11.1 /RD	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Each conductive accessible part under consideration shall be tested separately, to determine if the protective equipotential bonding path for that part is adequate to withstand the test current that the bonding path may be subjected to under fault conditions. The circuit under consideration shall be selected from amongst those circuits adjacent to the accessible part under consideration and separated from it by only basic or functional insulation. All of these selected circuits have to be analysed regarding prospective short circuit current and the associated protective element(s): - If the circuit under consideration exceeds the 5 s disconnection time requirement of IEC 60364-4-41, the protective equipotential bonding impedance test of 5.2.3.11.2/RD and the protective equipotential bonding short circuit test of 5.2.3.11.3/RD have to be performed. - If the circuit under consideration meets the 5 s disconnection time requirement of IEC 60364-4-41, the protective equipotential bonding short circuit test of 5.2.3.11.3/RD has to be performed. - If the circuit under consideration meets the disconnection time requirement of IEC 60364-4-41:2005, Table 41.1, as applicable, depending on the earthing system of the installation, no type test is required.		P
	For pluggable equipment type A only the protective equipotential bonding impedance test of 5.2.3.11.2/RD have to be performed.		P
5.2.3.11.2 /RD	Protective equipotential bonding impedance test	See the following details	P
5.2.3.11.2. 1/RD	Test conditions	See 5.2.3.11.2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Where required by 4.4.4.2.2/RD and 5.2.3.11.2.1/RD, the impedance of protective equipotential bonding means shall be checked by passing a test current through the bond for a period of time. The test current is based on the rating of the overcurrent protection for the equipment or part of the equipment under consideration, as follows: • for pluggable equipment type A, the overcurrent protective device is that provided external to the equipment (for example, in the building wiring, in the mains plug or in an equipment rack); • for pluggable equipment type B and permanently connected equipment, the maximum rating of the overcurrent protective device specified in the equipment installation instructions to be provided external to the equipment; • the rating of the provided overcurrent device for a circuit or part of the equipment for which an overcurrent protective device is provided as part of the equipment.		P
5.2.3.11.2.2/RD	Test current, duration and acceptance criteria	32A, 2 mins	P
	a) For PECS with an overcurrent protective device rating of 16 A or less, this test may be omitted, if an impedance not exceeding 0,1 Ω can be demonstrated.	0.009Ω	P
	b) As an alternative to Table 29, where the time-current characteristic of the overcurrent protective device that limits the fault current in the protective equipotential bonding means is known because the device is either provided in the equipment or fully specified in the installation instructions, the test duration may be based on that specific device's time-current characteristic. The tests are conducted for a duration corresponding to the 200 % current value on the time-current characteristic.		P
	c) For PECS with an overcurrent protective device rating of more than 460 A, calculations or simulations according to IEC 60949 shall be used to show the ability of the prospective short circuit current to fulfil the requirements. The protective equipotential bonding continuity routine test of 5.2.3.11.4/RD shall be performed to show that the impedance of the protective equipotential bonding means during and at the end of the test shall not exceed the expected value.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Acceptance criteria: The test current is 200 % of the overcurrent protective device rating and the duration of the test is as shown in Table 29. The voltage drop in the protective equipotential bonding means, during and at the end of the test, shall not exceed DVC As, as determined from Table 2 and Table 5 with respect to the accessible surface of the enclosure.		N/A
	After the tests, visual inspection shall show no damage to the protective equipotential bonding means.		P
5.2.3.11.3 /RD	Protective equipotential bonding short circuit withstand test (type test)		P
	As required by 5.2.3.11.2.1/RD, the short circuit test in 5.2.4.3/RD shall be performed to ensure that protective bonding has the ability to withstand the prospective short circuit current that it may be subjected to under fault conditions.	3 kA considered.	P
	The testing shall include an individual test of the protective bonding path for each conductive accessible part unless analysis shows that the short circuit withstand capability of the path is adequate, or that the results of one combination are representative of the anticipated results of another combination.	Complied according to analysis the path have enough capability to withstand short circuit.	P
5.2.3.11.4 /RD	Protective equipotential bonding continuity test (routine test)	Overcurrent protective device ratting less than 460A.	N/A
5.2.3.101	Backfeed protection test (type test)		P
5.2.3.101.1	General		P
5.2.3.101.2	Test for pluggable UPS		P
5.2.3.101.3	Test for permanently connected UPS	Pluggable UPS	N/A
5.2.3.101.4	Method to simulate the load-induced change of reference potential for pluggable UPS		N/A
5.2.3.101.5	Solid-state backfeed protection		N/A
5.2.3.102	Input current test	See table 4.3.101, 5.2.3.102	P
5.2.3.103	Short-time withstand current test (type test)	Icc ≤ 3 kA, not exceeding 10kA	P
5.2.3.103.1	General procedure		N/A
5.2.3.103.2	Input port rated conditional short-circuit current		N/A
5.2.3.103.3	Input port short-time withstand current rating		N/A
5.2.3.103.4	Exemption from testing	Icc ≤ 3 kA, not exceeding 10kA	P
5.2.3.104	Transformer protection test	See Table 4.2/RD to 4.3/RD	P
5.2.3.105	Unsynchronized load transfer test	No bypass source connected to the equipment	N/A
5.2.3.105.1	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.3.105.2	Phase displacement	Single phase	N/A
5.2.4/RD	Abnormal operation and simulated fault tests	See table 4.2/RD and 4.3/RD	P
5.2.4.1 5.2.4.1/RD	General	See table 4.2/RD and 4.3/RD	P
5.2.4.2/RD	Pass criteria		P
	As a result of the abnormal operation tests, the PSCS shall comply with the following: - there shall be no emission of flame, burning particles or molten metal; - the surgical cotton indicator shall not have ignited; - the earth connection and protective bonding of the PSCS shall not have opened; - doors and cover shall remain in place; - during and after the test, accessible DVC As, SELV and PELV circuits and accessible conductive parts shall not exhibit voltages greater than the time dependent voltages of Figure 1, Figure 2 or Figure 3, as appropriate and shall be separated from live parts at voltages greater than DVC As with at least basic insulation. Compliance shall be checked by the a.c./d.c. insulation test of 5.2.3.4/RD for basic insulation; - during and after the test, live parts at voltages greater than DVC As shall not become accessible.	No fire propagated beyond the equipment. No molten metal was emitted. Electric strength tests from primary to SELV and primary to PE were passed.	P
	The PSCS is not required to be operational after testing and it is possible that the enclosure can become deformed. Overcurrent protection integral to the PECS, or required to be used with the PECS, is allowed to open.		P
5.2.4.3/RD	Protective equipotential bonding short circuit withstand test (type test)		P
5.2.4.3.1 /RD	General		P
	When required by 5.2.3.11.2.1/RD, a protective bonding path shall be subjected to the following short-circuit withstand test.		P
5.2.4.3.2 /RD	Test conditions		P
	The equipment under test shall be supplied with power and the output port shall be operating as intended in 5.2.4.1/RD prior to closing the switching means that applied will be more severe.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The protective bonding short circuit test shall be performed with the PSCS working with light load, unless analysis shows that higher short circuit currents are available under higher loading conditions.		P
	A new sample may be used for each short-circuit test.		P
5.2.4.3.3 /RD	Protective equipotential bonding short circuit test method		P
5.2.4.3.4 /RD	Pass criteria		P
5.2.4.4/RD	Output short-circuit test (type test)	See table 4.2/RD to 4.3/RD	P
5.2.4.4.1 /RD	Load condition		P
	The short circuit test shall be performed with the PSCS at full load or light load whichever creates the more severe condition.		P
5.2.4.4.2 /RD	Short-circuit test method		P
	In addition to determining compliance with the criteria of 5.2.4.2/RD, this test is used to determine the output short circuit current rating of the port under consideration, in accordance with 4.3.2.3/RD. An oscilloscope or other suitable instrument shall be used to measure the peak current during the test, and to measure or calculate the r.m.s. value of the current.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The value(s) to be recorded and to be provided with the PECS instructions, in accordance with 6.2, are the peak current, and the highest of the r.m.s. current values measured or calculated over a time period as follows: a) for a.c. signals, three cycles of the nominal a.c. frequency for the port under consideration, in which case the value is to be stated as the 3-cycle r.m.s. value; b) for all signals, the duration of the short circuit from the time the short circuit is applied, until the time the short circuit current is interrupted by a protective device or other mechanism, in which case the value stated is to include the r.m.s. value and the time period in seconds; c) for short circuit tests that result in a continuous non-zero value, the steady-state r.m.s. value, in which case the value is to be stated as a continuous r.m.s value. For PECS with internal short circuit protection according to 4.3.2.3/RD, which protects the output port within some few µs, the requirements in a), b) and c) are not applicable.		P
5.2.4.5/RD	Output overload test (type test)	See table 4.2/RD to 4.3/RD	P
5.2.4.6/RD	Breakdown of components test (type test)		P
5.2.4.6.1 /RD	Load conditions	See table 4.2/RD and 4.3/RD	P
	The breakdown of a component, identified as a result of the circuit analysis of 4.2/RD, shall be tested with the PSCS at full load or light load whichever creates the more severe condition.		P
5.2.4.6.2 /RD	Application of short circuit or open-circuit		P
	The short circuit shall be applied with cable of a cross-section appropriate for the current that normally flows through the component, but no less than 2.5 mm². The length of the loop shall be as short as practical to perform the test. Short circuits and open circuits are applied using an appropriate switching device.		P
	Each identified component shall be subjected to only one breakdown of components test unless both open- and short-circuit failure modes are likely in that component.		P
5.2.4.6.3 /RD	Test sequence		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For the Breakdown of components test, identified components shall be short-circuited or open-circuited, whichever creates the worst hazard, one at a time.		P
5.2.4.7/RD	PWB short circuit test (type test)		N/A
	On PWBs, functional insulation provided by spacings which are less than those specified in Table 10 and Table 11 (see 4.4.7.7/RD) shall be type tested as described below.		N/A
	The decreased spacings shall be short-circuited one at a time, on representative samples, and the short-circuit shall be maintained until no further damage occurs.		N/A
5.2.4.8/RD	Loss of phase test (type test)		N/A
	A multi-phase PSCS shall be operated with each line (including neutral, if used) disconnected in turn at the input. The test shall be performed by disconnecting one line with the power conversion equipment operating at its maximum normal load and shall be repeated by initially energizing the device with on lead disconnected.		N/A
	The test shall continue until terminated by a protective mechanism, a component failure occurs, or the temperature stabilizes.		N/A
	This particular requirement may be simulated for PSCS with rated input current greater than 500 A.		N/A
5.2.4.9/RD	Cooling failure tests (type tests)	See table 4.2/RD to 4.3/RD	P
5.2.4.9.1 /RD	General and pass criteria		N/A
	For PSCS having a combination of cooling mechanisms, all relevant tests shall be performed. It is not necessary to perform the tests simultaneously. The test shall continue, - until the temperature stabilizes, in which case the temperature limits of 4.6.4.2/RD apply; or - until terminated by a protective mechanism or a component failure occurs, in which case the temperature limits of 4.6.4.2/RD may be exceeded by not more than 5°C. If this is not possible a warning statement shall be provided in the user documentation.		N/A
	NOTE The temperature increase of 5 °C with regard to the steady state limits reflect the spread of the burn threshold given in IEC Guide 117.		N/A
5.2.4.9.2 /RD	Inoperative blower motor test	No such device	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A PSCS having forced ventilation shall be operated at rated load with fan or blower motor or motors made inoperative, singly or in combination from a single fault, by physically preventing their rotation.		P
5.2.4.9.3 /RD	Clogged filter test	See table 4.2/RD and 4.3/RD	P
	Enclosed PSCS having filtered ventilation openings shall be operated with the openings blocked to represent clogged filters. The test shall be performed initially with the ventilation openings blocked 50 %. The test shall be repeated under full blocked condition.		P
5.2.4.9.4 /RD	Loss of coolant test		N/A
	A liquid cooled PSCS shall be operated at rated load. Loss of coolant shall be simulated by draining the coolant, blocking the flow or disabling the system coolant pump.		N/A
	If the PSCS is shut down due to the operation of a thermal device located inside the coolant, then the test shall be repeated with the coolant drained out of the system.		N/A
	NOTE: It is presumed that the thermal device will be inoperative if not surrounded by coolant liquid.		N/A
5.2.5/RD	Material tests		P
5.2.5.1/RD	General		P
	When requested by 4.4.7.8.2/RD, the manufacturer shall test the flammability properties of the materials used for insulating purposes, as defined in 5.2.5.2/RD, 5.2.5.3/RD and 5.2.5.4/RD. When requested by 4.6.3.2/RD the manufacturer shall test the flammability properties of the materials used for fire enclosure, as defined in 5.2.5.5/RD		P
5.2.5.2/RD	High current arcing ignition test (type test)		N/A
5.2.5.3/RD	Glow-wire test (type test)		P
	The glow-wire test shall be made under the conditions specified in 4.4.7.8.2/RD according to IEC 60695-2-10 and IEC 60695-2-13.	Approved AC outlet, AC inlet and AC connector used by UL.	P
5.2.5.4/RD	Hot wire ignition test (type test – alternative to glow-wire test)	Glow-wire test considered.	N/A
5.2.5.5/RD	Flammability test (type test)		N/A
5.2.5.6/RD	Flaming oil test (type test)		N/A
5.2.5.7/RD	Cemented joints test (type test)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	When required by 4.4.7.9/RD representative samples of cemented joints providing protection of type 1 or type 2 as defined in IEC 60664-3:2003 shall be tested as a type test as follows. The samples shall be subjected to the conditioning procedure specified in 5.7 of IEC 60664-3:2003, using the following parameters: for the cold test (5.7.1/RD), a temperature of -25 °C shall be used, and for the rapid change of temperature test (5.7.3/RD): –25 °C to +125 °C. After the conditioning the samples shall pass the following tests in the prescribed order: a) The mechanical strength of the joint shall be evaluated by loading the joint using the forces anticipated to be present under normal conditions. There shall be no separation of the parts. b) The insulation resistance between the conductive parts separated by the joint shall be measured according to 5.8.3 of IEC 60664-3:2003. c) Cemented joints shall be treated as to be thin sheet material and shall be tested according 4.4.7.8.3/RD d) The sectioning of the joint shall not show any cracks, voids or separation.		N/A
5.2.6 5.2.6/RD	Environmental tests (type tests)	See the following details	P
5.2.6.1/RD	General		P
	Compliance is shown by conducting test of 5.2.6.3/RD, 5.2.6.4/RD, 5.2.6.5/RD and 5.2.6.6/RD according to Table 30 as applicable for the environmental conditions specified by the manufacture.	No hazard as result from Dry heat test, Damp heat test, Vibration test.	P
5.2.6.2/RD	Acceptance criteria		P
	The following acceptance criteria shall be satisfied: - no degradation of any safety-relevant component of the PSCS; - no potentially hazardous behaviour of the PSCS during the test; - no sign of component overheating; - no live part shall become accessible; - no cracks in the enclosure and no damaged or loose insulators; - pass routine a.c. or d.c. voltage test 5.2.3.4/RD; - pass protective bonding test 5.2.3.11.2/RD; - no potentially hazardous behaviour when the PSCS is operated following the test.		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.6.3/RD	Climatic tests		P
5.2.6.3.1 /RD	Dry heat test (steady state)		P
	To prove the ability of components and equipment to be operated, transported or stored at high temperatures the dry heat (steady state) test shall be performed according to the conditions specified in Table 31.		P
5.2.6.3.2 /RD	Damp heat test (steady state)		P
	To prove the resistance to humidity, the PSCS shall be subjected to a Damp heat test (steady state) according to Table 32.		P
5.2.6.4	Vibration test (type test)		P
5.2.6.5	Salt mist test (type test)		N/A
5.2.6.6	Dust and sand test (type test)		N/A
5.2.7/RD	Hydrostatic pressure test (type test and routine test)		N/A
	For type tests, the pressure inside the cooling system of a liquid cooled PSCS (see 4.7.2.3.3/RD) shall be increased at a gradual rate until a pressure relief mechanism (if provided) operates, or until a pressure of twice the operating value or 1,5 times the maximum pressure rating of the system is achieved, whichever is the greater. NOTE: for the purpose of this test the coolant pump may be disabled. For routine tests, the pressure shall be increased to the maximum pressure rating of the system. The pressure shall be maintained for at least one minute. There shall be no thermal, shock, or other hazard resulting from the test. There shall be no significant leakage of coolant or loss of pressure during the test, other than from a pressure relief mechanism during a type test. After the hydrostatic pressure type test the PSCS shall pass the a.c. or d.c. voltage test 5.2.3.4/RD.		N/A

6	**Information and marking requirements**		P
6.1	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.1.101	Durability	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15 s and then again for 15 s with the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking on the label did not fade. There was neither curling nor lifting of the label edge.	P
6.1.102	Removable parts	No required markings placed on removable parts.	P
6.2	Information for selection	See copy of marking plate	P
6.3	Information for installation and commissioning	Detailed information regarding external interfaces and connection of supply and loads provided in the user's manual	P
6.3.1/RD	General		P
6.3.2/RD	Mechanical considerations		P
	The following drawings shall be prepared by the manufacturer: - Dimensional drawing, including mass information - Mounting drawing		P
6.3.3/RD	Environment		P
	In accordance with 4.9/RD the following environmental conditions shall be specified, for operation, transportation and storage:	Relevant and sufficient information provided in manual.	P
	Climatic (temperature, humidity, altitude, pollution, ultra-violet light, etc.)	See above	P
	Mechanical (vibration, shock, drop, topple, etc.)	See above	P
	Electrical (overvoltage category)	See above	P
6.3.4/RD	Handling and mounting		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	In order to prevent injury or damage, the installation documents shall include warnings of any hazards which can be experienced during installation. Where necessary, instructions shall be provided for: - packing and unpacking; - moving; - lifting; - strength and rigidity of mounting surface; - fastening; - provision of adequate access for operation, adjustment and maintenance.		N/A
6.3.5/RD	Enclosure temperature	See the following details	N/A
	When surface temperatures of the PECS, close to mounting surfaces, exceed the limit of 4.6.4.2/RD, the installation manual shall contain a warning to consider the combustibility of the mounting surface.	Enclosure temperature did not exceed the limit of 4.6.4.2/RD	N/A
	Where required by 4.6.3.1/RD, the following marking shall appear on the PECS and in the installation instructions: “suitable for mounting on concrete or other non-combustible surfaces only”.		N/A
6.3.6/RD	Connections	Relevant and sufficient information provided in manual.	P
6.3.6.1/RD	General		P
	Information shall be provided to enable the installer to make safe electrical connection to the PSCS. This shall include information for protection against hazards (for example, electric shock or availability of energy) that may be encountered during installation, operation or maintenance.		P
6.3.6.2/RD	Interconnection and wiring diagrams		P
	The installation and maintenance manuals shall include details of all necessary connections, together with a suggested interconnection diagram.		P
6.3.6.3/RD	Conductor (cable)selection		P
	The Installation manual shall define the voltage and current levels for all connections to the PSCS, together with cable insulation requirements. These shall be worst-case values, taking into account overcurrent and overload conditions and the possible effects of non-sinusoidal currents.		P
6.3.6.4/RD	Terminal capacity and identification		N/A
	The installation and maintenance manuals shall indicate the range of acceptable conductor sizes and types (solid or stranded) for all terminals, and also the maximum number of conductors which can simultaneously be connected.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For field wiring terminals, the manuals shall specify the requirements for tightening torque values and also the insulation temperature rating requirements for the conductor or cable.		N/A
	The identification of all field wiring terminals shall be marked on the PSCS, either directly or by label attached close to the terminals.		N/A
	The installation and maintenance manuals shall identify all external terminals relating to circuits protected by one of the methods of 4.4.6.4/RD.		N/A
6.3.7/RD	Protection requirements	See the following details	P
6.3.7.1/RD	Accessible parts and circuits	No such accessible parts and circuits	N/A
	The installation, users and maintenance manuals shall identify any accessible parts at voltages greater than DVC As, and shall describe the insulation and separation provisions required for protection.		N/A
	The manuals shall also indicate the precautions to be taken to ensure that the safety of DVC As connections maintained during installation.		N/A
	Where a hazard is present after the removal of a cover, a warning label shall be placed on the equipment. The label shall be visible before the cover is removed.		N/A
	The manual of a PSCS shall state the maximum voltage allowed to be connected to each port.		N/A
	The manuals shall provide instructions for the use of PELF circuits within a zone of equipotential bonding.		N/A
6.3.7.2/RD	Type of electrical supply system		P
	The installation manual or the PECS shall specify requirements for safe earthing including the permitted earthing system of the installation (see 4.4.7.1.4/RD)	TN	P
	The unacceptable earthing systems shall be indicated as: - not permitted; or - with modification of values and/or safety levels which shall be quantified through type test.		P
6.3.7.3/RD	Protective class	Class I equipment	P
6.3.7.3.1 /RD	General		P
	The installation manual of the PECS shall declare the protective class specified for the PECS and the product shall be marked according to the requirement of 6.3.7.3.2/RD, 6.3.7.3.3/RD, and 6.3.7.3.4/RD		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.3.7.3.2 /RD	Protective class I equipment		P
	Terminals for connection of the PE conductor shall be clearly and indelibly marked with one or more of the following:		P
	The symbol IEC 60417-5019 (2011-01)	Only PE of "Normal AC supply" with symbol 60417-1-IEC-5019, others with symbol 60417-1-IEC-5017.	P
	With the letters PE		P
	The colour coding green or green-yellow	Green-yellow	P
6.3.7.3.3 /RD	Protective class II equipment	Class I equipment	N/A
	Equipment of protective class II shall be marked with symbol IEC 60417-5172 (2011-01) (see Annex C). Where such equipment has provision for the connection of an earthing conductor for functional reasons (see 4.4.6.3/RD) it shall be marked with symbol IEC 60417-5018 (2011-01) (see Annex C).		N/A
6.3.7.3.4 /RD	Protective class III equipment		N/A
	No marking is required on the product.		N/A
6.3.7.4/RD	Touch current marking	See the following details	N/A
	Where the touch current in the PE conductor exceeds the limits given in 4.4.4.3.3/RD, this shall be stated in the installation and maintenance manuals. In addition, a warning symbol ISO 7010-W001 (2011-06) (see Annex C) shall be placed on the product, and a notice shall be provided in the installation manual to instruct the user that the minimum size of the PE conductor shall comply with the local safety regulations for high PE conductor current equipment.	Leakage current of the equipment does not exceed 3.5 mA.	N/A
6.3.7.5/RD	Compatibility with RCD marking		N/A
	The installation and maintenance manuals shall indicate compatibility with RCDs (see 4.4.8/RD). When 4.4.8/RD b) applies, a caution notice and the symbol ISO 7010-W001 (2011-06) (see Annex C) shall be provided in the user manual, and the symbol shall be placed on the product. The caution notice shall be the following or equivalent: “This product can cause a d.c. current in the PE conductor. Where a residual current-operated protective device (RCD) is used for protection against electrical shock, only an RCD of Type B is allowed on the supply side of this product.” (See 6.4.3/RD for general requirements for labels, signs and signals.)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.3.7.6/RD	Cable and connection	No such particular cable and connection requirements	N/A
	Any particular cable and connection requirements shall be identified in the installation and maintenance manuals.		N/A
6.3.7.7/RD	External protection devices		N/A
	Where external devices are necessary to protect against hazards, the installation manual shall specify the required characteristics (see also 5.2.4/RD and 4.3.2.1/RD)		N/A
6.3.8/RD	Commissioning	Relevant and sufficient information provided in manual.	P
	If commissioning tests are necessary to ensure the electrical and thermal safety of a PSCS, information to support these tests shall be provided for each part of the PSCS. This information can depend on the specific installation, and close cooperation between manufacturer, installer, and user can be required. Commissioning information shall include references to hazards that might be encountered during commissioning, for example those mentioned in 6.4/RD and 6.5/RD.		P
6.3.101	Guidance on UPS installation	Relevant and sufficient information provided in manual.	P
6.4	Information for use	Relevant and sufficient information provided in manual or warning labels.	P
6.4.1/RD	General		P
	The user's manual shall include all information regarding the safe operation of the PSCS. In particular, it shall identify any hazardous materials and risks of electrical shock, overheating, misuse of the PSCS.		P
	The manual should also indicate any hazards which can result from reasonably foreseeable misuse of the PSCS.		P
6.4.2/RD	Adjustment		P
	The user's manual shall give details of all safety-relevant adjustments intended for the user. The identification or function of each control or indicating device and fuse shall be marked adjacent to the item. Where it is not possible to do this on the product, the information shall be provided pictorially in the manual.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Maintenance adjustments may also be described in this manual, but shall be made clear that they should only be made by qualified personnel.		P
	Clear warnings shall be provided where excessive adjustment could lead to a hazardous state of the PSCS.		N/A
	Any special equipment necessary for making adjustments shall be specified and described.		N/A
6.4.3 6.4.3/RD	Labels, signs and signals		P
6.4.3.1/RD	General		P
	Labelling shall be in accordance with good ergonomic principles so that notices, controls, indications, test facilities, fuses, etc., are sensibly placed and logically grouped to facilitate correct and unambiguous identification. All safety related equipment labels shall be located so as to be visible after installation or readily visible by opening a door or removing a cover. Where a symbol is used, the information provided with the PSCS shall contain an explanation of the symbol and its meaning.		P
	Labels shall: • wherever possible, use international symbols as given by ISO 3864-1, ISO 7000 or IEC 60417; • if no international symbol is available, be worded in an appropriate language or in a language associated with a particular technical field; • be concise and unambiguous; • be conspicuous, legible and durable; • state the hazards involved and give ways in which risks can be reduced.		P
	When instructing the person(s) concerned as to • what to avoid: the wording should include “no”, “do not”, or “prohibited”; • what to do: the wording should include “shall”, or “must”; • the nature of the hazard: the wording should include “caution”, “warning”, or “danger”, as appropriate; • the nature of safe conditions: the wording should include the noun appropriate to the safety device.		P
	Safety signs shall comply with ISO 3864-1.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The signal words indicated hereinafter shall be used and the following hierarchy respected: • DANGER to call attention to a high risk, for example: “High voltage”. • WARNING to call attention to a medium risk, for example: “This surface can be hot.” • CAUTION to call attention to a low risk, for example: “Some of the tests specified in this standard involve the use of processes imposing risks on persons concerned.” Danger, warning and caution markings on the PECS shall be prefixed with the word “DANGER”, “WARNING”, or “CAUTION” as appropriate in letters not less than 3,2 mm high. The remaining letters of such markings shall be not less than 1,6 mm high.		P
6.4.3.2/RD	Isolators	No such device provided	N/A
	Where an isolating device is not intended to interrupt load current, a warning shall state: DO NOT OPEN UNDER LOAD.		N/A
	The following requirements apply to any supply isolating device which does not disconnect all sources of power to the PSCS.		N/A
	If the isolating device is mounted in an equipment enclosure with the operating handle externally operable, a warning label shall be provided adjacent to the operating handle starting that it does not disconnect all power to the PSCS.		N/A
	Where a control circuit disconnector can be confused with power circuit disconnectors due to size or location, a warning label shall be provided adjacent to the operating handle of the control disconnector stating that it does not disconnect all power to the PSCS.		N/A
6.4.3.3/RD	Visual and audible signals		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Visual signals such as flashing lights, and addible signals such as sirens, may be used to warn of an impending hazardous event such as the driven equipment start-up and shall be identified. It is essential that these signals: - are unambiguous; - can be clearly perceived and differentiated from all other signals used; - can be clearly recognized by the user; - are emitted before the occurrence of the hazardous event. It is recommended that higher frequency flashing lights be used for information. Note: IEC 60073 provides guidance on recommended flashing rates and on/off ratios.		P
6.4.3.4/RD	Hot surfaces		N/A
	Where required by 4.6.4.2/RD the warning symbol W017 of ISO 7010 shall be marked on or adjacent to parts exceeding the touch temperature limits of Table 15.	No parts exceeding the touch temperature limits	N/A
6.4.3.5/RD	Control and device marking		P
	The Identification of each control or indicating device and fuse shall be marked adjacent to the item. Replaceable fuses shall be marked with their rating and time characteristics. Where it is not possible to do this on the product, the information shall be provided pictorially in the manual. Appropriate identification shall be marked on or adjacent to each movable connector. Test points shall be individually marked with the circuit diagram reference. The polarity of any polarized devices shall be marked adjacent to the device. The diagram reference and if possible the function shall be marked adjacent to each pre-set control in a position where it is clearly visible while the adjustment is being made.		P
6.4.3.101	Distribution-related backfeed	Relevant and sufficient information provided in manual or warning labels.	P
6.4.3.102	Protection in building installation	Protection against electric shock does not rely on residual current devices.	P
6.4.3.102.1	General		P
6.4.3.102.2	Rated conditional short-circuit current (Icc)	3kA	P
6.4.3.102.3	Prospective short-circuit current (Icp)	Less than 3kA	P
6.4.3.102.4	Requirement for building installation		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.4.3.103	Batteries installed within the UPS enclosure	The battery installed inside the UPS enclosure	P
6.5	Information for maintenance	Relevant and sufficient information provided in manual or warning labels.	P
6.5.1/RD	General		P
	The PECS shall be marked with the date code, or serial number from which the date of manufacture can be determined.		P
	Safety information shall be provided in the installation and maintenance manuals including appropriate, the following:		P
	• Preventive maintenance procedures and schedules		P
	• Safety precautions during maintenance		P
	• Location of live parts that can be accessible during maintenance (for example, when covers are removed9		P
	• Adjustment procedures		P
	• Subassembly and component repair and replacement procedures		P
	• Any other relevant information		P
6.5.2/RD	Capacitor discharge		P
	When the requirements 4.4.9/RD are not met, the warning symbol W012 of ISO 7010 and an indication of the discharge time (for example, 45 s, 5 min) shall be placed in a clearly visible position on the enclosure, the capacitor protective barrier, or at a point close to the capacitor(s) concerned (depending on the construction). The symbol shall be explained and the time required for the capacitors to discharge after the removal or the power from the PSCS shall be stated in the installation and maintenance manuals.	Capacitors inside require 5 minutes to discharge to a safe level after all power is removed. See warning label in final installation system.	P
6.5.3/RD	Auto restart/bypass connection		N/A
	If a PSCS can be configured to provide automatic restart or bypass connection, the installation, user and maintenance manuals shall contain appropriate warning statements.		N/A
	A PSCS which is set to provide automatic restart or bypass connection, after the removal of power, shall be clearly identified at the installation.		N/A
6.5.4/RD	Other hazards		P
	The manufacturer shall identify any components and materials of a PSCS which require special procedures to prevent hazards.		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.5.5/RD	Equipment with multiple sources of supply		N/A
	In accordance with 4.8/RD, where there is more than one source of supply energizing the PSCS, information shall be provided to indicate which disconnect device or devices are required to be operated in order to completely isolate the equipment.		N/A
6.5.101	Battery information for maintenance	Relevant and sufficient information provided in manual or warning labels.	P
6.5.101.1	Labelling on battery		P
6.5.101.2	Information in instruction manual(s)		P
6.5.101.2.1	General		P
6.5.101.2.2	Instructions for battery replacement		P

Annex A	**Addition information for protection against electric shock**		P
A.1/RD	General		P
A.2/RD	Protection by means of DVC As		P
A.3/RD	Protection by means of protective impedance		P
A.4/RD	Protection by using limited voltages		P
A.5/RD	Evaluation of working voltage and selection of DVC for touch voltage, PELV and SELV circuits		N/A
A.5.1/RD	General		N/A
A.5.2/RD	Selection of DVC for touch voltage sets to protect against ventricular fibrillation		N/A
A.5.3/RD	Selection of DVC for touch voltage sets to protect against muscular reaction		N/A
A.5.4/RD	Selection of DVC for touch voltage sets to protect against startle reaction		N/A
A.5.5/RD	Determination of voltage limits for touch voltage under fault condition depending on protective equipotential bonding impedance		N/A
A.5.6/RD	Touch time- d.c. voltage zones of ventricular fibrillation		N/A
A.5.7/RD	Touch time- d.c. voltage zones of muscular reaction (inability to let go reaction)		N/A
A.5.8/RD	Touch time- d.c. voltage zones of saltwater-wet skin condition		N/A
A.5.9/RD	Touch time- a.c. voltage zones of ventricular fibrillation		N/A
A.5.10/RD	Touch time- a.c. voltage zones of muscular reaction (inability to let go reaction)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
A.5.11/RD	Touch time- a.c. voltage zones for startle reaction		N/A
A.6/RD	Evaluation of the working voltage of circuits		P
A.6.1/RD	General		P
A.6.2/RD	AC working voltage		P
A.6.3/RD	DC working voltage		N/A
A.6.4/RD	Pulsating working voltage		N/A
A.7/RD	Examples of the use of elements of protective measures		P
A.101	Comparison of limits of working voltage		P

Annex D	**Evaluation of clearance and creepage distances**		P
D.1/RD	Measurement		P
D.2/RD	Relationship of measurement to pollution degree		P
D.3/RD	Examples		P

Annex F	**Clearance and creepage distance determination for frequencies greater than 30kHz**		N/A
F.1/RD	General influence of the frequency on the withstand characteristics		N/A
F.2/RD	Clearance		N/A
F.2.1/RD	General		N/A
F.2.2/RD	Clearance for inhomogeneous fields		N/A
F.2.3/RD	Clearance for approximately homogenous fields		N/A
F.3/RD	Creepage distance		N/A
F.4/RD	Solid insulation		N/A
F4.1/RD	General		N/A
F4.2/RD	Approximately uniform field distribution without air gaps or voids		N/A
F4.3/RD	Other cases		N/A

Annex BB	**Reference loads**		P
BB.1	General		P
BB.2	Reference resistive load		P
BB.3	Reference inductive-resistive loads		P
BB.4	Reference capacitive-resistive loads		P
BB.5	Reference non-linear load		P
BB.5.1	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
BB.5.2	Test method		P

Annex CC	**Ventilation of lead-acid battery compartments**		P
CC.1	General		P
CC.2	Normal conditions		P
CC.3	Blocked conditions		P
CC.4	Overcharge conditions		P

Annex GG	**Requirements for the mounting means of rack-mounted equipment**		P
GG.1	General	See the following details.	P
GG.2	Mechanical strength test, variable force	Applied for 530N force, no damage, no hazard.	P
GG.3	Mechanical strength test, 250N force, including end stops	Applied for 250N force, no damage, no hazard.	P
GG.4	Compliance	Complied.	P

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Clause	Requirement + Test	Result - Remark	Verdict

4.2/RD to 4.3/RD	TABLE: fault condition tests		P
	ambient temperature (°C) .....:	See below	—

No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result
Tested with model NTCS3INT101-RTY							
1	Output	O-L	264Va.c.	10mins	--	--	Up to 125% load. Warning signal alarm sounds (output overload). UPS transfer to bypass mode after 1 minute. No damage, no hazard.
2	Output	O-L	264Va.c.	10mins	--	--	Up to 130% load. Warning signal alarm sounds (output overload). UPS transfer to bypass mode after 30 seconds. No damage, no hazard.
3	Output	O-L	264Va.c.	60s	--	--	Above 130% load. Warning signal alarm sounds (output overload). UPS transfer to bypass mode immediately. No damage, no hazard.
4	Output	O-L	Battery mode	10mins	--	--	Up to 125% load. Warning signal alarm sounds (output overload). UPS shut down after 1 minute. No damage, no hazard.
5	Output	O-L	Battery mode	60s	--	--	Up to 130% load. Warning signal alarm sounds (output overload). UPS shut down after 10 seconds. No damage, no hazard.
6	Output	O-L	Battery mode	10s	--	--	Above 130% load. Warning signal alarm sounds (output overload). UPS shut down immediately. No damage, no hazard.

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Clause	Requirement + Test				Result - Remark		Verdict
7	Output	S-C	264Va.c.	1s	--	--	UPS output shut down immediately. Warning signal alarm sounds (load power off). Recoverable after fault removed. No damage. No hazards.
8	Output	S-C	Battery mode	1s	--	--	UPS output shut down immediately. Warning signal alarm sounds (load power off). Recoverable after fault removed. No damage. No hazards.
9	C34 after transformer TX1	Overload	264Va.c.	2hours48 mins	--	--	The unit operate normally until temperature state. No damage, no hazard. Max. temperatures measured: TX1 coil: 46.3°C, TX1 core: 45.5; Button surface: 29.4°C; Metal enclosure: 30.2°C; Ambient: 25.0°C.
10	C34 after transformer TX1	O-L	Battery mode	30mins	--	--	The unit operate normally until temperature state. No damage, no hazard. Max. temperatures measured: TX1 coil: 42.7°C, TX1 core: 42.1; Button surface: 27.4°C; Metal enclosure: 28.8°C; Ambient: 25.0°C.
11	Ventilation opening	Covering	264Va.c.	1hours18 mins	--	--	The unit operate normally, after 15 mins, the unit warning signal alarm sounds (fault) and then shut down after 15 mins. No damage, no hazard. Max. temperatures measured: TX1 coil: 36.3°C, TX1 core: 35.5; Button surface: 26.4°C; Metal enclosure: 28.2°C; Ambient: 25.0°C.
12	Ventilation opening	Covering	Battery mode	10mins	--	--	The battery discharged until the unit shutdown, after 15 mins, no damage, no hazard.

IEC 62040-1 - ATTACHMENT							
Clause	Requirement + Test				Result - Remark		Verdict
13	DC fan	Blocked	264Va.c.	10mins	--	--	The equipment warning signal alarm sounds (fault) and then shut down after 2 mins, no damage, no hazard.
14	DC fan	Blocked	Battery mode	10mins	--	--	The equipment warning signal alarm sounds (fault) and then shut down after 2 mins, no damage, no hazard.
15	Q5 pin 1 to pin 2	S-C	264Va.c.	10mins	--	--	The unit shut down immediately, no hazard.
16	Q5 pin 1 to pin 3	S-C	264Va.c.	10mins	--	--	The unit shut down immediately, no hazard.
17	Q5 pin 2 to pin 3	S-C	264Va.c.	10mins	--	--	The unit shut down immediately, no hazard.
18	Q5 pin 1 to pin 2	S-C	Battery mode	10mins	--	--	The unit shut down immediately, no hazard.
19	Q5 pin 1 to pin 3	S-C	Battery mode	10mins	--	--	The unit shut down immediately, no hazard.
20	Q5 pin 2 to pin 3	S-C	Battery mode	10mins	--	--	The unit shut down immediately, no hazard.
21	U6 pin3 to pin4	S-C	264Va.c.	10mins	--	--	The unit shut down immediately, no hazard.
22	U6 pin1 to pin2	S-C	264Va.c.	10mins	--	--	The unit shut down immediately, no hazard.
23	U6 pin1	O-C	264Va.c.	10mins	--	--	The unit shut down immediately, no hazard.
24	U6 pin3	O-C	264Va.c.	10mins	--	--	The unit shut down immediately, no hazard.
Supplementary information: S-C: short circuit, O-C: open circuit, O-L: over load							

4.3.101, 5.2.3.102	TABLE: Electrical Data (in normal conditions)	P

fuse #	I rated (A)	U (V)	P (W)	I (A)	I fuse (A)	condition/status
--	--	198V/50Hz	1078	5.66	--	Normal operation with maximum load condition, the internal batteries is full discharged.
	--	198V/60Hz	1079	5.67	--	
	5.4	220V/50Hz	1093	5.00	--	
	5.4	220V/60Hz	1094	5.01	--	
	5.0	230V/50Hz	1087	4.79	--	
	5.0	230V/60Hz	1087	4.79	--	

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	4.8	240V/50Hz	1079	4.55	--	
	4.8	240V/60Hz	1079	4.55	--	
	--	264V/50Hz	1078	4.16	--	
	--	264V/60Hz	1078	4.17	--	
Supplementary information: Tested with model NTCS3INT101-RTY						

4.4.4.3.3 /RD	TABLE: Touch current measurement	P

Measured between:	Measured (mA)	Limit (mA)	Comments/conditions
Plastic enclosure with foil and earthing	0.005 / 0.005	0.25	Switch ‘e’ closed
Metal enclosure and earthing	0.722 / 0.723	3.5	Switch ‘e’ opened
RS232 port and earthing	0.384/ 0.384	0.25	Switch ‘e’ closed
RJ45 port and earthing	0.384/ 0.384	0.25	Switch ‘e’ closed
USB port and earthing	0.384/ 0.384	0.25	Switch ‘e’ closed
Supplementary information:			

4.4.7/RD	TABLE: Transformers	P

Loc.	Tested insulation	Working voltage peak / V	Working voltage rms / V	Required electric strength	Required clearance / mm	Required creepage distance / mm	Required distance thr. insul.
Transformer TX1 primary to secondary	Reinforce insulation	420	250	3000Va.c.	3.0	5.0	--
Transformer TX1 primary to core	Basic/ Supplementary insulation	420	250	1500Va.c.	1.5	2.5	--
Transformer TX1 secondary to core	Basic/ Supplementary insulation	420	250	1500Va.c.	1.5	2.5	--

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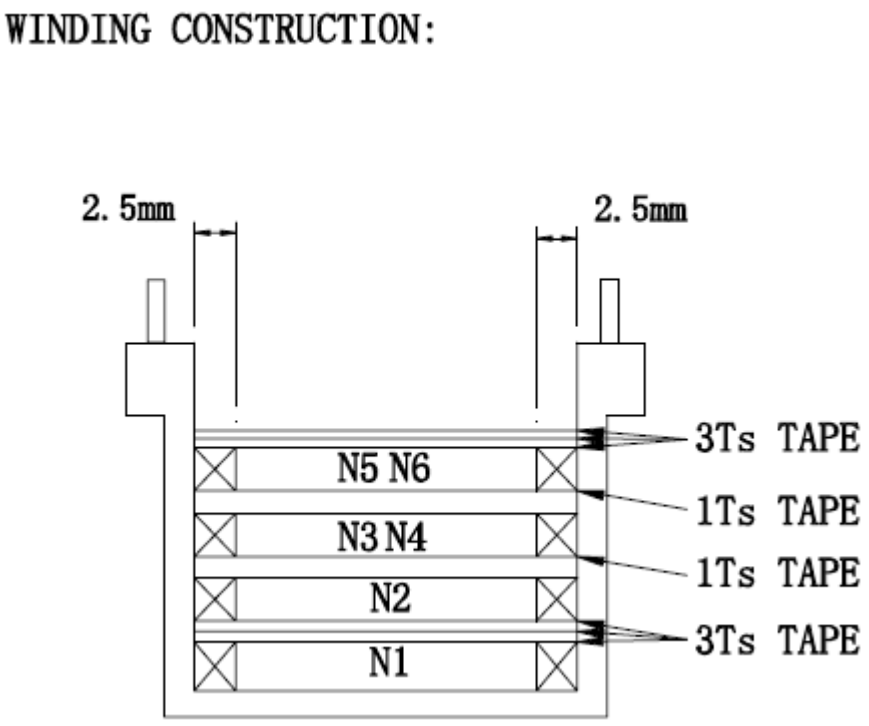
Loc.	Tested insulation	Test voltage/ V	Measured clearance / mm	Measured creepage dist./ mm	Measured distance thr. insul. / mm; number of layers
Transformer TX1 primary to secondary	Reinforce insulation	3000Va.c	10.4	10.4	--
Transformer TX1 primary to core	Basic/ Supplementary insulation	1500Va.c.	5.2	5.2	--
Transformer TX1 secondary to core	Basic/ Supplementary insulation	1500Va.c.	5.2	5.2	--
Supplementary information:					

4.4.7/RD	TABLE: Transformers	P

Transformer: Transformer TX1 on control board
Construction / winding diagram:



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4.4.7.2/RD	TABLE: Working Voltage Measurement	P

Location	RMS voltage (V)	Peak voltage (V)	Comments
TX1 pin1 to pin5	7.6	16.7	--
TX1 pin1 to pin6	4.6	8.8	--
TX1 pin1 to pin7	8.6	20.5	--
TX1 pin1 to pin8	7.5	20.5	--
TX1 pin1 to pin9	4.8	14.9	--
TX1 pin1 to pin10	7.4	17.5	--
TX1 pin2 to pin5	6.8	15.2	--
TX1 pin2 to pin6	5.7	10.2	--
TX1 pin2 to pin7	7.5	18.6	--
TX1 pin2 to pin8	6.1	17.9	--
TX1 pin2 to pin9	5.4	15.1	--
TX1 pin2 to pin10	7.1	16.3	--
TX1 pin3 to pin5	6.5	16.1	--
TX1 pin3 to pin6	5.2	11.3	--
TX1 pin3 to pin7	6.8	17.9	--
TX1 pin3 to pin8	6.2	17.1	--
TX1 pin3 to pin9	5.1	14.9	--
TX1 pin3 to pin10	6.8	15.7	--
TX1 pin4 to pin5	6.7	16.5	--
TX1 pin4 to pin6	5.3	11.5	--
TX1 pin4 to pin7	6.9	17.8	--
TX1 pin4 to pin8	6.3	17.4	--
TX1 pin4 to pin9	5.3	15.1	--
TX1 pin4 to pin10	6.5	15.3	--
U6(U7, U8, U9, U10) pin1 to pin3	7.8	12.8	--
U6(U7, U8, U9, U10) pin1 to pin4	7.6	13.4	--
U6(U7, U8, U9, U10) pin2 to pin3	7.6	12.7	--
U6(U7, U8, U9, U10) pin2 to pin4	7.5	12.6	--

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Clause	Requirement + Test	Result - Remark	Verdict

4.4.7.4/RD to 4.4.7.5/RD	TABLE: Clearance and Creepage Distance Measurements					P
clearance cl and creepage distance dcr at/of:	**Up (V)**	**U r.m.s. (V)**	**Required cl (mm)**	**cl (mm)**	**required dcr (mm)**	**dcr (mm)**
Two poles of fuse F3 (FI)	420	250	1.5	5.8	2.5	5.8
L pole and N pole of IN on filter board (FI)	420	250	1.5	3.7	2.5	3.7
L pole and N pole of out on filter board (FI)	420	250	1.5	2.6	2.5	2.6
N pole and PE pole of AC outlet (FI)	420	250	1.5	3.9	2.5	4.8
Two pins of Y-capacitor C2 (BI)	420	250	1.5	2.6	2.5	2.6
Transformer TX1 primary to secondary on the PCB trace (RI)	420	250	3.0	10.4	5.0	10.4
Transformer TX1 primary to secondary (RI)	420	250	3.0	7.4	5.0	8.9
Transformer TX1 primary to core (BI)	420	250	1.5	3.5	2.5	4.2
Transformer TX1 secondary to core (BI)	420	250	1.5	3.9	2.5	4.7
U6(U7, U8, U9, U10) primary to secondary	420	250	3.0	7.0	5.0	7.0
Supplementary information: FI=Functional insulation, BI=Basic insulation, RI=Reinforced insulation. Unless otherwise specified, the worst conditions of Cl. & Cr. In above mentioned locations have been considered and listed.						

4.4.7.8.2 /RD	TABLE: Ball Pressure Test of Thermoplastics			P
Allowed impression diameter (mm) .....:		2		—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)	
AC connector CN4, CN5, J2	See table List of critical components	125	1.2	
Supplementary information:				

4.4.7.8.2 /RD	TABLE: Resistance to heat and fire - Glow wire tests		N/A
Object/	**Manufacturer**	**Glow wire test (GWT); (°C)**	**Verdict**

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Clause	Requirement + Test	Result - Remark	Verdict

Part No./ Material	/ trademark	550	650		750		850	
			te	ti	te	ti		
--	--	--	--	--	--	--	--	--

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 [($t_e - t_i$) ≤ 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.	

4.4.7.8.3.2 /RD to 4.4.7.9/RD	TABLE: Distance Through Insulation Measurements	P

Distance through insulation di at/of:	U r.m.s. (V)	Test voltage (V)	Required di (mm)	di (mm)
Heat-shrinkable tubing around the secondary wire	250	AC 3000	0.4	Min. 0.4
LCD panel	250	AC 3000	0.4	Min. 0.4
Supplementary information:				

4.4.7.10 /RD, 5.2.3/RD	TABLE: electric strength measurements, impulse voltage test and partial discharge test	P

test voltage applied between:	test voltage (V)	impulse withstand voltage (V)	partial discharge extinction voltage (V)	Breakdown / flashover (Yes/No)
Primary to accessible plastic enclosure with foil	DC 4240	4000	--	No
Input/output to earth	DC 2120	2500	--	No
Input/output to RS232 port	DC 4240	4000	--	No
Input/output to USB port	DC 4240	4000	--	No

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Battery +/- to earth	DC 2120	2500	--	No
Supplementary information:				

4.4.9/RD	TABLE: Capacitor discharge			P
Condition	**τ calculated (s)**	**τ measured (s)**	**t u→ 0V (s)**	**Comments**
Input L to N	--	0.7	3.18	Vi=__376__Vp, 37% of Vi=__139__Vp, no load applied
Input L to PE	--	0	0	Vi=__0__Vp, 37% of Vi=__0__Vp, no load applied
Input N to PE	--	0	0	Vi=__0__Vp, 37% of Vi=__0__Vp, no load applied
Output L to N	--	0.7	3.18	Vi=__376__Vp, 37% of Vi=__139__Vp, no load applied
Output L to PE	--	0	0	Vi=__0__Vp, 37% of Vi=__0__Vp, no load applied
Output N to PE	--	0	0	Vi=__0__Vp, 37% of Vi=__0__Vp, no load applied
Supplementary information:				

4.6.3/RD	TABLE: Resistance to fire				P
Part	**Manufacturer of material**	**Type of material**	**Thickness (mm)**	**Flammability class**	**Evidence**
Material of LCD panel	See table List of critical components	See table List of critical components	See table List of critical components	5VA or better	UL
Plastic material of enclosure	See table List of critical components	See table List of critical components	See table List of critical components	5VA or better	UL
Supplementary information:					

4.6.3.3.3 /RD	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**					

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Clause	Requirement + Test	Result - Remark	Verdict

4.6.4/RD	TABLE: Heating Test		P
	Test voltage (V) .....:	See below	—
	Ambient (°C) .....:	See below	—

Thermocouple Locations	Max. temperature measured, (°C)				Max. temperature limit, (°C)
Test condition:	a	b	c	--	--
For UPS					
AC inlet	43.1	41.6	--	--	70
L wire(input)	43.0	41.6	--	--	105
PE wire input)	42.2	41.1	--	--	105
L wire(output)	42.8	42.0	--	--	105
C2 body	42.4	41.4	--	--	110
MOV2 body	42.3	41.3	--	--	85
C4 body	43.2	41.8	--	--	125
L1 body	55.8	48.6	--	--	130
C1 body	44.0	42.4	--	--	110
C106 body	42.5	41.1	--	--	125
CN4 body	52.9	49.9	--	--	--
PCB near NTC2	106.4	112.4	--	--	130
C50 body	43.5	42.5	--	--	125
RY3 body	45.3	44.9	43.2	--	85
CT3 coil	45.0	42.8	42.9	--	155
CT3 bobbin	44.8	42.7	42.7	--	150
CT3 core	45.9	44.5	43.8	--	155
L10 coil	45.1	44.6	43.0	--	180
C86 body	43.8	42.2	41.7	--	125
CN5 body	43.6	42.9	41.5	--	--
C87 body	43.1	41.9	41.0	--	125
L1 coil	119.4	85.6	117.3	--	180
L2 coil	88.7	98.4	86.6	--	180
T2 coil	54.5	52.3	52.4	--	130
T2 core	57.4	53.6	55.3	--	130
T2 bobbin	58.3	54.5	56.2	--	150

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Clause	Requirement + Test		Result - Remark		Verdict
C23 body	47.8	43.2	45.7	--	110
C34 body	45.8	44.6	43.7	--	125
R141 body	50.0	103.8	47.9	--	415
TX1 coil	47.3	58.2	45.2	--	130
TX1 core	46.5	66.5	44.4	--	130
TX1 bobbin	46.9	56.4	44.8	--	150
CD1 body	81.0	73.6	78.9	--	150
Q5 body	81.5	76.7	79.4	--	175
Q14 body	81.5	87.4	79.4	--	175
C62 body	43.0	41.7	40.9	--	125
TX2 coil	52.8	51.9	50.7	--	130
TX2 core	55.1	53.8	53.0	--	130
TX2 bobbin	54.6	53.5	52.5	--	150
HS1	68.2	75.0	66.1	--	--
For control board					
TX1 coil	47.0	47.0	46.5	--	90
TX1 core	46.8	46.9	46.3	--	90
TX1 bobbin	46.4	46.4	46.1	--	90
U6 body	47.5	47.5	47.1	--	100
Battery wire	44.5	54.8	61.1	--	105
Inside plastic enclosure	41.6	41.6	42.1	--	60
Battery surface	43.2	44.1	48.1	--	60
Accessible parts, shift to 25°C					
Metal enclosure	27.5	27.1	26.9	--	65
Outside plastic enclosure	26.0	26.3	26.0	--	85
Button surface	25.9	28.9	26.1	--	85
LCD panel	26.2	27.3	26.5	--	85
Ambient	25.0	25.0	40.0	--	--
For PDU					
L wire(input)	43.6	40.9	--	--	105
PE wire(input)	43.7	41.9	--	--	105
L wire(output)	44.0	41.9	42.5	--	105
AC inlet	44.9	42.1	--	--	70
AC outlet	44.0	42.4	43.7	--	70
Metal enclosure	26.3	27.0	26.5	--	65
Ambient	40.0	40.0	40.0	--	--

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Supplementary information:
a. Recharge mode, I/P: 198V/50Hz, O/P: with rating load until battery is full and temperature stable.
b. Recharge mode, I/P: 264V/50Hz, O/P: with rating load until battery is full and temperature stable.
c. Discharge mode with rating load until unit shutdown.

4.6.4/RD	TABLE: Heating test, resistance method					N/A
	Test voltage (V) ..... :		--			—
	Ambient, t_1 (°C) ..... :		--			—
	Ambient, t_2 (°C) ..... :		--			—
Temperature rise of winding	R_1 (Ω)	R_2 (Ω)	ΔT (K)	Max. dT (K)	Insulation class	
--	--	--	--	--	--	
Supplementary information:						

4.6.5/RD	TABLE: Limited power sources						P
Components	Test condition (Single fault)	Uoc (V)	Isc (A)		VA		
			Meas.	Limit	Meas.	Limit	
USB port	C34 SC	0*	0*	8	0*	100	
RS232 port	C34 SC	0*	0*	8	0*	100	
RJ45 port	C34 SC	0*	0*	8	0*	100	
Supplementary information: * indicated the equipment shutdown immediately.							

4.8.102, 5.2.3.101	TABLE: Backfeed protection			P
Condition	Voltage measured (V)			Comments
	L-N	L-PE	N-PE	
No load	0.14V	13V	13V	Battery mode, Normal
Full load	0.14V	16.7V	16.7V	Battery mode, Normal
Load-induced change	0.14V	16.3V	16.3V	Battery mode, Normal
Full load	0.14V	16.7V	16.7V	Battery mode, Abnormal condition (__Q5 c-e_ short circuit)

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No load	0.14V	13V	13V	Battery mode, Abnormal condition (__Q5 c-e__ short circuit)
Load-induced change	0.14V	13V	13V	Battery mode, Abnormal condition (__Q5 c-e__ short circuit)
Supplementary information:				

4.12.1/RD, 5.2.2.4.3 /RD	TABLE: Impact Resistance	P

Impacts per surface	Surface tested	Impact energy (Nm)	Comments
Front	Front	6.4	No damage, no hazard
Top	Top	6.4	No damage, no hazard
Bottom	Bottom	6.4	No damage, no hazard
Side	Side	6.4	No damage, no hazard
Rear	Rear	6.4	No damage, no hazard
Supplementary information:			

Annex CC	TABLE: Ventilation of lead-acid battery compartments	P

The required dimension for the ventilation openings will be calculated with the following formula:

$A \geq Q/360$ [m²]

with $Q = 0.054 * n * I * C$

where:
Q : airflow in m^3/h
n : number of battery cells
I : constant factor (0,2A/100Ah for valve regulated lead acid batteries)
C : is the battery nominal capacity in Ah at the 10h discharge rate

With the specific data for the UPS the following dimension for the ventilation openings is required:

n : 24 (6 cells per battery, 2 batteries in series)
C : 9Ah

$A \geq (0.054 * n * 0.2\ A/100\ Ah * C)/360$

$A \geq 0.8 \times 10^{-6}$ m² for all models

Verdict

The size of ventilation openings in battery cabinet exceeds the required airflow by far (as well as the UPS).

Supplementary information:

The area of the openings is 3.168×10^{-3} m²

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	TABLE: list of critical components				P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity
Whole unit					
Internal Battery	Shenzhen KSTAR Science And Technology Co., Ltd.	6-FM-9	12Vdc/9Ah	UL 1989	UL MH45005
(Alternative)	Shenzhen KSTAR Science And Technology Co., Ltd.	6-FM-7	12Vdc/7Ah	UL 1989	UL MH45005
(Alternative)	CSB ENERGY TECHNOLOGY CO.,LTD.	UPS 12460 F2FR	12Vdc/9Ah	UL 1989	UL MH14533
(Alternative)	CSB ENERGY TECHNOLOGY CO.,LTD.	UPS 123607 F2FR	12Vdc/7Ah	UL 1989	UL MH14533
(Alternative)	SHENZHEN CENTER POWER TECHNOLOGY CO.,LTD.	CP1290A	12Vdc, 9Ah	UL 1989	UL MH25860
(Alternative)	SHENZHEN CENTER POWER TECHNOLOGY CO.,LTD.	CP1270A	12Vdc, 7Ah	UL 1989	UL MH25860
(Alternative)	SHENZHEN CENTER POWER TECH.CO.,LTD.	HPS12-36W	12Vdc, 9Ah	UL 1989	UL MH25860
(Alternative)	B&B BATTERY (USA) INC	SHR10-12	12Vdc, 9Ah	UL 1989	UL MH19884
(Alternative)	B&B BATTERY (USA) INC	HR1234W	12Vdc, 9Ah	UL 1989	UL MH19884
(Alternative)	B&B BATTERY (USA) INC	SHR17-12FR	12V, 8.5Ah	UL 1989	UL MH19884
(Alternative)	LEOCH BATTERY SHENZHEN CORP	LP12-9.0SL	12Vdc, 9Ah	UL 1989	UL MH26866
(Alternative)	LEOCH BATTERY SHENZHEN CORP	LPX12-9.0	12Vdc, 8.6Ah	UL 1989	UL MH26866

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(Alternative)	CSB Energy Technology Co Ltd	HR 1234W FR@	12Vdc, 8.5Ah	UL 1989	UL MH14533
Battery connector	SHENZHEN GRID POWER CONNECTORS CO.,LTD.	SBS50	600V, 50A	UL 1977	UL E357218
(Alternative)	SHENZHEN GRID POWER CONNECTORS CO.,LTD.	SB50	600V, 50A	UL 1977	UL E357218
(Alternative)	SHENZHEN GRID POWER CONNECTORS CO.,LTD.	PS70AFP	600V, 70A	UL 1977	UL E357218
(Alternative)	Dongguan nabaichuan ELECTRONIC TECH.CO.,LTD	SA30	600V, 50A	UL 1977	UL E319259
(Alternative)	Dongguan nabaichuan ELECTRONIC TECH.CO.,LTD	SAS50	600V, 75A	UL 1977	UL E319259
Enclosure	Various	Hot Galvanized Steel	Thickness min. 0.8mm	EN 62040-1	Tested with appliance
Front panel	LG Chemical Ltd	AF-310, AF-310HT, AF312C	94V-0, 80℃, Thickness min. 2.5mm	UL 94 IEC 60950 IEC 60707	UL E67171
Breaker	KUOYUH DongGuan Enterprise Co., ltd.	88 series	8A, 250Vac	EN 60934	VDE 40036160
(Alternative)	ZheJiang BSB Electrical Appliances Co.,Ltd.	BC5-25 Series	8A, 250Vac	EN 60934	TUV R50406012
(Alternative)	Dongguan Dan Luo Electric Co.,Ltd.	L2 series	8A, 250Vac	EN 60934	TUV R50046704
(Alternative)	RONG FENG INDUSTRIAL CO., LTD.	RFMB-083	8A, 250Vac	EN 60934:2001+A1:2007+A2:2013	TUV B041047124004
DC Fan	HE YUAN YONG JIA ELECTRONIC CO., LTD.	AB8025V12	12Vdc, 0.5A 4500RPM	IEC 60950-1	TUV 642102002778 01
(Alternative)	Shenzhen	DA08025B	12Vdc, 0.5A	IEC 62368-1	TUV

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	Huaxia Hengtai Electronic Co.,Ltd.	12XH	4500RPM		R50490586
(Alternative)	SHENZHEN YCCFAN TECHNOLOGY CO LTD.	YDD8025B 12G	12Vdc, 0.5A 4500RPM	IEC 62368-1	TUV R50486168
AC inlet	Rong Feng Industrial Co., Ltd.	SS-120	10A, 250Vac, 70°C	IEC/EN 60320-1	VDE 40028101
(Alternative)	Shenzhen HuaXingHui Electronics Technology CO.,Ltd.	SS-120	10A, 250Vac, 70°C	IEC/EN 60320-1	TUV B097227 0006
(Alternative)	Dongguan Nanke Industrial Investment Co., Ltd.	SS-120	10A, 250Vac, 70°C	IEC/EN 60320-1	ECM: 0P230420.DNI UD21
Socket Outlet	Huaxinghui Electronics Technology Co., Ltd.	HP-F4	10A, 250Vac, 70°C	IEC/EN 60320-1	ENEC: U6 097227 002
(Alternative)	Dongguan Nanke Industrial Investment Co., Ltd.	XD-108	10A, 250Vac, 70°C	IEC/EN 60320-1	ECM Mark No. 0P230420.DNI UD21
Internal input wire and output wire	Dongguan Yonghao Electrical Industry Co., Ltd.	1015	600V, 18AWG, 105ºC, VW-1	UL 758 IEC 60227	UL E240426 VDE 40027125
Internal input wire and output wire	Interchangeable	Interchangeable	18AWG RoHS 105℃, VW-1 Yellow green	UL 758	UL
Internal wire(DC line)	Interchangeable	Interchangeable	10AWG RoHS 105℃, VW-1 Red	UL 758	UL
Internal wire(DC line)	Interchangeable	Interchangeable	10AWG RoHS 105℃, VW-1 Black	UL 758	UL
Battery Fuse	Shenzhen Stand Electronics CO.,LTD.	6C	T30AH, 250Vac	IEC/EN 60127-1 IEC/EN 60127-3	TUV 50136250
(Alternative)	LITTELFUSE INC	6C	T30AH, 250Vac	IEC/EN 60127-1 IEC/EN 60127-3	TUV T5026910801

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Clause	Requirement + Test	Result - Remark	Verdict

(Alternative) (For 1K 24V)	Dongguan CHEYENELECTRONICCOLTD	ab19u030	30A,32Vdc	UL 248	UL E360382
(Alternative) (For 1K 36V)	Dongguan CHEYENELECTRONICCOLTD	ab19u030	30A,58Vdc	UL 248	UL E360382
(Alternative)	LITTELFUSE INC	314/324 Series	30A,250Vac	UL248-14	UL E10480
(Alternative)	ADVANCED SURGETECH MATERIALS	MV630 Series	30A,250Vac	UL248-14	UL E355868
(Alternative)	Shenzhen Stand Electronics CO.,LTD.	6C	30A,250Vac	UL248-14	UL E166522
(Alternative)	ADVANCED SURGETECH MATERIALS	HV660 Series	30A, 250Vac	UL248-14	UL E355868
(Alternative)	LITTELFUSE INC	505 series	30A, 250Vac	UL248-14	UL E10480
(Alternative)	VICFUSR	VF505/VF505-P Series	30A, 250Vac	UL248-14	UL E357828
(Alternative)	WOGE PRECISION ELECTRONICAL CO.,LTD.	AB20030	30A, 58Vdc	IEC 60127	UL E360382
Heat-Shrinkable tube	DONGGUAN SALIPT TECHNOLOGY CO.,LTD.	S-901-600	VW-1, 600V, 125℃	UL 224	UL E209436
Input Filter Board					
X- Capacitor (C1)	FARAD ELECTRONICS CO., LTD.	PXK	X2(2.2uF, 275Vac, 110 ºC	IEC/EN 60384-14	VDE 40014111
(Alternative)	SHENZHEN JINGHAO CAPACITORS CO.,LTD.	PXK	X2(2.2uF, 275Vac, 110 ºC	IEC/EN 60384-14	VDE 40018690
(Alternative)	Songtian Electronics (STE) Co.,LTD.	PXK	X2(2.2uF, 275Vac, 110 ºC	IEC/EN 60384-14	VDE 40034679
(Alternative)	SHENZHEN HONGSHUNYUAN CAPACITORS CO., LTD.	PXK	X2(2.2uF, 275Vac, 110 ºC	IEC/EN 60384-14	VDE 40044173

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Y- Capacitor (C2, C3)	Shantou High-New Technology	CD	Y2,(4700pF, 250Vac, 125 ºC）	IEC/EN 60384-14	VDE 40025754
Y- Capacitor (C2,C3)	FARAD ELECTRONICS CO., LTD.	CT7	472M, 250Vac	EN 60384-14	VDE 40025754
(Alternative)	Songtian Electronics (STE) Co., LTD.	CD	Y2,(4700pF, 250Vac, 125 ºC）	IEC/EN 60384-14	VDE 40025748
(Alternative)	Shenzhen Tongyong Xing Industrial Co., Ltd.	CD	Y2,(4700pF, 250Vac, 125 ºC）	IEC/EN 60384-14	TUV R50232060
Inductor (L2)	Interchangeable	Interchangeable	1.6mH, Class B, 130℃	----	Tested with appliance
PCB	Interchangeable	Interchangeable	V-0 130°C	UL 796 CAN/CSAC22.2 No. 0.17	UL
Main Board					
Output Relay (RY3)	Song Chuan Precision Co., Ltd.	801H-1A-C	Coil: 12Vdc, 10A/250Vac, 85ºC	EN 61810-1	VDE 50056914
(Alternative)	GOLDEN Co., Ltd.	GH-1C-12L	12Vdc 10A/250Vac	EN 61810-1	TUV R50158866 VDE 40045697
(Alternative)	Xiamen Hongfa Electroacoustic Co.,Ltd.	HF3FF/012 1ZSTF	Coil: 12Vdc 10A/250Vac，105℃	EN 61810-1	TUV R50148356
(Alternative)	ZETTLER RELAY（XIAMEN） CO.,LTD.	AZ943–1CH– 12D	Coil: 12Vdc 10A/250Vac，85℃	EN 61810-1	UL E43203 TUV R50161256
(Alternative)	Song Chuan Precision Co., Ltd.	833H-1C-C 12VDC	Coil: 12Vdc, 10A/277Vac, 70 ºC	EN 61810-1	UL E88991 TUV R3-09754206
(Alternative)	GOLDEN Co., Ltd.	GJ-1C-12L	Coil: 12Vdc 10A/250Vac，85℃	EN 61810-1	UL E321783 TUV R50158866
(Alternative)	Xiamen Hongfa Electroacoustic Co.,Ltd.	HF152/012-1ZST	Coil: 12Vdc 16A/250Vac，85℃	EN 61810-1	TUV R50148356

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Clause	Requirement + Test	Result - Remark	Verdict

Input Relay (RY1)	Song Chuan Precision Co., Ltd.	SCL-1-H	Coil: 12Vdc, 10A/250Vac, 85ºC	EN 61810-1	VDE 50056914
(Alternative)	Yuandaohe Co., Ltd.	BRD-SS-112L	Coil: 12Vdc, 12A/250Vac, 70ºC	EN 61810-1	TUV R5018395
(Alternative)	ZETTLER RELAY（XIAMEN）CO.,LTD.	AZ743–2A–12DE	Coil: 12Vdc 10A/250Vac，100℃，air gap 2.0mm	EN 61810-1	UL E44211 VDE 40006031
(Alternative)	ZETTLER RELAY（XIAMEN）CO.,LTD.	AZ7339W-2AE-12D(200)	Coil: 12Vdc 12A/277Vac，85℃，air gap 2.0mm	EN 61810-1	UL E44211 VDE 40006031
(Alternative)	ZETTLER RELAY（XIAMEN）CO.,LTD	AZ7339WT-2AE-12D(200)	Coil: 12Vdc 16A/277Vac，85℃，air gap 2.0mm	EN 61810-1	UL E44211 VDE 40006031
(Alternative)	ZETTLER RELAY（XIAMEN）CO.,LTD.	AZ762–2A–12DE	Coil: 12Vdc 16A/250Vac，100℃，air gap 2.0mm	EN 61810-1	UL E44211 VDE 40006031
(Alternative)	Song Chuan Precision Co., Ltd.	894H-2AH2-F-C	Coil: 12Vdc, 12A/250Vac, 70 ºC，air gap 2.0mm	EN 61810-1	UL E88991 TUV R50008226
(Alternative)	Xiamen Hongfa Electroacoustic Co.,Ltd.	HF140FF/0122HSWTF	Coil: 12Vdc, 12A/250Vac, 85 ºC，air gap 2.0mm	EN 61810-1	UL E134517 TUV R50149131
(Alternative)	Xiamen Hongfa Electroacoustic Co.,Ltd.	HF140FF-G/0122HSWTF	Coil: 12Vdc, 16A/250Vac, 85 ºC，air gap 2.0mm	EN 61810-1	UL E134517 TUV R50149131
(Alternative)	CHUROD ELECTRONICS	CHI05-S-212H1A2-10A	Coil: 12Vdc, 10A/250Vac, 85 ºC，air gap 2.0mm	EN 61810-1	UL E341422 TUV R50512829
(Alternative)	GOLDEN Co., Ltd.	GAN-2A-12DHG2CF	Coil: 12Vdc 12A/250Vac，	EN 61810-1	ULE321783 TUV

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Clause	Requirement + Test	Result - Remark	Verdict

			85℃		R50293943
(Alternative)	GOLDEN Co., Ltd.	GAN-2A-12DMG2CF	Coil: 12Vdc 16A/250Vac，85℃	EN 61810-1	ULE321783 TUV R50293943
Transformer (T2)	Shenzhen Click Technology Co., Ltd.	BCK2801-1534	390uH, 130 ºC	IEC 62040-1	Tested with appliance
(Alternative)	Shenzhen jingquan hua Technology Co., Ltd.	BCK2801-1534	Class B	IEC 62040-1	Tested with appliance
(Alternative)	Shenzhen jiepusi Technology Co., Ltd.	BCK2801-1534	Class B	IEC 62040-1	Tested with appliance
Transformer (T3)	Shenzhen Click Technology Co., Ltd.	BCK3901-589	4mH, 155 ºC	IEC 62040-1	Tested with appliance
(Alternative)	Shenzhen jingquan hua Technology Co., Ltd.	BCK3901-589	4mH, 155 ºC	IEC 62040-1	Tested with appliance
(Alternative)	Shenzhen jiepusi Technology Co., Ltd.	BCK3901-589	4mH, 155 ºC	IEC 62040-1	Tested with appliance
(Alternative)	Hu bei guan mei Technology Co., Ltd.	BCK3901-589	4mH, 155 ºC	IEC 62040-1	Tested with appliance
Transformer (TX2)	Shenzhen Click Technology Co., Ltd.	BCK2201-453	24uH, 130 ºC	IEC 62040-1	Tested with appliance
(Alternative)	Shenzhen jing quan hua Technology Co., Ltd.	BCK2201-453	24uH, 130 ºC	IEC 62040-1	Tested with appliance
(Alternative)	Shenzhen jiepusi Technology Co., Ltd.	BCK2201-453	24uH, 130 ºC	IEC 62040-1	Tested with appliance
Transformer（T4,T5,T7）	SHENZHEN CLICK TECHNOLOGY CO., LTD	EE1010	19mH, Class B, 130℃	IEC 62040-1	Tested with appliance
(Alternative)	SHENZHEN JING QUANH HUA TECHNOLOGY CO., LTD	EE1010	19mH, Class B, 130℃	IEC 62040-1	Tested with appliance

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Clause	Requirement + Test	Result - Remark	Verdict

(Alternative)	Shenzhen jiepusi Technology Co., Ltd.	EE1010	19mH, Class B, 130℃	IEC 62040-1	Tested with appliance
Transformer (CT3)	JISHENGYUAN Co., Ltd.	GKT2511	0.7H~1.4H, 130ºC	IEC 62040-1	Tested with appliance
(Alternative)	Shenzhen Click Technology Co., Ltd.	GKT2511	0.7H~1.4H, 130ºC	IEC 62040-1	Tested with appliance
Inductor (L1)	Interchangeable	Interchangeable	850uH, Class H, 180℃	IEC 62040-1	Tested with appliance
Inductor (L3)	Interchangeable	Interchangeable	325uH, Class H, 180℃	IEC 62040-1	Tested with appliance
Inductor (TX5)	Interchangeable	Interchangeable	39.4uH±10%, 180 ºC	IEC 62040-1	Tested with appliance
Inductor (L2)	Interchangeable	Interchangeable	2mH, Class H, 180℃	IEC 62040-1	Tested with appliance
Inductor (L4)	Interchangeable	Interchangeable	DR2W-10*16 220uH L	IEC 62040-1	Tested with appliance
Inductor (L10)	Interchangeable	Interchangeable	TR22*14*8 1.6mH Class H, 180℃	IEC 62040-1	Tested with appliance
Opto-coupler (U2, U3)	TOSHIBA	TLP781	Insulated voltage 5000Vrms, Dti>0.4mm	EN 60747-5-5	VDE 40021173
(Alternative)	COSMO ELECTRONICS CORP	K1010	Isolated voltage 5000Vac	UL1577 EN 60747-5-5	UL E169586 VDE 101347
(Alternative)	BaoDi HaoDong International Trade(Shenzhen) Co.,Ltd.	TLP781	Insulated voltage 5000Vrms, Dti>0.4mm	EN 60747-5-5	TUV 40021173
(Alternative)	Su zhou Everlight Co., Ltd	EL817S1	Isolated voltage 5000Vac	EN 60747-5-5	VDE 133249
(Alternative)	Su zhou Everlight Co., Ltd	EL816	Isolated voltage 5000Vac	EN 60747-5-5	VDE 133249
PCB	Interchangeable	Interchangeable	V-0, 130ºC	UL94	UL E340729
Control Board					
Transformer (TX1)	Shenzhen Click Technology Co., Ltd.	BCK1601-1128	0.1mH, 130 ºC	IEC 62040-1	Tested with appliance

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Clause	Requirement + Test	Result - Remark	Verdict

(Alternative)	Shenzhen JING QUAN HUA Technology Co., Ltd.	BCK1601-1128	0.1mH, 130 ºC	IEC 62040-1	Tested with appliance
(Alternative)	Shenzhen jiepusi Technology Co., Ltd.	BCK1601-1128	0.1mH, 130 ºC	BCK1601-1128	Tested with appliance
(Alternative)	Hu bei guan mei Technology Co., Ltd.	BCK1601-1128	0.1mH, 130 ºC	IEC 62040-1	Tested with appliance
-Bobbin	SUMITOMO BAKELITE CO., LTD.	PM9820	Phenolic, V-0, 150 ºC	UL 94, UL746C	UL E41429
-Magnet wire	PACIFIC ELECTRICAL WIRE&CABLE(SHEN ZHEN) CO., LTD.	MW75(UEWF/U)	130 ºC	UL 1446	UL E201757
-Insulation tape	JingJiang Yahua Pressure Senstive Glue Co., Ltd.	CT	130 ºC	UL 510A	UL E165111
-Margin tape	JingJiang Yahua Pressure Senstive Glue Co., Ltd.	WF	130 ºC	UL 510A	UL E165111
-Varnish	Hang Cheung Petrochemical Ltd	8562	130 ºC	UL 1446	UL E200154
Opto-coupler (U6, U7, U8, U9, U10)	TOSHIBA	TLP781	Insulated voltage 5000Vrms, Dti>0.4mm	EN 60747-5-5	VDE40021173
(Alternative)	COSMO ELECTRONICS CORP	K1010	Isolated voltage 5000Vac	EN 60747-5-5	VDE 101347
(Alternative)	Su zhou Everlight Co., Ltd	EL817S1	Isolated voltage 5000Vac	EN 60747-5-5	VDE 133249
PCB	Interchangeable	Interchangeable	V-0, 130°C	UL 796	UL
USB board					
Opto-coupler (U2, U3)	TOSHIBA	TLP781	Insulated voltage 5000Vrms, Dti>0.4mm	EN 60747-5-5	VDE 40021173

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Clause	Requirement + Test	Result - Remark	Verdict

Alternative)	COSMO ELECTRONICS CORP	K1010	Isolated voltage 5000Vac	UL1577 EN 60747-5-5	UL E169586 VDE 101347
(Alternative)	BaoDi HaoDong International Trade(Shenzhen) Co.,Ltd.	TLP781	Insulated voltage 5000Vrms, Dti>0.4mm	EN 60747-5-5	TUV 40021173
(Alternative)	Su zhou Everlight Co., Ltd.	EL817S1	Isolated voltage 5000Vac	EN 60747-5-5	VDE 133249
(Alternative)	Su zhou Everlight Co., Ltd.	EL816	Isolated voltage 5000Vac	EN 60747-5-5	VDE 133249
PCB	Interchangeable	Interchangeable	V-0, 130°C	UL 796	UL796
For external battery cabinet					
Internal Battery	Shenzhen KSTAR Science And Technology Co., Ltd.	6-FM-9	12Vdc/9Ah	UL 1989	UL MH45005
(Alternative)	Shenzhen KSTAR Science And Technology Co., Ltd.	6-FM-7	12Vdc/7Ah	UL 1989	UL MH45005
(Alternative)	CSB ENERGY TECHNOLOGY CO.,LTD.	UPS 12460 F2FR	12Vdc/9Ah	UL 1989	UL MH14533
(Alternative)	CSB ENERGY TECHNOLOGY CO.,LTD.	UPS 123607 F2FR	12Vdc/7Ah	UL 1989	UL MH14533
(Alternative)	CSB ENERGY TECHNOLOGY CO.,LTD.	12460 F2FR	12Vdc/9Ah	UL 1989	UL MH14533
(Alternative)	CSB ENERGY TECHNOLOGY CO.,LTD.	123607 F2FR	12Vdc/7Ah	UL 1989	UL MH14533

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Clause	Requirement + Test	Result - Remark	Verdict

(Alternative)	SHENZHEN CENTER POWER TECHNOLOGY CO.,LTD.	CP1290A	12Vdc, 9AH	UL 1989	UL MH25860
(Alternative)	SHENZHEN CENTER POWER TECHNOLOGY CO.,LTD.	CP1270A	12Vdc, 7AH	UL 1989	UL MH25860
(Alternative)	SHENZHEN LEOCH BATTERIES TECHNOLOGY CO., LTD.	LP12-9.0SL	12Vdc, 9AH	UL 1989	UL MH26866
(Alternative)	SHENZHEN LEOCH BATTERIES TECHNOLOGY CO., LTD.	LP12-7.0SL	12Vdc, 7AH	UL 1989	UL MH26866
Battery connector	SHENZHEN GRID POWER CONNECTORS CO,.LTD	SB50	600V, 50A	UL 1977	UL E357218
(Alternative)	SHENZHEN GRID POWER CONNECTORS CO,.LTD	SBS50	600V, 75A,	UL 1977	UL E357218
(Alternative)	SHENZHEN GRID POWER CONNECTORS CO,.LTD	PS70AFP	600V, 70A	UL 1977	UL E357218
(Alternative)	Dongguan nabaichuan ELECTRONIC TECH.CO.,LTD	SA30	600V, 50A	UL 1977	ULE319259
(Alternative)	Dongguan nabaichuan ELECTRONIC TECH.CO.,LTD	SAS50	600V, 75A	UL 1977	ULE319259

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Fuse (F1,F2)	XC Electronics(ShenZ h en)Corp.,Ltd.	6C/6H	30A,250Vac	UL248-14	UL E249609
(Alternative)	LITTELFUSE INC	314/324 Series	30A,250Vac	UL 248-14	UL E10480
(Alternative)	SUN ELECTRIC CO	6H	30A,250Vac	UL 248-1 UL248-14	UL E166522
(Alternative)	ADVANCED SURGETECH MATERIALS	MV630 Series	30A,250Vac	UL 248-14	UL E355868
(Alternative)	ADVANCED SURGETECH MATERIALS	HV660 Series	30A, 250Vac	UL 248-14	UL E355868
(Alternative)	LITTELFUSE INC	505 series	30A,250Vac	UL 248-14	UL E10480
(Alternative)	SHENZHEN VICTORS INDUSTRIAL CO LTD	VF505	30A, 500 Vdc	UL 248-1 UL248-14	UL E357828
(Alternative)	GUANGDONG CHnbel Co .LTD	632.500 series	30A, 500 Vdc	UL 248-1 UL248-14	UL E365879
(Alternative)	HOLLYAND Co .LTD	60NM(P)	30A, 250VAC	UL 248-1 UL248-14	UL E156471

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(Alternative)	Dongguan Reomax Electronics Technology Co .LTD	6.250 series	30A, 250VAC	UL 248-1 UL248-14	UL E340427
(Alternative)	XC Electronics（ShenZhen）Corp.,Ltd	6H	T30AH,250 Vac	IEC/EN 60127-1 IEC/EN 60127-3	TUV J 50531916
PCB	HUIZHOU TRUSTWIN ELECTRONICS DEVELOPMENT CO LTD	TW-6(ASP1)	V-0, 130ºC, 2.0/OZ T=1.6mm,75.9*28.8mm	UL 796	UL E340729
(Alternative)	Interchangeable	Interchangeable	V-0, 130ºC, 2.0/OZ T=1.6mm,75.9*28.8mm	UL 796	Test in the appliance
Internal wire	Interchangeable	1015	105℃, 600Vac,VW-1	UL 758	UL
Breaker	Zhengjiang CHNT ELECTRICAL CO., LTD.	NB1-63 1P	63A, 250VDC	IEC 60898-1 IEC 60898-2	TUV R50233613
(Alternative)	SHANGHAI LIANGXIN ELECTRICAL CO., LTD.	NDB2Z-63 1P	63A, 250VDC	IEC 60898-1 IEC 60898-2	TUV R50436891

Supplementary information:

1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

5	GENERAL NOTES ON TESTS		--
5.1	Tests according to this standard are type tests or routine tests	Type tests	P
5.2	Unless otherwise specified, the specimens are tests as delivered and under normal conditions of use		P
5.3	The tests are carried out in the order of the clauses		P
	Tested at an ambient temperature between 15℃ and 35℃		P
5.4	Three specimens are subjected to all the relevant tests		P
5.5	The specimens are submitted to all the relevant tests and the requirements are satisfied if all the tests are met	All samples and tests complied with relevant requirement	P
5.6	Routine tests are specified in annex A		P

6	RATINGS		--
6.1	Accessories should preferably be of a type and preferably have a voltage and current rating as shown in table 1	2P + ⏚ 250V, 16A	P
6.2	In a cord extension set, the rated current of the portable socket-outlet shall not be higher and the rated voltage shall not be less than that of the plug	No a cord extension set	N/A
6.3	Accessories should have a degree of protection IP20, IP40, IP44, IP54 or IP55	IP20	P

7	CLASSIFICATION		--
7.1	Accessories classification		--
7.1.1	-According to the degree of protection due to the ingress of solid foreign objects	IP20	P
7.1.2	-According to the degree of protection due to the ingress of water	IP20	P
7.1.3	-According to the provision for earthing	2P + ⏚	P
7.1.4	-According to the method of connecting the cable	Non-rewirable accessories	N/A
7.1.5	-According to the type of terminals		P
7.2	Socket-outlets classification		P
7.2.5	-According to the intended use		P
7.3	Plugs classification		--
	- Class 0, Class I, Class II		N/A

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8	MARKING		--
8.1	Rated current	16A	P
	Nature of supply		P
	Manufacturer's or responsible vendor's name, trademark or identification mark	VOLTRONIC POWER	P
	IP number	IP20	P
	The length of insulation		N/A
	The suitability to accept rigid conductor		N/A
	Replace the first dashed text : -rated current in amperes and /or power in watts		--
8.2	When symbols are used, they shall comply with requirements		P
8.3	For fixed socket-outlets the complying marking shall be placed on the main part		P
8.4	For plugs and portable socket-outlets the marking shall be easily discernible when the accessory is wired and assembled		N/A
	Class II shall be not be marked with the symbol for class II construction		N/A
8.5	- marking of terminals for the neutral conductor (N)		P
	- marking of protect earthing terminals		P
	- marking not placed on removable parts		P
8.6	IP number for surface-type mounting boxes forming an integral part of socket-outlets	IP20	N/A
8.7	Special precautions, in instruction sheet		N/A
8.8	Marking, durable and easily legible: 15 s water 15 s hexane		P

9	**CHECKING OF DIMENSIONS**		--
9.1	Accessories and boxes comply with Standard Sheet		P
9.2	No possible engage plug with different rated values or construction		P
9.3	Deviations from dimensions may be permitted		P

10	**PROTECTION AGAINST ELECTRIC SHOCK**		--
10.1	Socket-outlets shall be so designed and constructed that when they are mounted and wired as for normal use, live parts are not accessible, even after removal of parts which can be removed without the use of a tool.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Live parts of plugs shall not be accessible when the plug is in partial or complete engagement with a socket-outlet.		N/A
	Compliance is checked by inspection and, if necessary, by the following test. The test is made on the specimen mounted as for normal use and fitted with conductors of the smallest nominal cross-sectional area, the test being then repeated using conductors of the largest nominal cross-sectional area, specified in table 3.		N/A
	The standard test finger, test probe B of IEC 61032, is applied in every possible position, an electrical indicator with a voltage between 40 V and 50 V being used to show contact with the relevant parts.		N/A
	For plugs, the test finger is applied when the plug is in partial and complete engagement with a socket-outlet.		N/A
	For accessories where the use of thermoplastic or elastomeric material is likely to influence the requirements, one additional test is made but at an ambient temperature of (35 ± 2)°C, the accessories being at this temperature.		N/A
	During this additional test the accessories are subjected for 1 min to a force of 75 N, applied through the tip of a straight unjointed test finger, test probe 11 of IEC 61032. This finger with an electrical indicator as described above is applied to all places where yielding of insulating material could impair the safety of the accessory, but is not applied to membranes or the like and is applied to thin-walled knock-outs but with a force of 10 N.		N/A
	During this test, accessories, with their associated mounting means, shall not deform to such an extent that those dimensions shown in the relevant standard sheets which ensure safety are unduly altered and no live parts shall be accessible.		N/A
	Each specimen of plug or portable socket-outlet is then pressed between two flat surfaces with a force of 150 N for 5 min, as shown in figure 8. The specimen is checked 15 min after removal from the test apparatus, and shall not show such deformation as it would result in undue alteration of those dimensions shown in the relevant standard sheets which ensure safety.		N/A
10.2	Accessible parts, of insulating material		P
10.2.1	Covers or cover-plates protected by additional insulation by insulating linings or barriers adequately fixed and correctly designed	No such covers	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.2.2	Earthing of metal covers or cover-plates, made while fixing covers or cover plates Connection shall be of low resistance R < 0.05 Ω	No such covers	N/A
10.3	It shall not be possible to make contact between a pin of a plug and a live socketcontact of a socket-outlet while any other pin is accessible.		P
	Compliance is checked by manual test and by means of gauges based on the most unfavourable dimensions of the standard sheet, the tolerances of the gauges shall be as specified in table 2.		P
	For accessories with enclosures or bodies of thermoplastic material, the test is made at an ambient temperature of (35 ± 2) °C, both the accessory and the gauge being at this temperature.		N/A
	For socket-outlets with enclosures or bodies of rubber or polyvinyl chloride, the gauge is applied with a force of 75 N for 1 min.		N/A
	For fixed socket-outlets provided with metal covers or cover-plates, a clearance, between a pin and a socket-contact, of at least 2 mm is required, when another pin is or other pins are in contact with the metal covers or cover-plates.		P
10.4	External parts of plugs, with the exception of assembly screws and the like, currentcarrying and earthing pins, earthing straps and metal rings around pins and accessible metal parts fulfilling the requirements of 10.2, shall be of insulating material.		N/A
	The overall dimensions of rings, if any, around pins shall not exceed 8 mm concentric with respect to the pin.		N/A
10.5	Shuttered socket-outlets shall, in addition, be so constructed that live parts are not accessible without a plug in engagement, with the gauges shown in figures 9 and 10.	No Shuttered socket-outlets	P
	The gauges shall be applied to the entry holes corresponding to the live contacts only and shall not touch live parts.		P
	To ensure this degree of protection, socket-outlets shall be so constructed that live contacts are automatically screened when the plug is withdrawn.		P
	The means for achieving this shall be such that they cannot easily be operated by anything other than a plug and shall not depend upon parts which are liable to be lost.		P
	An electrical indicator with a voltage between 40 V and 50 V included is used to show contact with the relevant part.		P
	Compliance is checked by inspection and for socket-outlets with a plug completely withdrawn by applying the above gauges as follows.		P

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Clause	Requirement + Test	Result - Remark	Verdict

	For socket-outlets with enclosures or bodies of thermoplastic material, the test is made at an ambient temperature of (35 ± 2)°C, both the socket-outlets and the gauge being at this temperature.		P
10.6	Earthing contacts, if any, of a socket-outlet shall be so designed that they cannot be deformed by the insertion of a plug, to such an extent that safety is impaired.		P
10.7	Live parts not accessible for socket-outlet with increased protection (gauge fig. 4 - 1 N)	It could not touch live parts with the gauge	P

11	**PROVISION FOR EARTHING**		--
11.1	Earth connection, made before the current carrying contacts when inserting and broken after when withdrawing		P
11.2	- Earthing terminals: comply clause 12, same size as supply terminals. - External earthing terminal: suitable for 6 mm^2 . Earthing terminal: internal; - Earthing terminals fixed to the base; - Earthing contacts: fixed to the base or cover reliable connected to earthing terminal; contact pieces having protection to corrosion and abrasion - Earthing circuit: one piece or reliably connected		P
11.3	Accessible metal parts: permanently and reliably connected to earthing terminal		P
11.4	Socket-outlets, other than ordinary: internal earthing terminal for continuity of earthing circuit	IP20	N/A
11.5	Connection between earthing terminal: < 0,05Ω test current: [ ] 25 A or [ ] 1,5 In _____ A	0,02Ω	P

12	**TERMINALS**		--
12.1	General		P
12.1.1	Rewirable fixed socket-outlets shall be provided with screw-type terminals or with screwless terminals.		P
	Rewirable plugs and rewirable portable socket-outlets shall be provided with terminals with screw clamping.		N/A
	If pre-soldered flexible conductors are used, care shall be taken that in screw-type terminals the pre-soldered area shall be outside the clamp area when connected as for normal use.		N/A
	The means for clamping the conductors in the terminals shall not serve to fix any other component, although they may hold the terminals in place or prevent them from turning.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
12.1.2	Non-rewirable accessories shall be provided with soldered, welded, crimped or equally effective permanent connections (termination); screwed or snap-on connections shall not be used.		N/A
	Connections made by crimping a pre-soldered flexible conductor are not permitted, unless the soldered area is outside the crimping area		N/A
12.1.3	Compliance is checked by inspection and by the tests of 12.2 or 12.3, as applicable.		P
12.2	Terminals with screw clamping for external copper conductors:	No such terminals	N/A
12.2.1	Cross sect. areas: rigid: _____ to _____ mm^2 flexible: _____ to _____ mm^2 conductor space: fig.: ____ D min.: ____ mm		N/A
12.2.2	Conductor connected without special preparation		N/A
12.2.3	Terminals: adequate mechanical strength screws and nuts: ISO thread or similar screws: not be of metal soft or liable to creep		N/A
12.2.4	Terminals resistant to corrosion		N/A
12.2.5	Terminals clamp the conductor without damage [ ] rigid/stranded [ ] flexible smallest sect.: _____ mm^2 _____ mm^2 largest sect.: _____ mm^2 _____ mm^2 Torque: ____ Nm H: ____ mm Mass: ____ kg During the test, conductor no slip out or break		N/A
12.2.6	Conductor clamped between metal surfaces (terminal fitted as 12.2.5 - torque: ____ Nm (2/3) N1 of conductors: ____ [ ] rigid [ ] flexible Pull test: _____ N for 1 min During the test, conductor not move noticeably		N/A
12.2.7	Conductors cannot slip out while clamping screws or nuts are tightened largest sect.: _____ mm^2 N1 of conductors: ___ [ ] rigid solid: 1 x _____ stranded: 7 x ____ [ ] flexible: ____ x _____ torque (2/3): _____ Nm After the test, no wire escaped		N/A
12.2.8	Terminals not work loose: tightened and loosened 5 times largest sect.: _____ mm5 torque: _____ Nm During the test, terminals not work loose		N/A
12.2.9	Earthing terminals: adequately locked against loosening. To loosen only by tool		N/A
12.2.10	Earthing terminals: no risk of corrosion - body of brass or other no less resistant mate- rial to corrosion; - precaution to avoid risk of corrosion		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
12.2.11	Pillar terminals: distance : _____ mm (fig. 34) mantle terminals: distance: _____ mm (fig. 37)		N/A
12.3	Screwless terminals for external copper conductors		N/A
12.3.1	Screwless terminals may be of the type suitable for rigid copper conductors only or of the type suitable for both rigid and flexible copper conductors.		N/A
	For the latter type the tests are carried out with rigid conductors first and then repeated with flexible conductors.		N/A
12.3.2	Screwless terminals shall be provided with two clamping units each allowing the proper connection of rigid or of rigid and flexible copper conductors having nominal crosssectional areas as shown in table 7.		N/A
	When two conductors have to be connected, each conductor shall be introduced in a separate independent clamping unit (not necessarily in separate holes).		N/A
	Compliance is checked by inspection and by fitting conductors of the smallest and largest nominal cross-sectional areas specified.		N/A
12.3.3	Screwless terminals shall allow the conductor to be connected without special preparation.		N/A
12.3.4	Parts of screwless terminals mainly intended to carry current shall be of materials as specified in 26.5.		N/A
12.3.5	Screwless terminals shall be so designed that they clamp the specified conductors with sufficient contact pressure and without undue damage to the conductor.		N/A
12.3.6	It shall be clear how the connection and disconnection of the conductors is to be made.		N/A
12.3.7	Screwless terminals which are intended to be used for the interconnection of two or more conductors shall be so designed that		N/A
12.3.8	Screwless terminals of fixed socket-outlets shall be designed so that adequate insertion of the conductor is obvious and over-insertion is prevented if further insertion is liable to reduce the creepage distances and/or clearances required in table 23, or to influence the operation of the socket-outlet.		N/A
12.3.9	Screwless terminals shall be properly fixed to the socket-outlet.		N/A
12.3.10	Screwless terminals shall withstand the mechanical stresses occurring in normal use.		N/A
12.3.11	Screwless terminals shall withstand the electrical and thermal stresses occurring in normal use.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
12.3.12	Screwless terminals shall be so designed that the connected rigid solid conductor remains clamped, even when it has been deflected during normal installation, for example, during mounting in a box, and the deflecting stress is transferred to the clamping unit.		N/A
13	CONSTRUCTION OF FIXED SOCKET-OUTLETS		--
13.1	Socket-contact assemblies shall have sufficient resilience to ensure adequate contact pressure on plug pins.		P
13.2	Socket-contacts and pins of socket-outlets shall be resistant to corrosion and abrasion.		P
13.3	Insulating linings, barriers and the like shall have adequate mechanical strength.		P
13.4	Socket-outlets shall be so constructed as to permit		P
	– easy introduction and connection of the conductors in the terminals;		P
	– easy fixing of the base to a wall or in a mounting box;		P
	– correct positioning of the conductors;		P
	– adequate space between the underside of the base and the surface on which the base is mounted or between the sides of the base and the enclosure (cover or box) so that, after installation of the socket-outlet, the insulation of the conductors is not necessarily pressed against live parts of different polarity.		P
	For surface type socket-outlets to be mounted on a mounting plate, a wiring channel may be needed to comply with this requirement.		N/A
	In addition, socket-outlets classified as design A shall permit easy positioning and removal of the cover or cover-plate, without displacing the conductors.		P
13.5	Socket-outlets shall be so designed that full engagement of associated plugs is not prevented by any projection from their engagement fa		P
13.6	If covers are provided with bushings for the entry holes for the pins, it shall not be possible to remove them from the outside or for them to become detached inadvertently from the inside when the cover is removed.		P
13.7	Covers, cover-plates or parts of them which are intended to ensure protection against electric shock shall be held in place at two or more points by effective fixings.	No such construction	N/A
	Covers, cover-plates or parts of them may be fixed by means of a single fixing, for example, by a screw, provided that they are located by another means (for example, by a shoulder).		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Where the fixings of covers or cover-plates of socket-outlets of design A serve to fix the base, there shall be means to maintain the base in position, even after removal of the covers or cover-plates.		N/A
13.7.1	For covers or cover-plates whose fixings are of the screw-type: by inspection only.		N/A
13.7.2	For covers or cover-plates whose fixing is not dependent on screws and whose removal is obtained by applying a force in a direction approximately perpendicular to the mounting/supporting surface:	(See table 13)	N/A
	– when their removal may give access, with the standard test finger, to live parts: by the tests of 24.14;		N/A
13.7.2	For covers or cover-plates whose fixing is not dependent on screws and whose removal is obtained by applying a force in a direction approximately perpendicular to the mounting/supporting surface (see table 13):		N/A
	– when their removal may give access, with the standard test finger, to live parts: by the tests of 24.15;		N/A
	– when their removal may give access, with the standard test finger, only to： by the tests of 24.15;		N/A
	– when their removal may give access, with the standard test finger, only to ·parts of insulating material, or earthed metal parts, or ·metal parts separated from live parts in such a way that creepage distances and ·clearances have twice the values shown in table 23, or ·live parts of SELV circuits not greater than 25 V a.c.: by the tests of 24.16.		N/A
13.7.3	For covers or cover-plates the fixing of which is not dependent on screws and whose removal is obtained by using a tool, in accordance with the manufacturer's instructions given in an instruction sheet or in other documentation:		N/A
	by the same tests of 13.7.2 except that the covers or cover-plates or parts of them need not come off when applying a force not exceeding 120 N in directions perpendicular to the mounting/supporting surface.		N/A
13.8	A cover-plate intended for a socket-outlet with earthing contact shall not be interchangeable with a cover-plate intended for a socket-outlet without earthing contact, if such interchange results in a change of the classification of the socket-outlet according to 7.1.3.		P

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Clause	Requirement + Test	Result - Remark	Verdict
13.9	Surface-type socket-outlets shall be so constructed that, when they are fixed and wired as for normal use, there are no free openings in their enclosures other than the entry openings for the pins of the plug or other openings for contacts, for example, side earthing contacts, or locking devices, etc.		N/A
	Drain holes, small gaps between enclosures or boxes and conduits, cables, or earthing contacts (if any), or between enclosures or boxes and grommets or membranes and knockouts are ignored.		N/A
13.10	Screws or other means for mounting the socket-outlet on a surface in a box or enclosure shall be easily accessible from the front. These means shall not serve any other fixing purpose.		P
13.11	Multiple socket-outlets with a common base shall be provided with fixed links for the interconnection of the contacts in parallel. The fixing of these links shall be independent from the connection of the supply wires.		P
13.12	Multiple socket-outlets with a common base shall be provided with fixed links for the interconnection of the contacts in parallel. The fixing of these links shall be independent from the connection of the supply wires.		N/A
13.13	The mounting plate of surface-type socket-outlets shall have adequate mechanical strength.		N/A
13.14	Socket-outlets shall withstand the lateral strain imposed by equipment likely to be introduced into them.		P
	For socket-outlets having ratings up to and including 16 A and 250 V, compliance is checked by means of the device shown in figure 13.	250V, 10A or 250V, 16A	P
	Each specimen is mounted on a vertical surface with the plane through the socket-contacts horizontal. The device is then fully engaged and a weight hung on it such that the force exerted is 5 N.		P
	The device is removed after 1 min and the socket-outlet is turned through 90° on the mounting surface. The test is made four times, the socket-outlet being turned through 90° after each engagement		P
	During the test the device shall not become disengaged from the socket-outlet.		P
	After the tests, the socket-outlets shall show no damage within the meaning of this standard; in particular, they shall comply with the requirements of clause 22.		P
13.15	Socket-outlets shall not be an integral part of lampholders.		P

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Clause	Requirement + Test	Result - Remark	Verdict
13.16	Surface-type socket-outlets having an IP code higher than IP20 shall be according to their IP classification when fitted with conduits or with sheathed cables as for normal use and without a plug in engagement.		N/A
	Surface-type socket-outlets having degrees of protection IPX4 and IPX5 shall have provision for opening a drain hole.		N/A
	If a socket-outlet has a drain hole, it shall be not less than 5 mm in diameter, or 20 mm2 in area with a width and a length of not less than 3 mm.		N/A
	If the position of the lid is such that only one mounting position is possible, the drain hole shall be effective in that position. Alternatively, the drain hole(s) shall be effective in at least two positions of the socket-outlet when this is mounted on a vertical wall, one of these with the conductors entering at the top and the other with the conductors entering at the bottom.		N/A
	Lid springs, if any, shall be of corrosion-resistant material, such as bronze or stainless steel.		N/A
13.17	Earthing pins shall have adequate mechanical strength.		N/A
13.18	Earthing pins shall have adequate mechanical strength.		P
13.19	Metal strips of the earthing circuit shall have no burrs which might damage the insulation of the supply conductors.		P
13.20	Socket-outlets to be installed in a box shall be so designed that the conductor ends can be prepared after the box is mounted in position, but before the socket-outlet is fitted in the box.		P
13.21	Inlet openings shall allow the introduction of the conduit or the sheath of the cable so as to afford complete mechanical protection.		N/A
	Surface-type socket-outlets shall be so constructed that the conduit or sheath of the cable can enter at least 1 mm into the enclosure. In surface-type socket-outlets the inlet opening for conduit entries, or at least two of them if there are more than one, shall be capable of accepting conduit sizes of 16, 20, 25 or 32 according to IEC 60423 or a combination of at least two of any of these sizes.		N/A
	In surface-type socket-outlets, the inlet opening for cable entries will preferably be capable of accepting cables having the dimensions specified in table 14 or be as specified by the manufacturer.		N/A
13.22	Membranes (grommets) in inlet openings shall be reliably fixed and shall not be displaced by the mechanical and thermal stresses occurring in normal use.		N/A
	Compliance is checked by inspection and by the following test.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Membranes are tested when assembled in the accessory.		N/A
	First the accessories are fitted with membranes which have been subjected to the treatment specified in 16.1.		N/A
	The accessories are then placed for 2 h in a heating cabinet as described in 16.1, the temperature being maintained at (40 ± 2) °C.		N/A
	Immediately after this period, a force of 30 N is applied for 5 s to various parts of the membranes by means of the tip of a straight unjointed test finger (test probe 11 of IEC 61032).		N/A
	During these tests, the membranes shall not deform to such an extent that live parts become accessible.		N/A
	For membranes likely to be subjected to an axial pull in normal use, an axial pull of 30 N is applied for 5 s.		N/A
	During this test, the membranes shall not become detached.		N/A
	The test is then repeated with membranes which have not been subjected to any treatment.		N/A
13.23	It is recommended that membranes in inlet openings be so designed and made of such material that the introduction of the cables into the accessory is permitted when the ambient temperature is low.		N/A
	When required, compliance is checked by the following test.		N/A
	Membranes are tested when assembled in the accessory.		N/A
	The accessories are fitted with membranes which have not been subjected to ageing treatment, those without openings being suitably pierced.		N/A
	The accessories are then kept for 2 h in a freezer at a temperature of (–15 ± 2) °C.		N/A
	After this period, the accessories are removed from the freezer and immediately afterwards, while the accessories are still cold, it shall be possible to introduce, without undue force,cables of the largest diameter through the membranes.		N/A
	After the tests of 13.22 and 13.23 the membranes shall show no harmful deformation, cracks or similar damage which would lead to non-compliance with this standard.		N/A

14	**CONSTRUCTION PORTABLE ACCESSORIES**		--
14.1	Non-rewirable portable accessories shall be such that		N/A
	– the flexible cable cannot be separated from the accessory without making it permanently useless, and		N/A
	– the accessory cannot be opened by hand or by using a general purpose tool, for example, a screwdriver used as such.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Compliance is checked by inspection, by manual test and by the test of 24.14.3.		N/A
14.2	Pins of portable accessories shall have adequate mechanical strength.		N/A
	Compliance is checked by the test of clause 24 and, for pins which are not solid, by the following test which is made after the test of clause 21.		N/A
	A force of 100 N is exerted on the pin, which is supported as shown in figure 14, for 1 min in a direction perpendicular to the axis of the pin, by means of a steel rod having a diameter of 4,8 mm, the axis of which is also perpendicular to the axis of the pin.		N/A
	During the application of the force, the reduction of the dimension of the pin at the point where the force is applied shall not exceed 0,15 mm.		N/A
	After removal of the rod, the dimensions of the pin shall not have changed by more than 0,06 mm in any direction.		N/A
14.3	Pins: locked against rotation; not removable without dismantling the plug; adequately fixed in the body Not possible replace earthing or neutral pins or contacts in an incorrect position		N/A
14.4	Earthing contacts and neutral contacts of portable socket-outlets shall be locked against rotation and removable only with the aid of a tool, after dismantling the socket-outlet.		N/A
	Compliance is checked by inspection, by manual test and, for single portable socket-outlets, by the test of 24.2.		N/A
14.5	Socket-contact assemblies shall have sufficient resilience to ensure adequate contact pressure.		N/A
	This requirement may also cover socket-outlets where the contact pressure relies on insulating parts having such characteristics as to ensure a safe and permanent contact in any condition of normal use, with regard in particular to shrinkage, ageing and yielding. Compliance is checked by inspection and by the tests of 9, 21 and 22.		N/A
14.6	Pins and socket contacts: resistant to corrosion and abrasion		N/A
14.7	Enclosures of rewirable accessories: completely enclose terminals and ends of flexible cable Construction, no risk that: - damage to conductors insulation; - core pressed against accessible metal parts; - core of earthing conductor pressed against live parts		N/A
14.8	Screws or nuts: no connection between live parts and earthing terminal when fall out of position		N/A
14.9	Earthing contact: ample space for slack of the earthing conductor		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
14.10	Terminals located or shielded: free wire 6 mm not touch accessible metal part or emerge from to enclosure		N/A
14.11	For rewirable portable accessories:		N/A
	– it shall be clear how the relief from strain and the prevention of twisting is intended to be effected;		N/A
	– the cord anchorage, or at least part of it, shall be integral with or fixed to one of the component parts of the plug or portable socket-outlet;		N/A
	– makeshift methods, such as tying the flexible cable in a knot or tying the ends with string, shall not be used;		N/A
	– the cord anchorage shall be suitable for the different types of flexible cable which may be connected to it;		N/A
	– screws, if any, which have to be operated to clamp the flexible cable, shall not serve to fix any other component;		N/A
	– cord anchorages shall be of insulating material or be provided with an insulating lining fixed to the metal parts;		N/A
	– metal parts of cord anchorages, including clamping screws, shall be insulated from the earthing circuit.		N/A
	Compliance is checked by inspection and, if applicable, by manual test.		N/A
14.12	Insulating parts: reliably fixed, not possible dismantle without a tool		N/A
14.13	If covers of portable socket-outlets are provided with bushings for the entry holes for the pins, these bushes shall not be removable from the outside or detachable inadvertently from the inside, when the cover is removed.		N/A
14.14	Screws: captive		N/A
14.15	The engagement face of plugs shall have no projections other than the pins, when the plug is wired and assembled as for normal use.		N/A
	Compliance is checked by inspection, after fitting conductors of the largest nominal crosssectional area specified in table 3.		N/A
14.16	Portable socket-outlets shall be designed in such a way that full engagement of associated plugs is not prevented by any projection from their engagement face.		N/A
14.17	IPX4 or IPX5 accessories: - provided with gland; - pins: adequately enclosed when fitted; - socket-outlets: enclosed without a plug; - lid springs: resistant material to corrosion	IP20	N/A
14.18	Suspension means not allow access to live parts; No free openings		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
14.19	Circuit breakers or other protective devices: comply with the relevant standard (if any)		N/A
14.20	Lampholders not allowed with portable accessories		N/A
14.21	Plugs for class II: - non rewirable; - cord set with a connector for class II; - cord extension set with portable socket-outlet for class II		N/A
14.22	Switches and fuses: comply with the relevant IEC Standard	No Switches and fuses	N/A
14.23	Plug integral part of equipment: not cause overheating or undue strain Plugs > 16 A 250 V not integral part of equipment		N/A
14.23.1	1,1 Vn of equipment: _____ V for 1 h Temperature rise not exceed 45 K		N/A
14.23.2	The equipment is inserted into a fixed socket-outlet complying with this standard, the socket-outlet is pivoted about a horizontal axis through the axis of the live socket-contacts at a distance of 8 mm behind the engagement face of the socket-outlet and parallel to this engagement face.		N/A
	The additional torque which has to be applied to the socket-outlet in order to maintain the engagement face in the vertical plane shall not exceed 0,25 Nm.		N/A
14.24	Plugs shall be shaped in such a way and made of such material that they can easily be withdrawn by hand from the relevant socket-outlet.		N/A
	In addition, the gripping surfaces shall be designed in such a way that the plug can be withdrawn without having to pull on the flexible cable.		N/A
14.25	Membranes in inlet openings of portable accessories shall meet the requirements of 13.22 and 13.23.	Not applicable	N/A
15	**INTERLOCKED SOCKET-OUTLET PORTIONS OF ADAPTORS**		--
	Socket-outlets interlocked with a switch shall be constructed in such a way that a plug cannot be inserted into or completely withdrawn from the socket-outlet while the socket-contacts are live, and the socket-contacts of the socket-outlet cannot be made live until a plug is almost completely in engagement.		N/A
16	**RESISTANCE TO AGEING, TO HARMFUL INGRESS OF WATER AND TO HUMIDITY**		--
16.1	Resistance to ageing: 70±2°C for 7 days (168 h)		P

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Clause	Requirement + Test	Result - Remark	Verdict

	After the test, no crak visible, and no traces of cloth		P
16.2	[ ] IPX 4 [ ] IPX 5 (according to IEC 529) - Fixed and portable socket-outlets tested without a plug - Plugs tested in engagement: a) fixed socket-outlet b) portable socket-outlets; Electric strength clause 17.2	IP20	N/A
16.3	Humidity treatment: 91-95% , 2 days ordinary accessories ;7 days accessories other than ordinary; After the test, no damage	95%, 7 days	N/A

17	**INSULATION RESISTANCE AND ELECTRIC STRENGTH**		--
17.1	Insulation resistance: 500 V d.c. for 1 min.		P
	The insulation resistance shall be not less than 5MΩ,except for items g)and h)of sub-clause 17.1.1,where the resistance shall not be less than 2MΩ.		P
17.1.1	For socket-outlets the insulation is measured consecutively		--
	a) between all poles connected together and body b) between each pole in turn and all others c) between any metal enclosure and metal foil in contact with the inner surface of its insulating linings,(this test is noly made if an insulation lining is necessary to provide insulation) d) beween any metal part of the cord anchorage and each terminals or earthing contact e) between any metal part of the cord anchorage of portable socket-outlets and a metal rod of the maximum diameter of the flexible cable inserted in its place		P
	f) all poles connected together and the body ,with the switch in the “on”position g) each pole in turn and all others connected to the body with the switch in the “on”position	No switch	N/A
17.1.2	This clause of part 1 is not applicable(IEC 60884-2-5:1995)		--

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Clause	Requirement + Test	Result - Remark	Verdict
17.2	Electric strength: test voltage a.c. for 1 min [ ] plugs [ ] socket-oulets a) .....[ ] 1250 V [ ] 2000 V b) .....[ ] 1250 V [ ] 2000 V c) .....[ ] 1250 V [ ] 2000 V d) .....[ ] 1250 V [ ] 2000 V e) .....[ ] 1250 V [ ] 2000 V No flashover or breakdown	See table 17.2	P
18	**OPERATION OF EARTHING CONTACTS**		--
	Earthing contacts: adequate contact pressure tests clause 19 and 21		P
19	**TEMPERATURE RISE**		--
	Rated current: _____ A cross sect.: _____mm² Test current: _____ A for 1 h Temperature rise of terminals not exceed 45 K External parts of insulating material (clause 25.3)	Rated current: 16A, cross sect.: 1.5mm² See table 19	P
20	**BREAKING CAPACITY**		--
	Accessories shall have adequate breaking capacity		P
	Replace the second, fourth, sixth, and eighth paragraph (see 60884-2-5)		P
	Test values: 1,1 Vn: _____ V 1,25 In: _____ A cos Φ: 0,6 100 strokes [ ] 30 strokes/min [ ] 15 strokes/min During the test, no sustained arcing occur After the test, no damage	1.1X250V, 1.25X16A 30 strokes/min no damage	P
21	**NORMAL OPERATION**		--
	Test values: V: _____ V I: _____ A cos Φ: 0,8 10.000 strokes [ ] 30 strokes/min [ ] 15 strokes/min During the test, no sustained arcing occur After the test, no damage Shuttered socket-outlets: gauge fig. 3 - 20 N not touch live parts gauge fig. 4 - 1 N Temperature rise: I: _____ A ≤ 45 K Electric strength: according to clause 17.2 [ ] 1000 V [ ] 1500 V	AC250V, 16A, 30 strokes/min The temperature rise at any points: < 45K	P
22	**FORCE NECESSARY TO WITHDRAW THE PLUG**		--

IEC 62040-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	The construction of accessories shall allow for easy insertion and withdrawal of the plug, and prevent the plug from working out of the socket-outlet in normal use.		P
	For the purpose of this test, earthing contacts, irrespective of the number, are considered as one pole.		P
22.1	Maximum withdrawal force: Force: _____ N Plug not remain	40N	P
	The adaptor is fixed to a mounting plate A of an apparatus as shown in figure 13, so that the axis of the socket-contacts are vertical and the entry holes for the pins of the plug face downwards. (IEC 60884-2-5:1995)		P
22.2	Minimum withdrawal force: Force (single pin): _____ N Gauge not fall from contact within 30 s	1.5N	P
22	**FORCE NECESSARY TO WITHDRAW THE PLUG**		--
	The construction of accessories shall allow for easy insertion and withdrawal of the plug, and prevent the plug from working out of the socket-outlet in normal use.		P
	For the purpose of this test, earthing contacts, irrespective of the number, are considered as one pole.		P
22.1	Maximum withdrawal force: Force: _____ N Plug not remain	40N	P
	The adaptor is fixed to a mounting plate A of an apparatus as shown in figure 13, so that the axis of the socket-contacts are vertical and the entry holes for the pins of the plug face downwards. (IEC 60884-2-5:1995)		P
22.2	Minimum withdrawal force: Force (single pin): _____ N Gauge not fall from contact within 30 s	1.5N	P
23	**FLEXIBLE CABLES AND THEIR CONNECTION**		--
	Intermediate adaptors intended for use with a flexible cable shall be provided with a cord anchorage such that the conductors ate relieved from strain, including twisting, where they are connected to the terminal or terminations, and that their covering is protected from abrasion. (IEC 60884-2-5:1995)		N/A
23.1	Cord anchorage adequate		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
23.2	Type of cable or cord: _____ cross sect. areas: _____ mm^2 Pull test: 100 times _____ N Torque test: _____ Nm Displacement ≦ 2 mm; - Rewirable accessories: end of conductors not moved ; - Non rewirable accessories: no break connections ; - Rewirable accessories up to 16 A: fitted with cable : 245 IEC ____ sect.: _____ mm^2		N/A
23.3	Non-rewirable plugs and non-rewirable portable socket-outlets shall be provided with a flexible cable complying with IEC 60227 or IEC 60245. The nominal cross-sectional areas of the conductors in relation to the rating of accessories are given in the relevant columns of table 20.		N/A
	Flexible cables shall have the same number of conductors as there are poles in the plug or socket-outlet, earthing contacts, if any, being considered as one pole, irrespective of their number. The conductor connected to the earthing contact shall be identified by the colour combination green/yellow.		N/A
	Compliance is checked by inspection, by measurement and by checking that the flexible cables are in accordance with the relevant parts of either IEC 60227 or IEC 60245, as applicable.		N/A
23.4	Flexing test: Test current: _____ A mass: [ ] 20 N [ ] 10 N [ ] 10.000 flexing or [ ] 5.000 turned 90^0 [ ] 5.000 ;During the test, no interruption of current; no short circuit between conductors ;Voltage drop: current: _____ A < 10 mV After the test, guard not separated from the body flexible cable, no sign of abrasion or wear		N/A
24	**MECHANICAL STRENGTH**		--
	Accessories, surface mounting boxes and screwed glands shall have adequate mechanical strength so as to withstand the stresses imposed during installation and use.		P
24.1	Fixed socket-outlets and surface mounting boxes: Impact test: [ ] A - 5 blows [ ] B,C,D - 4 blows Height of falls: [ ] 100 mm ; [ ] 150mm ; [ ] 200 mm [ ] 250 mm ; After the test, no damage; live parts not accessible		P
24.2	Portable single socket-outlets and pins: Tumbling burrel: m of falls: [ ] 1.000 [ ] 500 [ ] 100 ; - After the test, no damage. Pins not turn with torque 0,4 Nm		P
24.3	Ordinary surface type socket-outlets:ø cylinder: _____ mm; fixing screws: torque [ ] 0,5 Nm [ ] 1,2 Nm ; - After the test, no damage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
24.4	Impact test: - 15±2°C; 16 h mass: 1000 g 100 mm. - After the test, no damage		P
24.5	Compression test: 300 N for 1 min; - After the test, no damage		P
24.6	Screwed glands: [ ] Metal [ ] Moulded material φ test rod: _____ mm torque: _____ Nm; - After the test, no damage		N/A
24.7	Pins with insulating sleeves: 20.000 movements - force 4 N ; - After the test, no damage, insulating sleeve not punctured or rucked up	Pins of plug with insulating sleeves	P
24.8	Shuttered socket-outlets: [ ] 40 N [ ] 75 N for 1 min , Pin not come in contact with live parts After the test, no damage		N/A
24.9	Rewirable multiple portable socket-outlets: flexible cable: _____ smallest sect.:____mm^2 8 falls; - No damage ; - Accessories IPX4 and IPX5: test as clause 16.2		N/A
24.10	Plug: 70±2°C for 1 h pull: _____ N for 1 min - After the test, no pin have been displaced ≤ 1 mm	72°C	P
24.11	Suspension means: steel rod ø 3 mm pushed with 1,5 times force of _____ N for 10 s, Rod not pierce barrier		N/A
24.12	Portable socket-outlets: suspended with steel rod, force: _____N for 10s During the test, not break		N/A
24.13	Portable socket-outlets: suspended with round head screw ø 3 mm, pull force: _____ N for 10 s , During the test, not break		N/A
24.14.1	Verification of the non removal of covers, cover plates: [ ] 40 N (if comply with tests clause 24.17 and 24.18); [ ] 80 N others - Force applied for 1 min., not come off, - Repetition on new samples, no damage		P
24.14.2	Verification of removal of covers, cover plates: Force not exceeding 120 N, applied 10 times Covers, ... come off Repetition on new samples, no damage		N/A
24.15	[ ] 10 N (if comply with tests clause 24.17 and 24.18) [ ] 20 N others	10N	P
24.16	[ ] 10 N for all covers, ...		P
24.17	Gauge fig. 7 ... , distances between face C gauge and outline of the side, not decrease		P
24.18	Gauge fig. 5 with a force of 1N, not enter more than 1 mm		P

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Clause	Requirement + Test	Result - Remark	Verdict

25	**RESISTANCE TO HEAT**		--
	Accessories and surface mounting boxes:		P
25.1	Heating cabinet 100±2°C for 1 h; - no damage, no live parts accessible; - marking still be legible		P
25.2	Ball pressure test: 125±2°C for 1 h; φimpression: ≤ 2 mm	Material near the engagement	P
25.3	Ball pressure test: [ ] 70±2°C or [ ] ___ °C ; φ impression: ≤ 2 mm	Enclosure	P
25.4	Compression test: 80 ±2°C 1 h 20 N No damage		P

26	**SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS**		--
26.1	- Connections, withstand mechanical stresses - Thread forming or thread cutting screws, used only if suplied together with the piece ..... - Thread cutting screws, captive - Screws and nuts transmitting pressure contact, engagement in metal thread - 10 times for thread insulating material and for screws of insulating material - 5 times for others times: screws: ø: torque: 5 10 - terminals: _____ mm _____ Nm [ ] - earthing : _____ mm _____ Nm [ ] - cord anchorage: _____ mm _____ Nm [ ] [ ] - assembly: _____ mm _____ Nm [ ] [ ] - others: _____ mm _____ Nm [ ] [ ]		P
26.2	Thread insulating material: ensured correct introduction		P
26.3	Contact pressure not transmitted through insulating material, other than ceramic, ...		P
26.4	Screws and rivets locked against loosening or turning		P

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Clause	Requirement + Test	Result - Remark	Verdict
26.5	Current-carrying parts and earthing, metal ..... - copper; - - alloy containing 58% copper for rolled sheet or - 50% for other parts; - - stainless steel containing 13% chromium; - - steel provided with coating of zinc (ISO 2081); - - steel provided with coating of nickel and chromium (ISO 1456); - - steel provided with coating of tin (ISO 2093); - current-carrying parts subjected to mechanical; - wear, not made of steel with coating		P
26.6	Sliding contact, metal resistant to corrosion		P
26.7	Thread-forming and thread-cutting screws not used for current-carrying parts If used for earthing continuity at least 2 screws		P
27	**CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH SEALING COMPOUND**		--
27.1	Creepage distances: (mm)		P
	Between: 1. live parts of different polarity..... 4(3)	>4mm	P
	2. live parts and: - accessible surface of parts of insulating material 3	>3mm	P
	- earthed metal parts including parts of earthing circuit 3	No earthing parts	N/A
	- metal frames supporting the base 3		N/A
	- screws for fixing bases, covers 3	>3mm	P
	- external assembly screws 3	>3mm	P
	3. pins of an adaptor and metal parts ..... 6(4,5)		P
	4. accessible unearthed metal parts and a fully engaged adaptor ..... 6(4,5)		N/A
	5. live parts and unearthed metal parts ... 6(4,5)		N/A
	Clearance distances: (mm)		P
	Between: 6. live parts of different polarity 3	>3mm	P
	7. live parts and: - accessible insulating..... 3	>3mm	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- earthed metal parts including parts of earthing circuit..... 3	>3mm	P
	- metal frames supporting the base 3		N/A
	- screws for fixing bases, covers 3	>3mm	P
	- external assembly screws 3	>3mm	P
	8. live parts and: - earthed metal boxes 3		N/A
	- unearthed metal boxes 4,5		N/A
	9. live parts and surface on which the base of surface type is mounted 6	>6mm	P
	10. live parts and the bottom conductor recess . 3	>3mm	P
	Distances through insulating sealing compound: live parts covered with at least 2 mm and: 11. surface on which the base is mounted .4(3)		N/A
	12. the bottom of conductor recess 2,5		N/A
27.2	Insulating sealing compound not protrude above the edge		N/A
27.3	Ordinary surface-type: not bare current-carrying strips at the back		N/A

28	**RESISTANCE OF INSULATING MATERIAL TO ABNORMAL HEAT, TO FIRE AND TO TRACKING**		--
28.1.1	Glow wire test: For parts of insulating material [ ] 650 °C - not necessary to retain current-carrying in position;	Enclosure	P
	[ ] 750°C - necessary to retain current-carrying parts of portable accessories in position;	Material near the engagement	P
	[ ] 850 °C - necessary to retain current-carrying in position of fixed accessories		N/A
	No visible flame, no sustained glowing; or if flame and glowing, extinguish within 30s no ignition of the tissue paper		P
28.1.2	Pins with insulating sleeves: [ ] 120 °C [ ] 180 °C for 3 h ,4 impacts: 100 g - 100 mm ; - No cracks	Pins of plug with insulating sleeves	P
28.2	Resistance to tracking: (only for IP), 50 drops test voltage 175 V, No flashover or breakdown		P
29	**RESISTANCE TO RUSTING**		--
	10 min in a 10% solution of ammonium chloride; 10 min in humid ambient; 10 min in heating cabinet at 100 °C No signs of rust		P

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Clause	Requirement + Test	Result - Remark	Verdict

30	**ADDITIONAL TESTS ON PINS PROVIDED WITH INSULATING SLEEVES**		--
30.1	Pressure test at high temperature: 200 °C for 2 h force: 2,5 N Thickness: _____ mm - After the test: ≥ 50% ____ mm		P
30.2	Static amp heat test (IEC 68-2-30): two cycles - After the test: - insulation resistance and electric strength clause 17; and - abrasion test clause 24.7		P
30.3	Test a low temperature: - 15 °C for 24 h After the test: - insulation resistance and electric strength clause 17; and - abrasion test clause 24.7		P
30.4	Impact test a low temperature : - 15 °C for 24 h 100 g - 100 mm ; 4 impacts - No cracks		P

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Clause	Requirement + Test	Result - Remark	Verdict

17.1.1	TABLE: insulation resistance measurements		P
insulation resistance R between:		R (M)	required R (M)
L / N to enclosure (with a plug in engagement)		>20MΩ	5
L to N (with a plug in engagement)		>20MΩ	5

17.2	TABLE: electric strength measurements		P
test voltage applied between:		test voltage (V)	breakdown
L / N to enclosure (with a plug in engagement)		2000Vac	No
L to N (with a plug in engagement)		2000Vac	No

19	TABLE: temperature rise measurements		P
	Input voltage and current	AC250V, 16A	
	Ambient (t1) (℃)	26.3	
	Ambient (t1) (℃)	25.5	

No.	Temperature rise dT of part/at:	dT (K)	Limited dT (K)
1	Enclosure, inside, near L terminal	25.6	45
2	Enclosure, outside, above	9.8	45
3	Enclosure, outside, left side	8.5	45
4	Enclosure, outside, bottom	7.8	45

25	TABLE: ball-pressure tests for thermoplastics		P
	Limited impression diameter (mm)	≦2 mm	--
Part	Test temperature (°C)	Impression diameter (mm)	
Enclosure	75°C	1.0	
Material near the engagement	125°C	1.1	

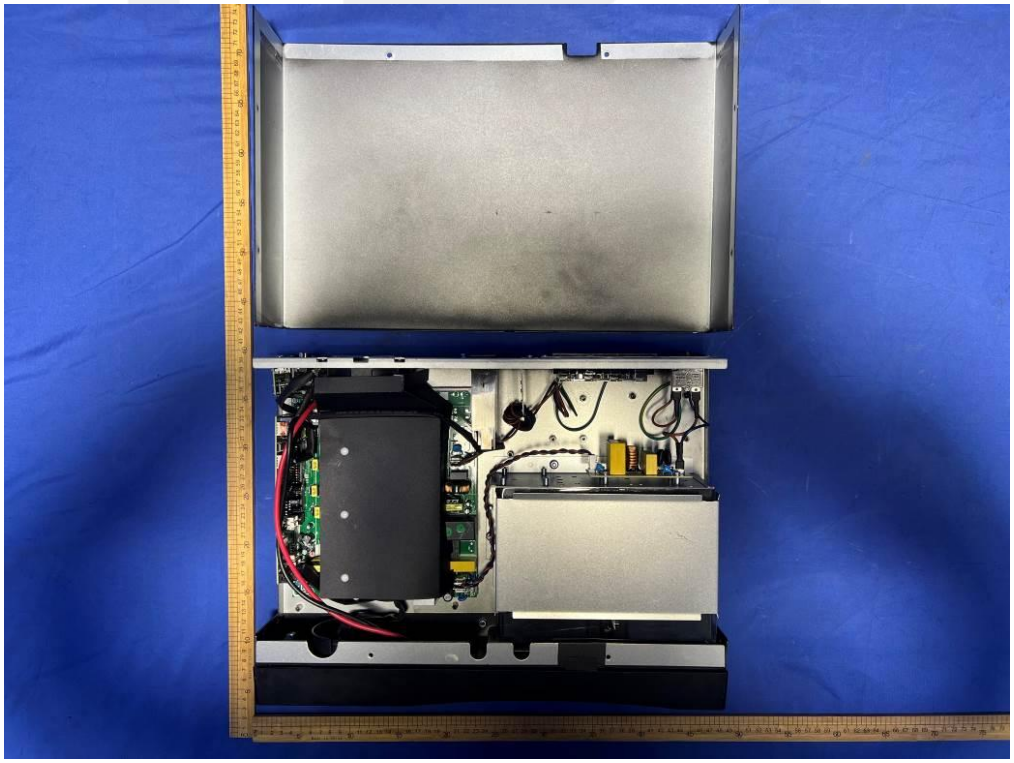
28	TABLE: glow wire test		P
Part	Test temperature (°C)	Result	
Material near the engagement	750°C	Not burning	
Enclosure	650°C	Not burning	

Overall view

External view

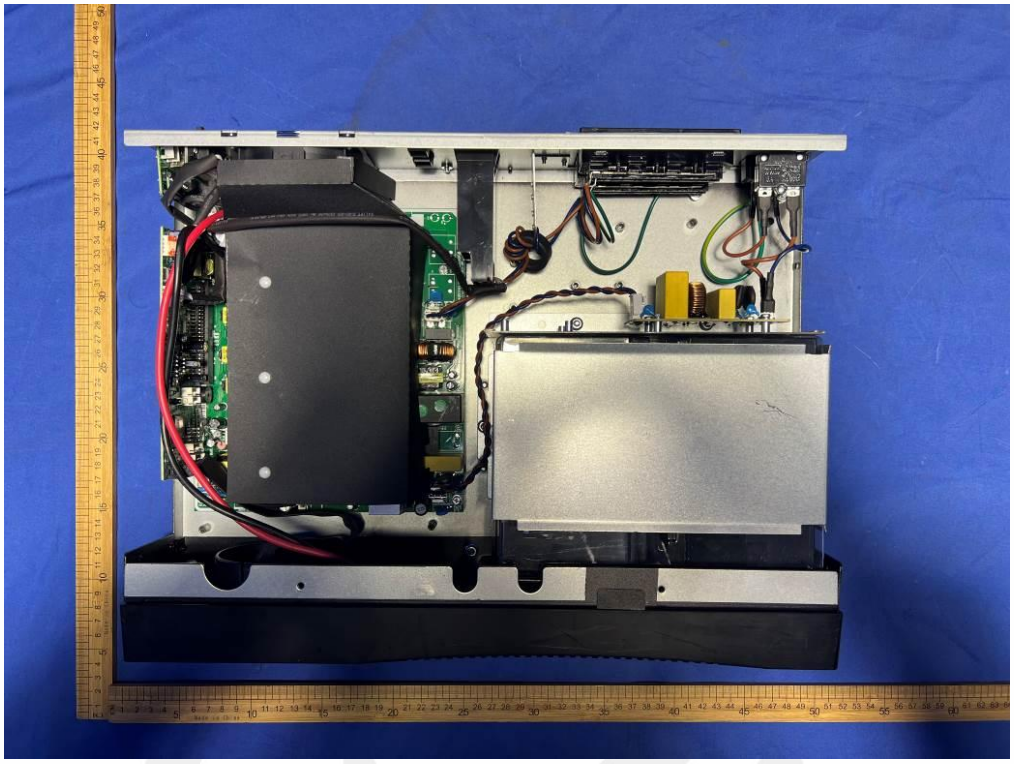
ATTACHMENT Photos

External view

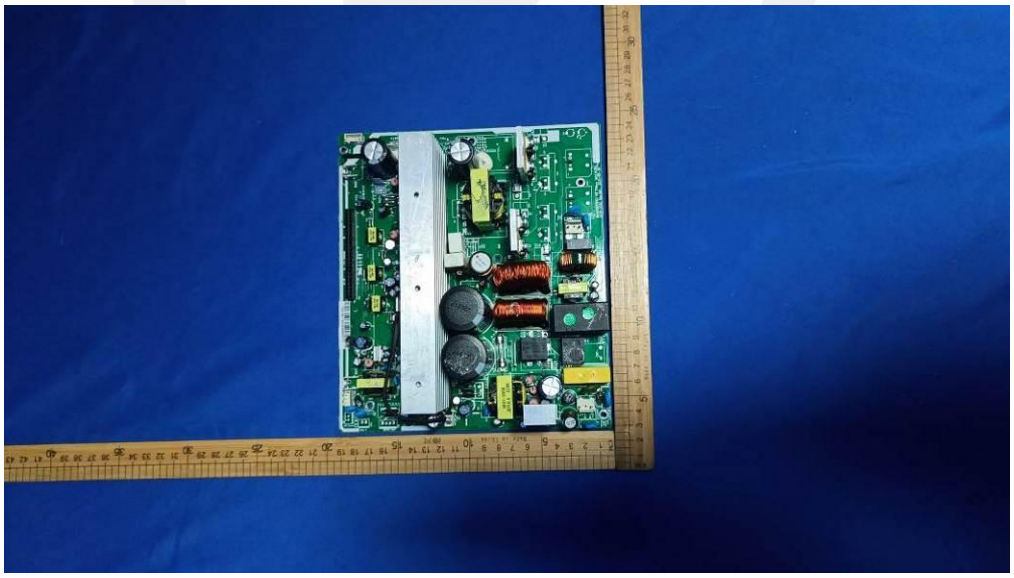


Internal view

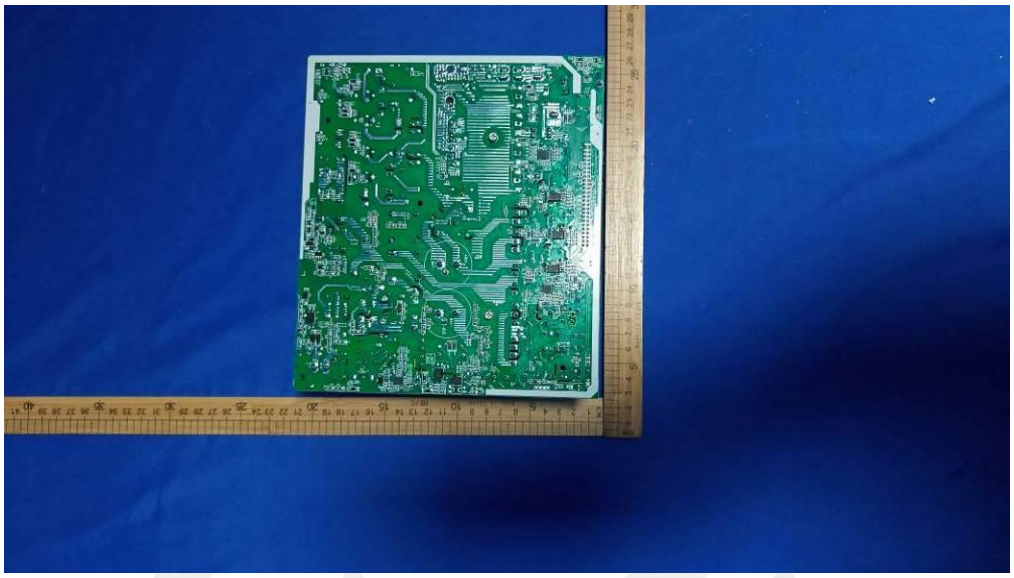
ATTACHMENT Photos



Internal view



PCB view



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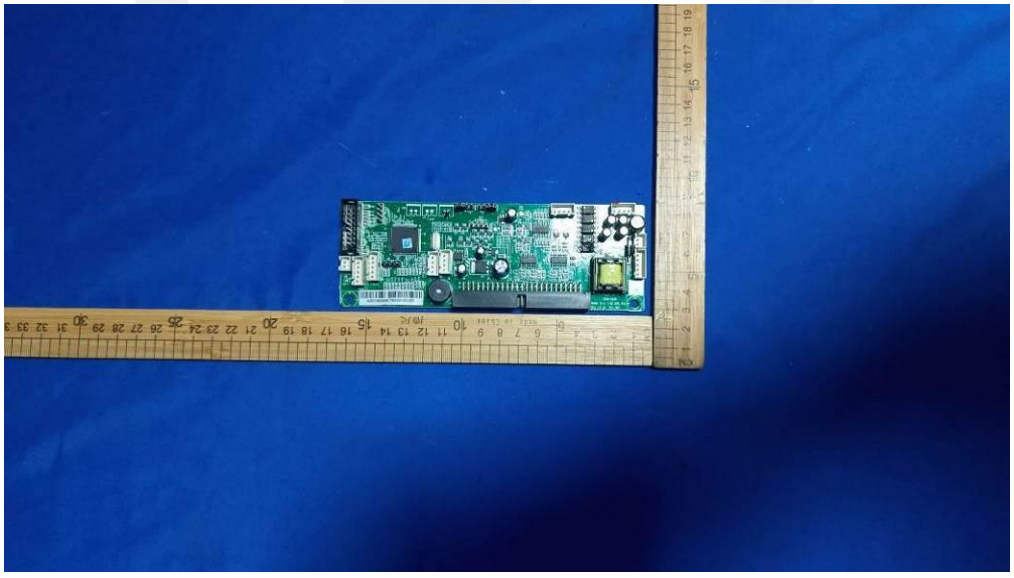

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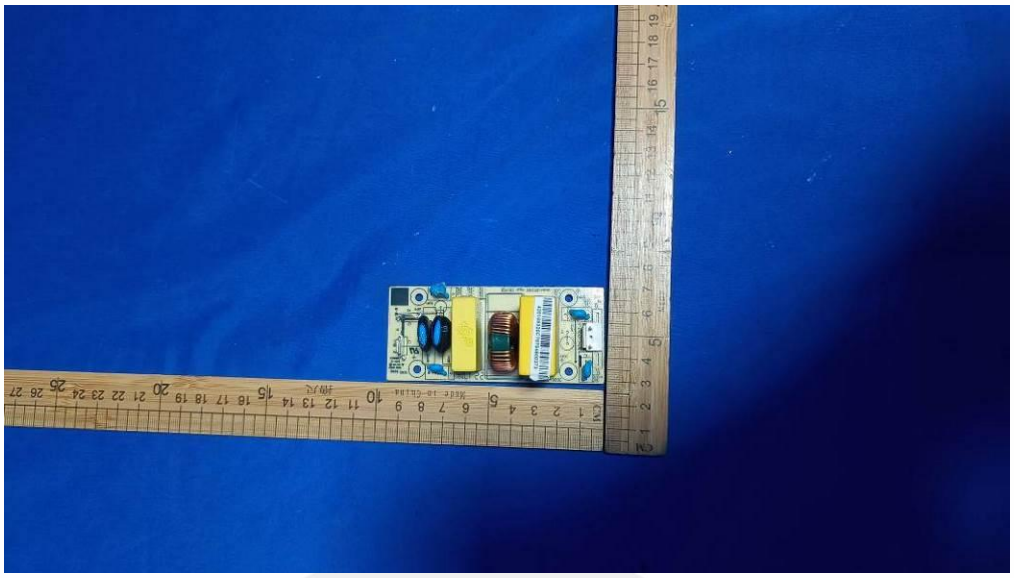

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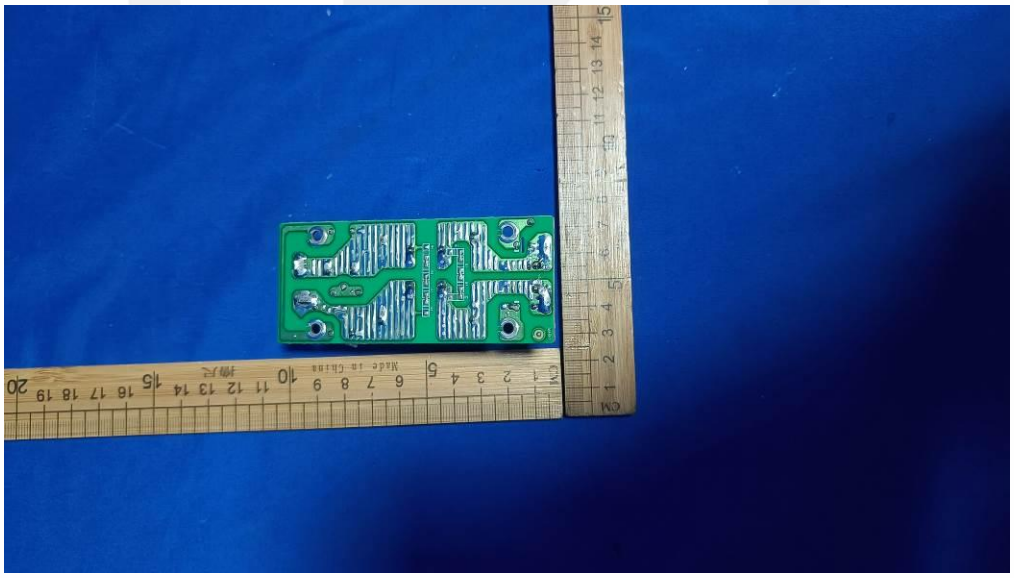
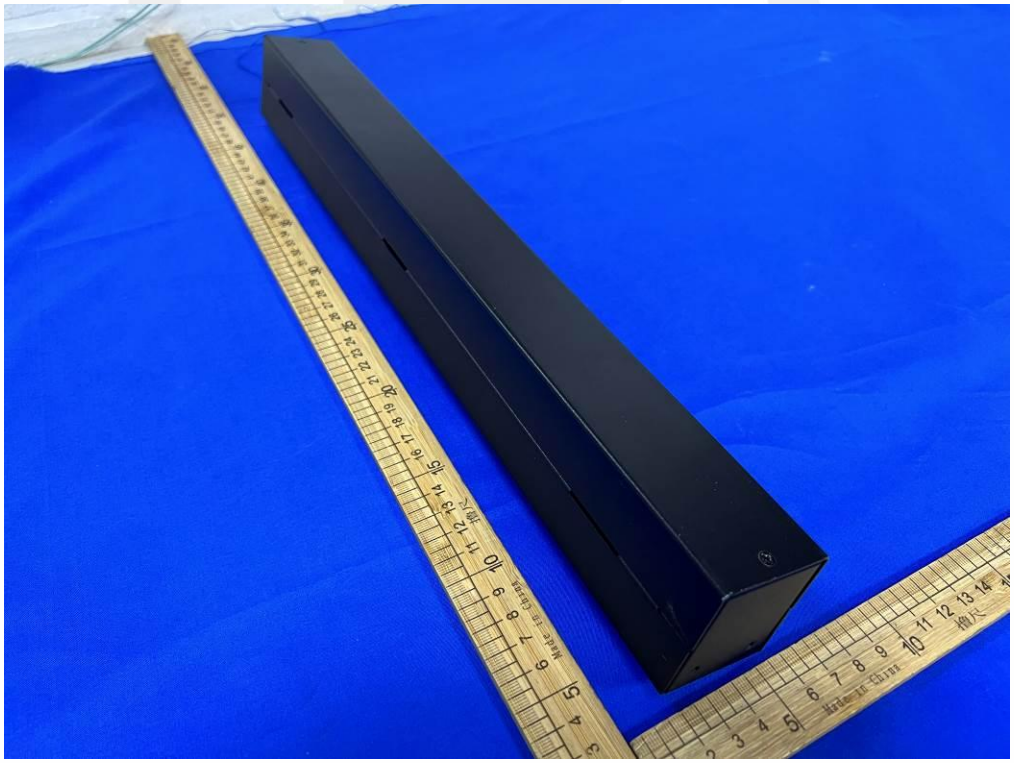


PCB view

PDU view



PDU view

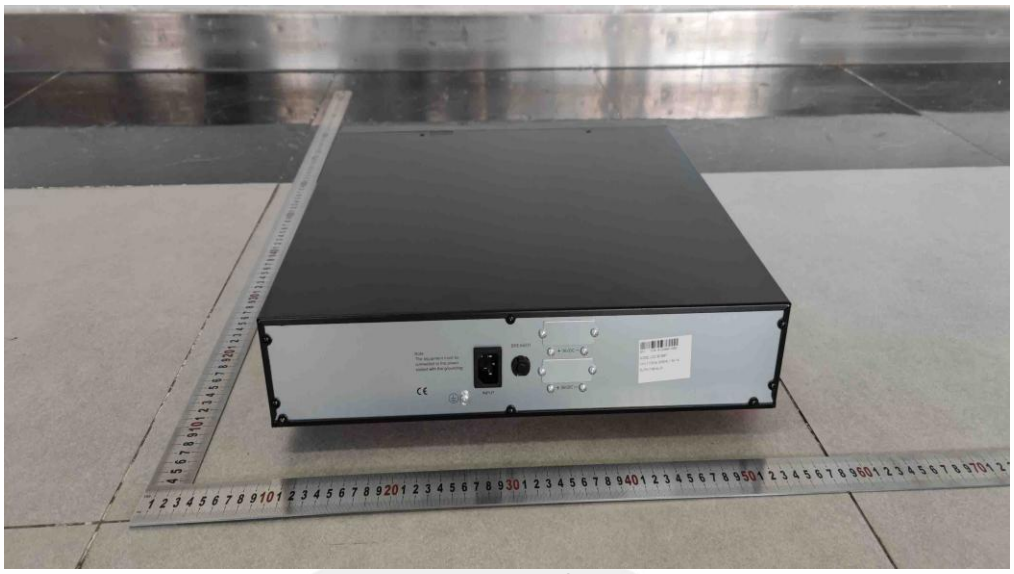
PDU view

NTBR4024C view1

NTBR4024C view2

NTBR4024C view3

NTBR6036C view1



NTBR6036C view2

NTBR6036C view3

ATTACHMENT Photos

External view

*** End of Report ***

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