APPLICATION FOR LOW VOLTAGE DIRECTIVE

On Behalf of

INVT POWER SYSTEM (SHENZHEN) CO., LTD

Uninterruptible Power Systems

Model(s): PM40X, PM50X

Prepared For : **INVT POWER SYSTEM (SHENZHEN) CO., LTD**
5th Floor, 1#Building,Gaofa Industrial Park, LongJing,
Nanshan District, Shenzhen,China, 518055

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TEST REPORT

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

Report Number. ..... :	ES160617013S
Date of issue ..... :	August 31, 2016
Total number of pages	66 pages
Applicant's name ..... :	INVT POWER SYSTEM(SHENZHEN) CO., LTD
Address ..... :	5th Floor, 1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen,China, 518055
Test specification:	
Standard ..... :	IEC 62040-1:2008 (First Edition) + Am 1:2013
Test procedure ..... :	Compliance with IEC 62040-1:2008 (First Edition) + Am 1:2013
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC62040_1C
Test Report Form(s) Originator.... :	TÜV Rheinland Japan Ltd.
Master TRF ..... :	Dated 2014-01

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.

Test item description .....:	Uninterruptible Power Systems
Trade Mark ..... :	INVT
Manufacturer ..... :	INVT POWER SYSTEM(SHENZHEN) CO., LTD
Address ..... :	5th Floor, 1#Building, Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen, China, 518055
Model/Type reference ..... :	PM40X, PM50X
Ratings ..... :	See the rating label

Testing procedure and testing location:		
☒ Testing Laboratory:	EMTEK (SHENZHEN) CO., LTD.	
Testing location/ address ..... :	Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China	
☐ Associated Testing Laboratory:		
Testing location/ address ..... :		
Tested by (name + signature) ..... :	James Dan	
Approved by (name + signature) ..... :	William Guo	
☐ Testing procedure: TMP		
Testing location/ address ..... :		
Tested by (name + signature) ..... :		
Approved by (name + signature) ..... :		
☐ Testing procedure: WMT		
Testing location/ address ..... :		
Tested by (name + signature) ..... :		
Witnessed by (name + signature) .... :		
Approved by (name + signature) ..... :		
☐ Testing procedure: SMT		
Testing location/ address ..... :		
Tested by (name + signature) ..... :		
Approved by (name + signature) ..... :		
Supervised by (name + signature) .. :		

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

- Pages 1 to 53 for IEC 62040-1 TRF
- Pages 54 to 55 for Appendix 1: European group differences and national differences
- Pages 56 to 66 for Appendix 2: Product photo

Summary of testing:

From the result of our tests on the submitted samples, we conclude they comply with the requirements of the standards IEC 62040-1:2008 (First Edition) + Am 1:2013

Tests performed (name of test and test clause):	**Testing location:**
The submitted samples were found to comply with the requirements of: - IEC 62040-1:2008+A1:2013 - EN 62040-1:2008+A1:2013	**EMTEK (SHENZHEN) CO., LTD.** **Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China**

Summary of compliance with National Differences

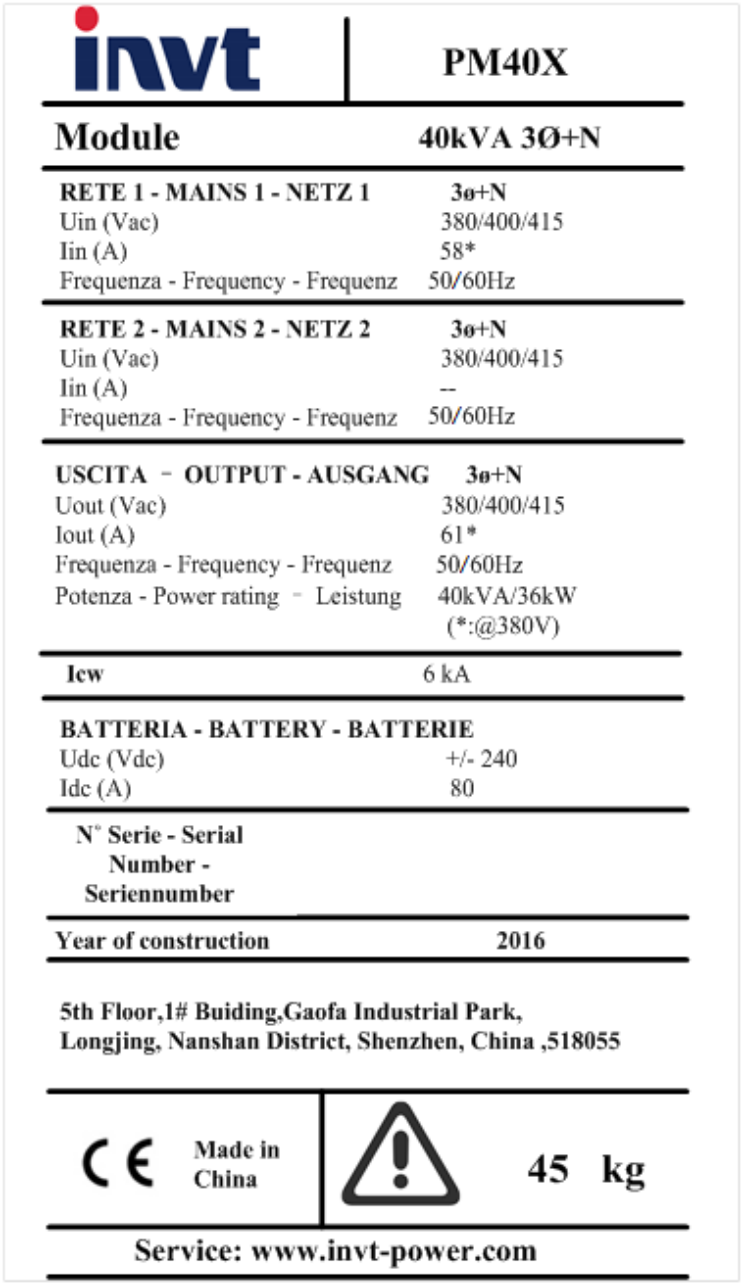
List of countries addressed: Group differences and national differences for CENELEC countries were checked.

☒ **The product fulfils the requirements of EN 62040-1: 2008+A1: 2013.**

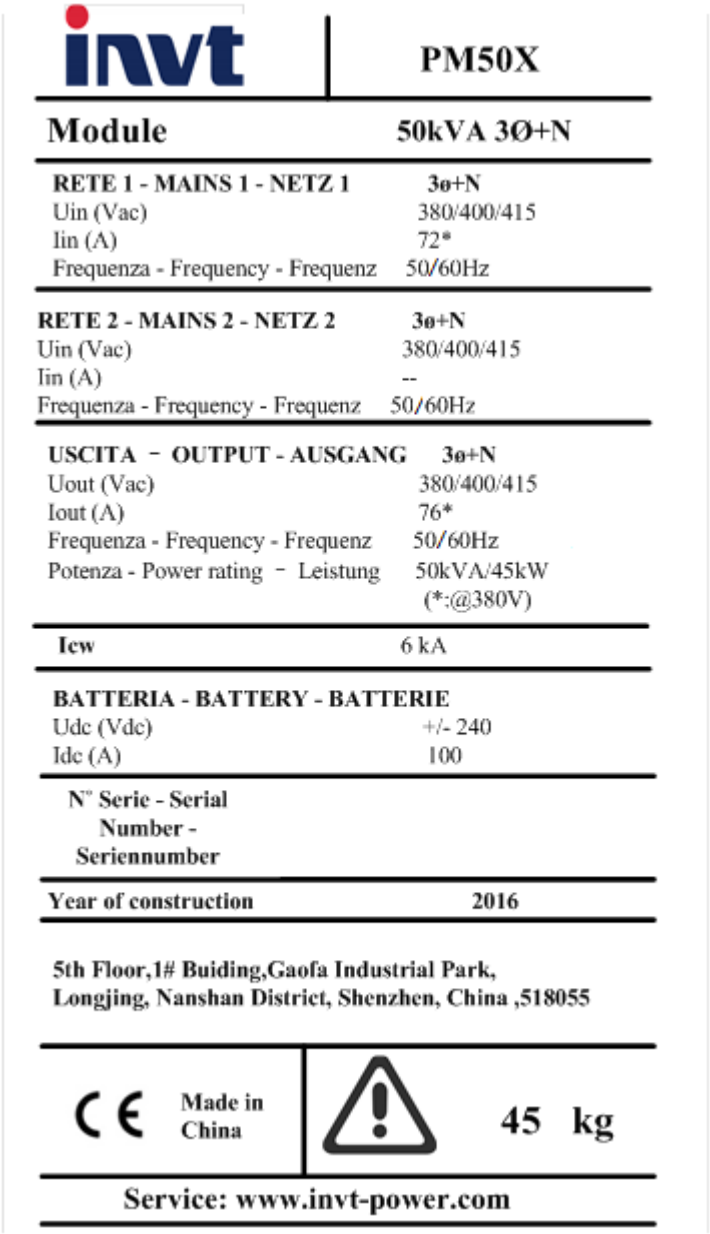
Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

1. Rating label for model PM40X:



2. Rating label for model PM50X:



invt	PM50X
Module	**50kVA 3Ø+N**
RETE 1 - MAINS 1 - NETZ 1	**3ø+N**
Uin (Vac)	380/400/415
Iin (A)	72*
Frequenza - Frequency - Frequenz	50/60Hz
RETE 2 - MAINS 2 - NETZ 2	**3ø+N**
Uin (Vac)	380/400/415
Iin (A)	--
Frequenza - Frequency - Frequenz	50/60Hz
USCITA - OUTPUT - AUSGANG	**3ø+N**
Uout (Vac)	380/400/415
Iout (A)	76*
Frequenza - Frequency - Frequenz	50/60Hz
Potenza - Power rating - Leistung	50kVA/45kW (*:@380V)
Icw	6 kA
BATTERIA - BATTERY - BATTERIE	
Udc (Vdc)	+/- 240
Idc (A)	100
N° Serie - Serial Number - Seriennumber	
Year of construction	**2016**

5th Floor,1# Buiding,Gaofa Industrial Park,
Longjing, Nanshan District, Shenzhen, China ,518055

CE Made in China | 45 kg

Service: www.invt-power.com

Manufacturer: INVT POWER SYSTEM(SHENZHEN) CO., LTD
Address: 5th Floor, 1#Building,Gaofa Industrial Park, LongJing, Nanshan District, Shenzhen,China, 518055
Importer:xxxxxx
Address:xxxxxx

1. Warning label on outer enclosures

Warning:Hazardous mains voltage and/or battery voltage present(s)behind the protective cover

The components that can only be accessed by opening the protective cover with tools cannot be operated by user.

Only qualified service personnel are authorised to remove such covers.

Module Handling

The module is very heavy.

It should be handled by 2 persons.

Please handle and lift the module with proper method to prevent any human injury or damage to the module.

Please do not touch the terminals and wait for 10 minutes to let the DC bus capacitor fully discharge before maintenance.

DANGER

The module has been pulled out by half, continuous pulling out the module must be done by two people.

Pay attention to prevent falling of module, otherwise it may cause personal injury.

Test item particulars.....:	
Equipment mobility .....:	[x] movable [] stationary [] for building-in
Connection to the mains.....:	[] pluggable equipment [x] permanent connection [] detachable power supply cord [] non-detachable power supply cord
Operating condition .....:	[x] continuous [] rated operating / resting time:
Access location .....:	[x] operator accessible [] restricted access location
Over voltage category (OVC) .....:	[] OVC I [x] OVC II [] OVC III [] OVC IV [] other
Mains supply tolerance (%) or absolute mains supply values .....:	380Vac(-10%), 415Vac(+10%) of input voltage considered
Tested for IT power systems .....:	[] Yes [x] No
IT testing, phase-phase voltage (V) .....:	NA
Class of equipment .....:	[x] Class I [] Class II [] Not classified
Considered current rating (A) .....:	72A
Pollution degree (PD) .....:	[] PD 1 [x] PD 2 [] PD 3
IP protection class .....:	IP20
Altitude during operation (m) .....:	Up to 2000
Altitude of test laboratory (m) .....:	below 2000
Mass of equipment (kg) .....:	45Kg
Possible test case verdicts:	
- test case does not apply to the test object .....:	N
- test object does meet the requirement .....:	P (Pass)
- test object does not meet the requirement .....:	F (Fail)
Testing.....:	
Date of receipt of test item.....:	August 01, 2016
Date(s) of performance of tests.....:	August 01, 2016 to August 31, 2015

General remarks:

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 testing laboratory.
"(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.
Standard IEC/EN 62040-1:2008+A1:2013 is to be used in conjunction with EN 60950-1:2006, which is referred to in this TRF as "RD".

General product information:

1. The equipment is an on-line type uninterruptible power supply with sinewave O/P for general supply of office equipment.

2. Model difference description:
All models have the same constructions, circuit diagram and PCB layout. Only model name, appearance

and the parameter of some parts are different. All tests were performed on model PM50X which means the typical model.

3.The maximum operating temperature is 40°C.

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

4	GENERAL CONDITIONS FOR TESTS	P

4.3	Components		P
1.5.1/RD	General		
	Comply with IEC 62040-1 or relevant component standard	(see appended table 4.5)	P
1.5.2/RD	Evaluation and testing of components	Certified components are used in accordance with their ratings, certifications and they comply with applicable parts of this standard. Components not certified are used in accordance with their ratings and they comply with applicable parts of IEC 60950-1 and the relevant component standard. Components, for which no relevant IEC-standard exists, have been tested under the conditions occurring in the equipment, using applicable parts of IEC 60950-1.	P
1.5.3/RD	Thermal controls	No thermal control.	N
1.5.4/RD	Transformers	Transformers used are suitable for their intended application and comply with the relevant requirements of the standard and particularly Annex C/RD.	P
1.5.5/RD	Interconnecting cables	The interconnecting cable to PC is carrying only SELV voltage on a low energy level.	P
1.5.6/RD	Capacitors bridging insulation	Between lines: X2 capacitor according to IEC 60192-14: 1993 with 21 days damp heat test was used. Between Line and PE: Y2 capacitors according to IEC 60192-14 with 21 days damp heat test was used.	P
1.5.7/RD	Resistors bridging insulation		P
1.5.7.1/RD	Resistors bridging functional, basic or supplementary insulation		P
1.5.7.2/RD	Resistors bridging double or reinforced insulation between a.c. mains and other circuits	No resistors bridging double or reinforced insulation.	N
1.5.7.3/RD	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable	No antenna or coaxial cable.	N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.5.8/RD	Components in equipment for IT power systems	No Y-cap used.	N
4.6	Power interface		P
1.6.1/RD	AC power distribution systems	TN power system	P
1.6.2/RD	Input current	Highest normal load according to 1.2.2.1/RD for this equipment is the charging of empty battery and operation with the maximum specified output load. (see appended table 4.6)	P
4.6 1.6.4/RD	Neutral conductor	Neutral is insulated from earth with basic insulation throughout the equipment. O/P neutral is not isolated from I/P neutral.	P
4.7	Marking and instructions		P
4.7.1	General	See below.	P
4.7.2 1.7.1/RD	Power rating	The required marking is located on the outside surface of the equipment.	P
	Input rated voltage/range (V).....:	See rating labels	P
	Input rated current/range (A).....:	See rating labels	P
	Input symbol for nature of supply (d.c.) .....:	±240V⎓	P
	Input rated frequency/range (Hz) .....:	50/60	P
	Number of Input phases and neutral.....:	3Φ	P
	Output rated voltage/range (V) .....:	See rating labels	P
	Output rated current/range (A) .....:	See rating label	P
	Output rated power factor, (if less than unity, or active power and apparent power or active power and rated current) .....:	Not marked.	N
	Number of output phases and neutral.....:	3Φ	P
	Output rated active power (W) .....:	See rating labels	P
	Output rated apparent power (VA) .....:	See rating labels	P
	Output symbol for nature of supply (d.c.) .....:	No d.c. output.	N
	Output rated frequency/range (Hz).....:	50/60	P
	Ambient operating temperature range (°C).....:	40°C	P
	Rated short-time withstand current (Icw) or rated conditional short-circuit current (Icc)	See rating label	P
	Manufacturer's name or trademark or identification mark .....:	See rating label	P

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

	Type/model or type reference .....:	See rating label	P
	Symbol for Class II equipment only .....:	The equipment is Class I.	N
	Other symbols .....:	The additional marking does not give rise to misunderstandings.	P
	Certification marks .....:	CE	P
	Instructions for units with automatic bypass / maintenance bypass, additional input a.c. supply, or external batteries, having text "See installation instructions before connecting to the supply" .....:	See caution label	P
4.7.3	Safety instructions	The user manual contains information for operation, installation, servicing transport, storage and technical data.	P
4.7.3.1	General	Considered	P
4.7.3.2	Installation .....:	Installation instructions are available to the user in User's Manual.	P
	Location in a restricted access location only ...:	Instruction manual provided. Not for restricted access location.	P
	Permanent connector UPS.....:	Instruction manual provided.	P
	Pluggable type A or Pluggable type B UPS ....:	Not Pluggable type A or Pluggable type B UPS	N
4.7.3.3	Operation.....:	The suitable information list in the user manual when operate the UPS. Not for restricted access location.	P
4.7.3.4	Maintenance.....:	The instruction of maintenance is only included in the service manual.	P
4.7.3.5	Distribution related backfeed.....:	Backfeed protection provided externally to the UPS.	P
4.7.4 1.7.4/RD	Main voltage adjustment .....:	Software set.	P
	Methods and means of adjustment; reference to installation instructions .....:	Software set.	P
4.7.5 1.7.5/RD	Power outlets.....:	Relevant information provided on the marking that is affixed near the outlets.	P
4.7.6 1.7.6/RD	Fuse identification (marking, special fusing characteristics, cross-reference) .....:	Marking near holders for fuses.	P
4.7.7 1.7.7/RD	Wiring terminals	Refer below:	P

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

1.7.7.1/RD	Protective earthing and bonding terminals .....:	The earthing terminal is marked with the standard earthing symbol (60417-2-IEC-5019) near the terminal.	P
1.7.7.2/RD	Terminals for a.c. mains supply conductors	The AC terminal is marked with L, N, G symbol near the terminal.	P
1.7.7.3/RD	Terminals for d.c. mains supply conductors	AC main supplied	N
4.7.8	Battery terminals :	The terminal of batteries is marked with standard symbol (IEC 60417, No. 5005 and No. 5006).	P
4.7.9 1.7.8/RD	Controls and indicators	See below	P
1.7.8.1/RD	Identification, location and marking :	The earthing terminal is marked with the standard earthing symbol (60417-2-IEC-5019) near the terminal.	P
1.7.8.2/RD	Colours :	The earthing terminal is marked with the standard earthing symbol (60417-2-IEC-5019) near the terminal.	P
1.7.8.3/RD	Symbols according to IEC 60417 :	The function switch is marked " " (IEC 60417-1 No. 5010).	P
1.7.8.4/RD	Markings using figures :	No controls affecting safety are using figures.	N
4.7.10 1.7.9/RD	Isolation of multiple power sources :	Only one external supply of hazardous voltage of energy (via appliance inlet).	N
4.7.11 1.7.2.4/RD	IT power systems	TN power system.	N
4.7.12	Protection in building installation	Permanently connected equipment relies on the building installation for short-circuit protection or overcurrent protection.	P
	Rated short-time withstand current (*I*cw) .....:		N
	Rated conditional short circuit current (*I*cc) .....:		N
	a) If higher Icp stated ≤ 10 kA		N
	a) If higher Icp stated > 10 kA		N
4.7.13 5.1/RD	High leakage current (mA) .....:	Leakage current of the equipment does not exceed 3.5mA. However due to the connected load has influence on the overall earth leakage current, a corresponding statement was provided in the User's Manual.	P

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

4.7.14 1.7.10/RD	Thermostats and other regulating devices	No thermostats or other regulating devices.	N
4.7.15 1.7.2.1/RD and 1.7.8.1/RD	Language(s) .....:	Instructions and markings shall be in a language acceptable for the country where the equipment is to be used. English user manual provided.	P
4.7.16 1.7.11/RD	Durability of markings	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15s and then again for 15s with the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking of the label did not fade. There was neither curling nor lifting of the label edge.	P
4.7.17 1.7.12/RD	Removable parts	No required markings placed on removable parts.	P
4.7.18 1.7.13/RD	Replaceable batteries	The battery is not placed in an operator access area. The required warning is in the safety manual.	P
	Language(s) .....:	Instructions and markings are in English.	
4.7.19 1.7.2.5/RD	Operator access with a tool.....:	All areas containing hazard(s) are inaccessible to the operator.	P
4.7.20	Battery	No battery used	N
	Clearly legible information .....:		N
	Battery type .....:		N
	Nominal voltage of total battery (V) .....:		N
	Nominal capacity of total battery (optional) .....:		N
	Warning label .....:		N
	Instructions .....:		N
2.1.1.5/RD	Protection against energy hazards	No energy hazard in operator access area. Checked by means of the test finger.	P
4.7.21 1.7.2.4/RD	Installation instructions		N

5	FUNDAMENTAL DESIGN REQUIREMENTS	P
5.1	Protection against electric shock and energy hazards	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.1 2.1.1/RD	Protection for UPS intended to be used in operator access areas	Refer below:	P
2.1.1.1/RD	Access to energized parts	There is adequate protection against operator contact with bare parts at ELV or hazardous voltage or parts separated from these with basic or functional insulation only (except protective earth). No hazardous voltages exceeding 1000V a.c. or 1500V d.c. Checked by test finger, test probe and test pin.	P
	Test by inspection :	Complies	P
	Test with test finger (Figure 2A) :	Complies	P
	Test with test pin (Figure 2B) :	Complies	P
	Test with test probe (Figure 2C) :	No TNV circuits	N
2.1.1.2/RD	Battery compartments	Inside the battery compartment only primary circuits.	N
2.1.1.3/RD	Access to ELV wiring	No internal wiring at ELV accessible to the operator.	N
	Working voltage (Vpeak or Vrms); minimum distance through insulation (mm)		
2.1.1.4/RD	Access to hazardous voltage circuit wiring	No operator accessible hazardous voltage circuit wiring.	N
2.1.1.5/RD	Energy hazards :		N
2.1.1.6/RD	Manual controls	No shafts of knobs etc. at ELV or hazardous voltage.	P
2.1.1.7/RD	Discharge of capacitors in equipment	The capacitance of the input circuits>0.1uF, refer to list of critical components.	P
	Measured voltage (V); time-constant (s) :	(See appended table 5.1.1)	--
2.1.1.8/RD	Energy hazards – d.c. mains supply	The equipment is not connected to d.c. mains supply	N
	a) Capacitor connected to the d.c. mains supply :		N
	b) Internal battery connected to the d.c. mains supply :		N
2.1.1.9/RD	Audio amplifiers :	No such parts.	N
5.1.2 2.1.1.5 c) /RD	Protection for UPS intended to be used in service access areas	Checked by inspection, unintentional contact is unlikely during service operations.	N
	Hazardous energy level		N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.3 2.1.1.5 c) /RD	Protection for UPS intended to be used in restricted access areas		N
	Hazardous energy level		N
5.1.4	Backfeed protection		—
	Shock hazard after de-energization of a.c. input for UPS	No shock hazard	P
	Measured voltage (V); time-constant (s) :	(see appended table 5.8)	P
	Description of the construction:	Backfeed protection was provided externally to the UPS in the a.c. input line.	P
	Air gap is employed for backfeed protection	Backfeed protection was provided externally to the UPS in the a.c. input line.	P
5.1.5	Emergency switching device	Not mandatory for pluggable UPS.	N
5.2	Requirements for auxiliary circuits		N
5.2.1 2.2/RD	Safety extra low voltage circuit - SELV		N
2.2.1/RD	General requirements		N
2.2.2/RD	Voltages under normal conditions (V) .....:		N
2.2.3/RD	Voltages under fault conditions (V) .....:		N
2.2.4/RD	Connection of SELV circuits to other circuits ..:		N
5.2.2 2.3/RD	Telephone network voltage circuits - TNV	Refer below:	N
2.3.1/RD	Limits	No TNV circuits, cl. 2.3/RD	N
	Type of TNV circuits :		
2.3.2/RD	Separation from other circuits and from accessible parts		N
2.3.2.1/RD	General requirements		N
2.3.2.2/RD	Protection by basic insulation		N
2.3.2.3/RD	Protection by earthing		N
2.3.2.4/RD	Protection by other constructions :		N
2.3.3/RD	Separation from hazardous voltages		N
	Insulation employed :		
2.3.4/RD	Connection of TNV circuits to other circuits		N
	Insulation employed :		
2.3.5/RD	Test for operating voltages generated externally		N
5.2.3 2.4/RD	Limited current circuits	No limited current circuits, cl. 2.4/RD.	N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
2.4.1/RD	General requirements		N
2.4.2/RD	Limit values		
	Frequency (Hz) :		
	Measured current (mA) :		
	Measured voltage (V) :		
	Measured circuit capacitance (nF or µF) :		
2.4.3/RD	Connection of limited current circuits to other circuits		N
5.2.4 3.5/RD	External signalling circuits		N
3.5.1/RD	General requirements		N
3.5.2/RD	Types of interconnection circuits :		N
3.5.3/RD	ELV circuits as interconnection circuits	No ELV interconnections.	N
3.5.4/RD	Data ports for additional equipment		N
5.2.5 2.5/RD	Limited power source		N
	a) Inherently limited output		N
	b) Impedance limited output		N
	c) Regulating network limited output under normal operating and single fault condition		N
	d) Overcurrent protective device limited output		N
	Max. output voltage (V), max. output current (A), max. apparent power (VA) .....:		N
	Current rating of overcurrent protective device (A)		N
	Use of integrated circuit (IC) current limiters		N
5.3	Protective earthing and bonding		P
5.3.1	General	See below.	P
2.6/RD	Provisions for earthing and bonding	See below.	P
2.6.1/RD	Protective earthing	Reliable connection of relevant conductive parts to the PE terminal (via green/yellow insulated wires).	P
2.6.2/RD	Functional earthing	No functional earthing.	N
2.6.3/RD	Protective earthing and protective bonding conductors		P
2.6.3.1/RD	General	Compliance checked.	P
2.6.3.2/RD	Size of protective earthing conductors		P
	Rated current (A), cross-sectional area (mm^2), AWG :	(see appended tabel 4.5)	P
2.6.3.3/RD	Size of protective bonding conductors	Refer to 2.6.3.4/RD.	P

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

	Rated current (A), cross-sectional area (mm^2), AWG :	Refer to 2.6.3.4/RD.	—
	Protective current rating (A), cross-sectional area (mm2), AWG :	Refer to 2.6.3.4/RD.	—
2.6.3.4/RD	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min) :	(See appended table 5.3.1)	P
2.6.3.5/RD	Colour of insulation :	All insulated protective earth conductors are used colored green and yellow.	P
2.6.4/RD	Terminals	See below.	P
2.6.4.1/RD	General	See below.	P
2.6.4.2/RD	Protective earthing and bonding terminals	Adequate protective earth connection, see also Sub-clause 2.6.3.4/RD and 3.3/RD	P
	Rated current (A), type, nominal thread diameter (mm) :		—
2.6.4.3/RD	Separation of the protective earthing conductor from protective bonding conductors	Separate PE and protective bonding conductor used.	N
2.6.5/RD	Integrity of protective earthing	See below.	P
2.6.5.1/RD	Interconnection of equipment	Interconnected equipment is properly earthed.	P
2.6.5.2/RD	Components in protective earthing conductors and protective bonding conductors	There are no switches or overcurrent protective devices in the protective earthing / bonding conductors.	P
2.6.5.3/RD	Disconnection of protective earth	It is not possible to disconnect protective earth without disconnecting mains	P
2.6.5.4/RD	Parts that can be removed by an operator	No operator removable parts with protective earth connection except supply cord.	P
2.6.5.5/RD	Parts removed during servicing	Protective earthed parts cannot be removed in a way which impair safety.	P
2.6.5.6/RD	Corrosion resistance	No risk of corrosion	P
2.6.5.7/RD	Screws for protective bonding	No such screw	N
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system	Protective earthing does not rely on a telecommunication network.	N
5.3.2 2.6.1/RD	Protective earthing	Accessible conductive parts are reliably connected to protective earth terminal	P
2.10/RD	Clearances, creepage distances and distances through insulation	See clause 5.7	P
4.2/RD	Mechanical strength	See clause 7.3	P

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.2/RD	Electric strength	See clause 8.2	P
5.3.3	Protective bonding	Refer also to 2.6.3.4/RD	P
5.4	AC and d.c. power isolation		P
5.4.1	General	See below.	P
3.4/RD	Disconnection from the mains supply	See below.	P
3.4.1/RD	General requirement	Considered	P
3.4.2/RD	Disconnect devices		N
3.4.3/RD	Permanently connected equipment		P
3.4.4/RD	Parts which remain energized	No parts remain energized after the disconnect device is pull out.	N
3.4.5/RD	Switches in flexible cords	No such construction.	N
3.4.6/RD	Number of poles - single-phase and d.c. equipment	three-phase equipment	N
3.4.7/RD	Number of poles - three-phase equipment		P
3.4.8/RD	Switches as disconnect devices		P
3.4.9/RD	Plugs as disconnect devices		N
3.4.10/RD	Interconnected equipment	Warning label provided on both the UPS, that both units must be disconnected before service. See copy of marking.	P
3.4.11/RD	Multiple power sources	Only one external supply of hazardous voltage or energy	N
5.4.2	Disconnect devices	Permanently connected equipment.	N
5.5	Overcurrent and earth fault protection		P
5.5.1	General	See below.	P
2.7.3/RD	Short-circuit backup protection	Adequate protective device.	P
2.7.4/RD	Number and location of protective devices …….:		P
2.7.5/RD	Protection by several devices	Only one protective device provided.	P
2.7.6/RD	Warning to service personnel :	Hazard may be still present in the equipment after the input circuit breaker opens. However, as it is considered that the plug to the mains will be disconnected during service work. No markings were needed.	N

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Clause	Requirement + Test	Result - Remark	Verdict
5.5.2	Basic requirements	Equipment relies on circuit breaker of the wall outlet installation protection of the building installation in regard to L, N short circuit and for L to PE earth fault. Over current protection is provided by the built-in device breaker.	P
5.5.3	Battery circuit protection	See below.	P
5.5.3.1	Overcurrent and earth fault protection	See below.	P
5.5.3.2	Location of protective device	The fuses are directly located behind the supply wire from the battery. The charger located in the battery circuit before the fuses. For the charger circuit there are no hazardous condition under any simulated fault conditions. (see also “Fault condition tests”)	P
5.5.3.3	Rating of protective device	See below.	P
5.3.1/RD	Protection against overload and abnormal operation	(see appended table 8.3)	P
5.5.4	Short-time withstand current		P
5.5.4.1	General		P
5.5.4.2	Modes of operation		P
5.5.4.3	Test procedure		P
5.5.4.3.1	General application		P
	Rated UPS output current/(r.m.s) (A) .....:	See product specification	P
	Prospective test current/(r.m.s) (A) .....:	See product specification	P
	Typical power factor .....:	See product specification	P
	Initial asymmetric peak current ration (*I*pk / *I*cw) .:	See product specification	P
	Minimum durating of prospective test current (cycles 50/60 Hz) .....:	See product specification	P
5.5.4.3.2	Exemption from testing		P

5.6	Protection of personnel – Safety interlocks *(No safety interlock provided for operator protection since there are no liable hazards capable of harming the operator during operation).*		P
5.6.1	Operator protection	See below	N
2.8/RD	Safety interlocks	No safety interlocks.	N
2.8.1/RD	General principles		N
2.8.2/RD	Protection requirements		N
2.8.3/RD	Inadvertent reactivation		N
2.8.4/RD	Fail-safe operation		N

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Clause	Requirement + Test	Result - Remark	Verdict
2.8.5/RD	Moving parts		N
2.8.6/RD	Overriding		N
2.8.7/RD	Switches and relays		N
2.8.7.1/RD	Contact gaps (mm) :		N
2.8.7.2/RD	Overload test		N
2.8.7.3/RD	Endurance test		N
2.8.7.4/RD	Electric strength test	(see appended table 8.2)	N
2.8.8/RD	Mechanical actuators		N
5.6.2	Service person protection	See below.	P
5.6.2.1	Introduction	Considered	P
5.6.2.2	Covers	It is unlikely that during the removal of any covers service personnel may touch hazardous voltage or energy.	P
5.6.2.3	Location and guarding of parts	Only the exchange of the battery is considered as possible servicing. A risk of injury is unlikely for the service personnel.	P
5.6.2.4	Parts on doors	The UPS is designed with only screwed enclosure parts.	P
5.6.2.5	Component access	No component access during operation mode necessary.	N
2.8.3/RD	Inadvertent reactivation	No servicing in operation mode necessary.	N
5.6.2.6	Moving parts	No hazardous moving parts.	N
5.6.2.7	Capacitor banks	The capacitors provided can produce energy level way below 20 joules.	P
5.6.2.8	Internal batteries		N
5.7 2.10/RD	Clearances, creepage distances and distances through insulation		P
2.10.1/RD	General	See below.	P
2.10.1.1/RD	Frequency .....:	Considered.	P
2.10.1.2/RD	Pollution degrees .....:	II	P
2.10.1.3/RD	Reduced values for functional insulation	The functional insulations comply with 5.3.4/RD a) and c)	P
2.10.1.4/RD	Intervening unconnected conductive parts	Considered.	P
2.10.1.5/RD	Insulation with varying dimensions	No such transformer used.	P
2.10.1.6/RD	Special separation requirements	Special separation is not used.	N

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Clause	Requirement + Test	Result - Remark	Verdict

2.10.1.7/RD	Insulation in circuits generating starting pulses	No such circuit generating starting pulses.	N
2.10.2/RD	Determination of working voltage	(See appended table 5.7)	P
2.10.2.1/RD	General	See below.	P
2.10.2.2/RD	RMS working voltage	(See appended table 5.7)	P
2.10.2.3/RD	Peak working voltage	(See appended table 5.7)	P
2.10.3/RD	Clearances	See below.	P
2.10.3.1/RD	General	See below.	P
2.10.3.2/RD	Mains transient voltages	See below.	P
	a) AC mains supply .....:	Equipment is Overvoltage Category II.	P
	b) Earthed d.c. mains supplies .....:	Not intended for d.c. mains supplies	N
	c) Unearthed d.c. mains supplies :	Not intended for d.c. mains supplies	N
	d) Battery operation :	Dedicated battery used.	P
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	P
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	P
2.10.3.5/RD	Clearances in circuits having starting pulses	No such circuit generating starting pulses.	N
2.10.3.6/RD	Transients from a.c. mains supply :	Considered.	P
2.10.3.7/RD	Transients from d.c. mains supply :	Not connected to d.c. mains supply.	N
2.10.3.8/RD	Transients from telecommunication networks and cable distribution systems :	No TNV circuits	N
2.10.3.9/RD	Measurement of transient voltage levels	Measurement not relevant	N
	a) Transients from a mains supply		N
	For an a.c. mains supply :		N
	For a d.c. mains supply :		N
	b) Transients from a telecommunication network :		N
2.10.4/RD	Creepage distances	(see appended table 5.7)	P
2.10.4.1/RD	General	See below.	P
2.10.4.2/RD	Material group and comparative tracking index	Material IIIb is used.	P
	CTI tests	CTI rating for all material of min. 100.	
2.10.4.3/RD	Minimum creepage distances	(see appended table 5.7)	P
2.10.5 /RD	Solid insulation	Considered.	P
2.10.5.1/RD	General	See below.	P
2.10.5.2/RD	Distances through insulation	(see appended table 5.8)	P

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Clause	Requirement + Test	Result - Remark	Verdict

2.10.5.3/RD	Insulating compound as solid insulation	Approved opto-couplers, see appended table 4.5	P
2.10.5.4/RD	Semiconductor devices	No semiconductor devices.	N
2.10.5.5/RD	Cemented joints	No cemented joint.	N
2.10.5.6/RD	Thin sheet material – General	See below.	P
2.10.5.7/RD	Separable thin sheet material		N
	Number of layers (pcs).		—
2.10.5.8/RD	Non-separable thin sheet material	Not used.	N
2.10.5.9/RD	Thin sheet material – standard test procedure		N
2.10.5.10 /RD	Thin sheet material – (Alternative) test procedure		—
	Electric strength test		N
2.10.5.11 /RD	Insulation in wound components		—
2.10.5.12 /RD	Wire in wound components	See cl. 2.10.5.12/RD	N
	Working voltage :	No wound components.	N
	a) Basic insulation not under stress :		—
	b) Basic, supplementary, reinforced insulation :		N
	c) Compliance with Annex U :		N
	Two wires in contact inside wound component; angle between 45º and 90º :		N
2.10.5.13 /RD	Wire with solvent-based enamel in wound components		N
	Electric strength test	No wire with solvent-based enamel in wound components.	N
	Routine test	(see appended table 8.2)	—
2.10.5.14 /RD	Additional insulation in wound components		N
	Working voltage :	No additional insulation used.	N
	- Basic insulation not under stress :		—
	- Supplementary, reinforced insulation :		N
2.10.6/RD	Construction of printed boards	See below.	P
2.10.6.1/RD	Uncoated printed boards	(see appended table 5.7)	P
2.10.6.2/RD	Coated printed boards	(see appended table 5.7)	P
2.10.6.3/RD	Insulation between conductors on the same inner surface of a printed board	No such part.	N
2.10.6.4/RD	Insulation between conductors on different layers of a printed board	No such part.	N

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Clause	Requirement + Test	Result - Remark	Verdict
	Distance through insulation	PCB layout does not serve as insulation barrier.	N
	Number of insulation layers (pcs) :		N
2.10.7/RD	Component external terminations	(see appended table 2.10.3 and 2.10.4)	P
2.10.8/RD	Tests on coated printed boards and coated components	No such part.	N
2.10.8.1/RD	Sample preparation and preliminary inspection	No such part.	N
2.10.8.2/RD	Thermal conditioning		N
2.10.8.3/RD	Electric strength test		N
2.10.8.4/RD	Abrasion resistance test		—
2.10.9/RD	Thermal cycling		N
2.10.10/RD	Test for Pollution Degree 1 environment and insulating compound	Approved opto-couplers, see appended table 4.5	P
2.10.11/RD	Tests for semiconductor devices and cemented joints	No such device used.	N
2.10.12/RD	Enclosed and sealed parts	Approved opto-couplers, see appended table 4.5	P
6	Wiring, connections and supply		P
6.1	General	Considered.	P
6.1.1	Introduction	Considered.	P
3.1/RD	General	See below.	P
3.1.1/RD	Current rating and overcurrent protection	Adequate cross sectional areas on internal wiring and interconnecting cables.	P
3.1.2/RD	Protection against mechanical damage	Wireways are smooth and free from edges. Wires are adequately fixed to prevent excessive strain on wire and terminals and avoiding damage to the insulation of the conductors.	P
3.1.3/RD	Securing of internal wiring	Internal wiring is secured against excessive strain, loosening of terminals and damage to the conductor insulation.	P
3.1.4/RD	Insulation of conductors	Insulation on internal conductors is considered to be of adequate quality and suitable for the application and the working voltage involved.	P
3.1.5/RD	Beads and ceramic insulators	No beads or similar ceramic insulators on conductors.	N

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Clause	Requirement + Test	Result - Remark	Verdict
3.1.6/RD	Screws for electrical contact pressure	Electrical and earthing connections screwed two or more complete threads into metal. No screws of insulating material for electrical and earthing connections, or where supplementary or reinforced insulation could be impaired by a metal replacement.	P
3.1.7/RD	Insulating materials in electrical connections	All current carrying and safety earthing connections are metal to metal.	P
3.1.8/RD	Self-tapping and spaced thread screws	Self-tapping screws provided in inverter circuit and earthing bonding.	P
3.1.9/RD	Termination of conductors	All conductors are reliable secured by the use of solder pins or glue or other mechanical fixing means. No risk of stranded conductors coming loose.	P
	10 N pull test	Considered	P
3.1.10/RD	Sleeving on wiring	Sleeves can only be removed by breaking or cutting.	P
6.1.2	Dimensions and rating of busbars and insulated conductors		P
6.2	Connection to power		P
6.2.1	General provisions for connection to power		P
3.2.2/RD	Multiple supply connections	Only one supply connections.	P
3.2.3/RD	Permanently connected equipment		N
	Number of conductors, diameter of cable and conduits (mm) .....:		—
3.2.4/RD	Appliance inlets	No appliance inlet.	N
3.2.5/RD	Power supply cords	No provided.	N
3.2.5.1/RD	AC power supply cords		N
	Type .....:		—
	Rated current (A), cross-sectional area (mm²), AWG .....:		—
3.2.5.2/RD	DC power supply cords	Not used.	N
3.2.6/RD	Cord anchorages and strain relief		N
	Mass of equipment (kg), pull (N) .....:		—
	Longitudinal displacement (mm) .....:		—
3.2.7/RD	Protection against mechanical damage		N

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Clause	Requirement + Test	Result - Remark	Verdict
3.2.8/RD	Cord guards		N
	Diameter or minor dimension D (mm); test mass (g) .....:		—
	Radius of curvature of cord (mm).....:		—
6.2.2	Means of connection :	Screw terminal used.	P
	More than one supply connection :		N
6.3	Wiring terminals for external power conductors *(No wiring terminals for external power conductors)*		N
3.3/RD	Wiring terminals for connection of external conductors		N
3.3.1/RD	Wiring terminals		N
3.3.2/RD	Connection of non-detachable power supply cords		N
3.3.3/RD	Screw terminals		N
3.3.4/RD	Conductor sizes to be connected		N
	Rated current (A), cord/cable type, cross-sectional area (mm2).....:		N
3.3.5/RD	Wiring terminal sizes		N
	Rated current (A), type, nominal thread diameter (mm) .....:		—
3.3.6/RD	Wiring terminal design		N
3.3.7/RD	Grouping of wiring terminals		N
3.3.8/RD	Stranded wire		N
7	Physical requirements		P
7.1	Enclosure	Adequate protection against risk of fire, electric shock, injury to persons and hazardous energy level.	P
7.2 4.1/RD	Stability		P
	Angle of 10	All models of the UPS do not overbalance when tilted to an angle of 10 degree.	P
	Test force (N) :	250N	P
7.3 4.2/RD	Mechanical strength		P

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Clause	Requirement + Test	Result - Remark	Verdict
4.2.1/RD	General	Complies with the requirement also after tests described below are applied.	P
4.2.2/RD	Steady force test, 10 N	No hazard, ref. comment in appended table 5.7, 2.10.4/RD.	—
4.2.3/RD	Steady force test, 30 N	No internal enclosure	N
4.2.4/RD	Steady force test, 250 N	No hazard. The test is performed on all sides of enclosure.	P
4.2.5/RD	Impact test	See below.	P
	Fall test	No hazard as result from the steel sphere fall test.	P
	Swing test	No hazard as result from the steel sphere swing test.	P
4.2.6/RD	Drop test; height (mm):	Drop test not applicable	N
4.2.7/RD	Stress relief test	Metal enclosure	N
4.2.8/RD	Cathode ray tubes	CRT(s) not used in the equipment.	N
	Picture tube separately certified：		—
4.2.9/RD	High pressure lamps	No high pressure lamps in the equipment.	N
4.2.10/RD	Wall or ceiling mounted equipment; force (N) :	No wall or ceiling mounted equipment	N
7.4	Construction details		P
7.4.1	Introduction	Considered.	P
4.3.1/RD	Edges and corners	All edges and corners are rounded and/or smoothed.	P
4.3.2/RD	Handles and manual controls; force (N)..... :	No handles	N
4.3.3/RD	Adjustable controls	No adjustable controls.	N
4.3.4/RD	Securing of parts	No loosening of parts impairing creepage distances or clearances is likely to occur.	P
4.3.5/RD	Connection by plugs and sockets	No mismatch of connectors, plugs or sockets possible.	P
4.3.7/RD	Heating elements in earthed equipment	No heating elements provided.	N
4.3.11/RD	Containers for liquids or gases	The equipment does not contain flammable liquids or gases.	N
4.4/RD	Protection against hazardous moving parts	No moving parts.	N

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Clause	Requirement + Test	Result - Remark	Verdict
4.4.1/RD	General	DC fan located at secondary circuit. The enclosure of the unit provide as fan guard. Test finger applied to openings. No fan blade accessible.	P
4.4.2/RD	Protection in operator access areas :	See 4.4.1	P
4.4.3/RD	Protection in restricted access locations :	Not for restricted access locations.	P
4.4.4/RD	Protection in service access areas	See 4.4.1	P
4.4.5/RD	Protection against moving fan blades	Considered	P
4.4.5.1/RD	General	See below.	P
	Not considered to cause pain or injury. a) .....:		N
	Is considered to cause pain, not injury. b) .....:		N
	Considered to cause injury. c) .....:		N
4.4.5.2	Protection for users	(See appended table 7.7)	P
	Use of symbol or warning .....:		N
4.4.5.3	Protection for service persons		N
	Use of symbol or warning .....:		N
4.5/RD	Thermal requirements	Considered	P
4.5.1/RD	General	See below.	P
4.5.2/RD	Temperature tests	(See appended table 7.7)	P
	Normal load condition per Annex L :		
4.5.3/RD	Temperature limits for materials	(See appended table 7.7)	P
4.5.4/RD	Touch temperature limits	(See appended table 7.7)	P
4.5.5/RD	Resistance to abnormal heat :		P
7.4.2	Openings	(See appended table 7.4.2)	P
7.4.3	Gas Concentration	The ventilation by openings exceeds the required airflow. Refer to Annex M.	P
7.4.4	Equipment movement		P
7.5 4.7/RD	Resistance to fire		P
4.7.1/RD	Reducing the risk of ignition and spread of flame	Use of materials with the required flammability classes	P
	Method 1, selection and application of components wiring and materials	Method 1 is used. No excessive temperatures. No easily burning materials employed. Safety relevant components used within their specified temperature limits.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Method 2, application of all of simulated fault condition tests		N
4.7.2/RD	Conditions for a fire enclosure	See below.	P
4.7.2.1/RD	Parts requiring a fire enclosure	With having the following components: - Components in primary circuits - Insulated wiring - Semiconductor devices, transistors, diodes, integrated circuits - Resistors, capacitors, inductors The fire enclosure is required.	P
4.7.2.2/RD	Parts not requiring a fire enclosure	The fire enclosure is required to cover all parts.	N
4.7.3/RD	Materials	See below.	P
4.7.3.1/RD	General	PCB rated V-0. See appended table.	P
4.7.3.2/RD	Materials for fire enclosures	Metal enclosure. (See appended table 4.3)	P
4.7.3.3/RD	Materials for components and other parts outside fire enclosures	No parts outside the fire enclosure.	N
4.7.3.4/RD	Materials for components and other parts inside fire enclosures	Internal components except small parts are V-2, HF-2 or better.	P
4.7.3.5/RD	Materials for air filter assemblies	No air filters in the equipment.	N
4.7.3.6/RD	Materials used in high-voltage components	No parts exceeding 4kV.	N
7.6	Battery location		N
7.6.1	Battery location and installation	No internal batteries provided	N
7.6.2	Accessibility and maintainability		N
7.6.3	Distance		N
7.6.4	Case insulation		N
7.6.5	Wiring		N
7.6.6	Electrolyte spillage		N
7.6.7	Ventilation		N
7.6.8	Charging voltage		N
7.7	Temperature rise		P
4.5/RD	Thermal requirements	Considered	P
4.5.1/RD	General	See below.	P

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Clause	Requirement + Test	Result - Remark	Verdict
4.5.2/RD	Temperature tests	(See appended table 7.7)	P
	Normal load condition per Annex L .....:		—
4.5.3/RD	Temperature limits for materials	(See appended table 7.7)	P
4.5.4/RD	Touch temperature limits	(See appended table 7.7)	P
4.5.5/RD	Resistance to abnormal heat .....:	(See appended table 7.4)	P
8	Electrical requirements and simulated abnormal conditions		P
8.1	General provisions for earth leakage		P
5.1.1/RD	General	Test conducted in accordance with Sub-clause 8.1	P
5.1.7/RD	Equipment with touch current exceeding 3,5 mA		P
8.2 5.2/RD	Electric strength		P
5.2.1/RD	General	(see appended table 8.2)	P
5.2.2/RD	Test procedure	(see appended table 8.2)	P
8.3	Abnormal operating and fault conditions		P
8.3.1	General	Considered.	P
5.3.1/RD	Protection against overload and abnormal operation	(See appended table 8.3)	P
5.3.2/RD	Motors	No motors	N
5.3.3/RD	Transformers	(See appended Annex C)	P
5.3.4/RD	Functional insulation :	Complies with a) and c).	P
5.3.5/RD	Electromechanical components	No electromechanical components in secondary circuits.	N
5.3.9/RD	Compliance criteria for abnormal operating and fault conditions	No fire or molten metal occurred and no deformation of enclosure during the tests. No reduction of clearance and creepage distances. Electric strength test is made on basic, supplementary and reinforced insulation.	P
5.3.9.1/RD	During the tests		P
5.3.9.2/RD	After the tests		P
8.3.2	Simulation of faults	(See appended table 8.3)	P
8.3.3	Conditions for tests	(See appended table 8.3)	P
9 6/RD	Connection to telecommunication networks		N

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Clause	Requirement + Test	Result - Remark	Verdict
6.1/RD	Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment		N
6.1.1/RD	Protection from hazardous voltages		N
6.1.2/RD	Separation of the telecommunication network from earth		N
6.1.2.1/RD	Requirements		N
	Supply voltage (V) .....:		
	Current in the test circuit (mA) .....:		
6.1.2.2/RD	Exclusions .....:		N
6.2/RD	Protection of equipment users from overvoltages on telecommunication networks		N
6.2.1/RD	Separation requirements		N
6.2.2/RD	Electric strength test procedure		N
6.2.2.1/RD	Impulse test		N
6.2.2.2/RD	Steady-state test		N
6.2.2.3/RD	Compliance criteria		N
6.3/RD	Protection of the telecommunication wiring system from overheating		N
	Max. output current (A) .....:		
3.5/RD	Interconnection of equipment		N
3.5.1/RD	General requirements		N
3.5.2/RD	Types of interconnection circuits .....:		N
3.5.3/RD	ELV circuits as interconnection circuits		N
3.5.4/RD	Data ports for additional equipment		N
2.1.3/RD	Protection in restricted access locations		N
2.3.1/RD	Limits		N
	Type of TNV circuits .....:		
2.3.2/RD	Separation from other circuits and from accessible parts		P
2.3.2.1/RD	General requirements		P
2.3.2.2/RD	Protection by basic insulation		P
2.3.2.3/RD	Protection by earthing		N
2.3.2.4/RD	Protection by other constructions .....:		N
2.3.3/RD	Separation from hazardous voltages		N
	Insulation employed.....:		
2.3.4/RD	Connection of TNV circuits to other circuits		N
	Insulation employed.....:		
2.3.5/RD	Test for operating voltages generated externally		N
2.6.5.8/RD	Reliance on telecommunication network or cable distribution system		N
2.10.3.3/RD	Clearances in primary circuits	(see appended table 5.7)	N

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.3.4/RD	Clearances in secondary circuits	(see appended table 5.7)	N
2.10.4/RD	Creepage distances		N
2.10.4.1/RD	General		N
2.10.4.2/RD	Material group and comparative tracking index		N
	CTI tests .....:		
2.10.4.3/RD	Minimum creepage distances		N
M/RD	ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1/RD)		N
M.1/RD	Introduction		N
M.2 /RD	Method A		N
M.3/RD	Method B		N
M.3.1/RD	Ringing signal		N
M.3.1.1/RD	Frequency (Hz) .....:		
M.3.1.2/RD	Voltage (V) .....:		
M.3.1.3/RD	Cadence; time (s), voltage (V) .....:		
M.3.1.4/RD	Single fault current (mA) .....:		
M.3.2/RD	Tripping device and monitoring voltage .....:		N
M.3.2.1/RD	Conditions for use of a tripping device or a monitoring voltage		
M.3.2.2/RD	Tripping device		N
M.3.2.3/RD	Monitoring voltage (V) .....:		N

A/RD	Annex A, Tests for resistance to heat and fire		N
A.1/RD	Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2/RD)		N
A.1.1/RD	Samples.....:		
	Wall thickness (mm) .....:		
A.1.2/RD	Conditioning of samples; temperature (°C) .....:		N
A.1.3/RD	Mounting of samples .....:		N
A.1.4/RD	Test flame (see IEC 60695-11-3)		N
	Flame A, B, C or D .....:		
A.1.5/RD	Test procedure		N
A.1.6/RD	Compliance criteria		N
	Sample 1 burning time (s) .....:		
	Sample 2 burning time (s) .....:		
	Sample 3 burning time (s) .....:		
A.2/RD	Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2/RD and 4.7.3.4/RD)		N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
A.2.1/RD	Samples, material.....:		
	Wall thickness (mm) .....:		
A.2.2/RD	Conditioning of samples; temperature (°C) .....:		N
A.2.3/RD	Mounting of samples .....:		N
A.2.4/RD	Test flame (see IEC 60695-11-4)		N
	Flame A, B or C .....:		
A.2.5/RD	Test procedure		N
A.2.6/RD	Compliance criteria		N
	Sample 1 burning time (s) .....:		
	Sample 2 burning time (s) .....:		
	Sample 3 burning time (s) .....:		
A.2.7/RD	(Alternative) test acc. to IEC 60695-11-5, cl. 5 and 9		N
	Sample 1 burning time (s) .....:		
	Sample 2 burning time (s) .....:		
	Sample 3 burning time (s) .....:		
A.3/RD	Hot flaming oil test (see 4.6.2/RD)		N
A.3.1/RD	Mounting of samples		N
A.3.2/RD	Test procedure		N
A.3.3/RD	Compliance criterion		N
B/RD	Annex B, Motor tests under abnormal conditions (see 4.7.2.2/RD and 5.3.2/RD)		N
B.1/RD	General requirements	No motors	N
	Position .....:		N
	Manufacturer .....:		N
	Type .....:		N
	Rated values .....:		N
B.2/RD	Test conditions		N
B.3/RD	Maximum temperatures		N
B.4/RD	Running overload test		N
B.5/RD	Locked-rotor overload test		N
	Test duration (days) .....:		N
	Electric strength test: test voltage (V) .....:		N
B.6/RD	Running overload test for d.c. motors in secondary circuits		N
B.6.1/RD	General		N
B.6.2/RD	Test procedure		N
B.6.3/RD	(Alternative) test procedure		N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
B.6.4/RD	Electric strength test; test voltage (V) .....:		N
B.7/RD	Locked-rotor overload test for d.c. motors in secondary circuits		N
B.7.1/RD	General		N
B.7.2/RD	Test procedure		N
B.7.3/RD	(Alternative) test procedure		N
B.7.4/RD	Electric strength test; test voltage (V) .....:		N
B.8/RD	Test for motors with capacitors		N
B.9/RD	Test for three-phase motors		N
B.10/RD	Test for series motors		N
	Operating voltage (V) .....:		N
C/RD	Annex C, Transformers (see 1.5.4/RD and 5.3.3/RD)		N
	Position .....:	No isolating transformer.	N
	Manufacturer .....:		N
	Type .....:		N
	Rated values .....:		N
	Method of protection.....:		N
C.1/RD	Overload test		N
C.2/RD	Insulation		N
	Protection from displacement of windings.....:		N
D/RD	Annex D, Measuring instruments for touch current tests (see 5.1.4/RD)		P
D.1/RD	Measuring instrument		P
D.2/RD	(Alternative) measuring instrument		N
E/RD	Annex E, Temperature rise of a winding (see 1.4.13/RD)		N
F/RD	Annex F, Measurements of clearances and creepage distance (see 2.10/RD and Annex G/RD)		P
G/RD	Annex G, (Alternative) method for determining minimum clearances		N
G.1/RD	Clearances		N
G.1.1/RD	General		N
G.1.2/RD	Summary of the procedure for determining minimum clearances		N
G.2/RD	Determination of mains transient voltage (V)		N
G.2.1/RD	AC mains supply .....:		N

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Clause	Requirement + Test	Result - Remark	Verdict

G.2.2/RD	Earthed d.c. mains supplies .....:		N
G.2.3/RD	Unearthed d.c. mains supplies .....:		N
G.2.4/RD	Battery operation .....:		N
G.3/RD	Determination of telecommunication network transient voltage (V) .....:		N
G.4/RD	Determination of required withstand voltage (V)		N
G.4.1/RD	Mains transients and internal repetitive peaks :		N
G.4.2/RD	Transients from telecommunication networks .:		N
G.4.3/RD	Combination of transients		N
G.4.4/RD	Transients from cable distribution systems		N
G.5/RD	Measurement of transient voltages (V)		N
	a) Transients from a mains supply		N
	For an a.c. mains supply		N
	For a d.c. mains supply		N
	b) Transients from a telecommunication network		N
G.6/RD	Determination of minimum clearances .....:		N

H	Annex H, Guidance on protection against ingress of water and foreign objects (see IEC 60529)	N

I	Annex I, Backfeed protection test		P
I.1	General		N
I.2	Test for pluggable UPS	Backfeed relay provided.	N
I.3	Test for permanently connected UPS		N
I.4	Load-induced change of reference potential		N
I.5	Solid-state backfeed protection (see clause 7.1-7.5 of IEC 62040-2 and clause 7.1-7.2 of IEC 62040-3)		N

J/RD	Annex J, Table of electrochemical potentials (see 2.6.5.6/RD)		P
	Metal(s) used .....:	Copper plated with tin and soldering lead.	

.

K/RD	Annex K, Thermal controls (see 1.5.3/RD and 5.3.8/RD)		N
K.1/RD	Making and breaking capacity		N
K.2 /RD	Thermostat reliability; operating voltage (V) ....:		N
K.3/RD	Thermostat endurance test; operating voltage (V) .....:		N
K.4/RD	Temperature limiter endurance; operating voltage (V) .....:		N

IEC 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict
K.5/RD	Thermal cut-out reliability		N
K.6/RD	Stability of operation		N
L	Annex L, Reference loads		P
L.1	General		P
L.2	Reference resistive load		P
L.3	Reference inductive-resistive load		
L.4	Reference capacitive-resistive loads	Worst case power factors as specified by the manufacturer maintained during the relevanttests.	P
L.5	Reference non-linear load		P
L.5.1	Test method		P
L.5.2	Connection of the non-linear reference load		
L.5.3	Connection of the non-linear reference load		N
M	Annex M, Ventilation of battery compartments		P
M.1	General		P
M.2	Normal conditions	See appended table M	P
M.3	Blocked conditions		P
M.4	Overcharge conditions		N
N	Annex N, Minimum and maximum cross-sections of copper conductors suitable for connection (see 6.3)		N
U/RD	Annex U, Insulated winding wires for use without interleaved insulation (see 2.10.5.4/RD)		N
V/RD	Annex V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1/RD)		P
V.1/RD	Introduction		P
V.2/RD	TN power distribution systems	See sub-clause 1.6.1/RD.	P
V.3/RD	TT power distribution systems		P
V.4/RD	IT power distribution systems		P

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

4.5	TABLE: List of critical components	

Component	Manufacturer/ trademark	Type/model	Value / rating	Standard	Approval/ Reference
Whole unit					
Enclosure	Various	Various	Steel/Aluminium	--	--
DC fan	Huaxia Hengtai	DZ12038B24 HR	DC24V, 1A, 20.4W	--	UL E254715
Insulation sheet	FORMEX, DIV OF ILLINOIS TOOL WORKS INC, FORMERLY	Formex GK-10	V-0, 115°C, Min thickness 0.4mm	UL 94 UL 746C	UL E256266 UL E121855
wire	Various	Various	---	UL 758	UL E314168
ON ASY01_PS1503_DR1					
(Optional) backfeed Contactor	EATON INDUSTRIES GMBH	DILM250/22	Ui=1000VAC, Ie=250A	UL 508, UL 60947-4-1	UL E29096
DC capacitor (C153,C154)	Jianghai	CD293-220UF	450V, 220uF, 85℃	--	UL
Diode (D81,D82)	Fairchild	FFP30S60STU	600V;30A	--	--
IGBT (Q45,Q46)	Infineon	IKW50N65H5	50A/650V	--	--
Thyristor (Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12)	VISHAY	VS-70TPS12Pbf	70A 1200V	--	--
Y2 capacitor (C166)	Various	CS11-E2GA222MYNS	250VAC/ 2200pF	IEC 60384-14	VDE:124321
Transformer (T14)	SIDNA	UMS33D1T1	Class B	--	Test with appliance
Transformer (T2, T3, T5, T6, T7, T8, T9)	SIDNA	UMS33D2T1	Class B	--	Test with appliance
PCB	Various	Various	V-0, 130℃	UL 796	UL
ON ASY02_PS1203_CT1					
Y2 capacitor (C265, C266, C267)	Various	CD16-E2GA472MYGS	250VAC/ 4700pF	IEC 60384-14	VDE:124321

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

Component	Manufacturer/ trademark	Type/model	Value / rating	Standard	Approval/ Reference
PCB	Various	Various	V-0, 130℃	UL 796	UL
ON ASY02_PS1203_PW5					
Optocouplers (U1)	NEC	PS2561L-1-V-F3-A-L	Cr. ≥7.0mm; Cl. ≥7.0mm; Dti. = 0.8mm, 110 °C	UL 1577	UL E72422,
PCB	Various	Various	V-0, 130℃	UL 796	UL
ON ASY01_PS1503_CP1					
FUSE (F1, F2)	BUSSMANN	BK-GBH-V030A6FR	30A/500VAC	UL 248	UL E56412
PCB	Various	Various	V-0, 130℃	UL 796	UL
ON ASY01_ PS1503_CP3					
Inductor (L1, L2)	FOT	PM50L1	CLASS F	--	Test with appliance
PCB	Various	Various	V-0, 130℃	UL 796	UL
ON ASY01_PS1503_CP2					
Optocouplers (U1, U2, U3, U4, U5, U6)	NEC	PS2561L-1-V-F3-A-L	--	UL 1577	UL:E72422,
FUSE (F1, F2, F3, F4, F5, F6, F7, F8, F9, F11, F12, F14, F15, F17, F18, F19, F20, F21)	BUSSMANN	BK/ABC-V-30	30A/250VAC	UL 248	UL E19180
PCB	Various	Various	V-0, 130℃	UL 796	UL
ON ASY01_PS1503_DR2					
Y2 capacitor (C58, C59)	Various	CS11-E2GA222MYNS	250VAC/ 2200pF	IEC 60384-14	VDE:124321
DC capacitor (C13, C15)	Jianghai	CD294-820UF	450V, 820uF, 105℃	--	UL
Diode (D17, D18, D30, D31)	Fairchild	FFH75H60S	75A/600V	--	--
IGBT (Q1, Q2, Q3, Q4, Q5, Q6)	Infineon	IKW50N65H5	50A/650V	--	--

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

Component	Manufacturer/ trademark	Type/model	Value / rating	Standard	Approval/ Reference
Inductor (L1, L2)	FOT	HTX3340L3	CLASS F	--	Test with appliance
Transformer (T3,T4)	SIDNA	UMS33D1T1	Class B	--	Test with appliance
PCB	Various	Various	V-0, 130℃	UL 796	UL
ON ASY01_PS1503_DR4					
DC capacitor (C47, C48, C49, C50)	Jianghai	CD294-820UF	450V, 820uF, 105℃	--	UL
Y2 capacitor (C63, C64, C65, C66, C67, C68)	Various	CD16-E2GA472MYGS	250VAC/ 2200pF	IEC 60384-14	VDE:124321
IGBT (Q5, Q6, Q7, Q8, Q9, Q10)	Infineon	IKW40N120H3	40A/1200V	--	--
IGBT (Q1, Q2, Q3, Q4)	Infineon	IKW75N60H3	75A/600V	--	--
PCB	Various	Various	V-0, 130℃	UL 796	UL
ON ASY01_PS1503_EM1					
DC capacitor (C183, C184)	Jianghai	CD293-220UF	450V, 220uF, 85℃	--	UL
Optocouplers (U11)	NEC	PS2561L-1-V-F3-A-L	--	UL 1577	UL:E72422,
Transformer (T4)	SIDNA	UMS33P1T2	Class B	--	Test with appliance
Transformer (T1, T2, T3)	SIDNA	UMS33D2T1	Class B	--	Test with appliance
Transformer (T6)	Boulder	UMXPS3T1	Class B	--	Test with appliance
Current Transformer (T5)	Boulder	UMX33CT1	Class B	--	Test with appliance
Relay (RY1, RY2, RY3, RY4, RY5, RY6)	Hongfa	HF92F-024D-2A12F	24V 30A	--\	UL:E134517
Y2 capacitor	Various	CS11-	250VAC/ 2200pF	IEC 60384-14	VDE:124321

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

Component	Manufacturer/ trademark	Type/model	Value / rating	Standard	Approval/ Reference
(C1, C157, C158, C159)		E2GA222MY NS			
Thyristor (Q12, Q13, Q14, Q15, Q16, Q17)	VISHAY	VS-70TPS12Pbf	70A 1200V	--	--
PCB	Various	Various	V-0, 130℃	UL 796	UL
ON ASY01_PS1503_TF3					
Y2 capacitor (C3, C6)	Various	CS11-E2GA222MY NS	250VAC/ 2200pF	IEC 60384-14	VDE:124321
PCB	Various	Various	V-0, 130℃	UL 796	UL
[1]) an asterisk indicates a mark which assures the agreed level of surveillance					
Remarks					

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

4.4	TABLE: electrical data (in normal conditions)					P
Fuse#	Irated(A)	U(V)	P(W)	I(A)	I fuse (A)	Condition/status
Input breaker	--	342V/50Hz	47368	78.74	--	O/P: 380V, 50Hz, 76A, 45KW
Input breaker	--	342V/60Hz	47368	78.74	--	O/P: 380V, 50Hz, 76A, 45KW
Input breaker	72	380V/50Hz	47368	71.77	--	O/P: 380V, 50Hz, 76A, 45KW
Input breaker	72	380V/60Hz	47368	71.77	--	O/P: 380V, 50Hz, 76A, 45KW
Input breaker	72	400V/50Hz	47269	68.51	--	O/P: 380V, 50Hz, 76A, 45KW
Input breaker	72	400V/60Hz	47269	68.51	--	O/P: 380V, 50Hz, 76A, 45KW
Input breaker	72	415V/50Hz	47619	66.14	--	O/P: 380V, 50Hz, 76A, 45KW
Input breaker	72	415V/60Hz	47619	66.14	--	O/P: 380V, 50Hz, 76A, 45KW
Input breaker	--	456.5/50Hz	47872	60.44	--	O/P: 380V, 50Hz, 76A, 45KW
Input breaker	--	456.5//60Hz	47872	60.44	--	O/P: 380V, 50Hz, 76A, 45KW
Input breaker	--	342V/50Hz	47319	78.66	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	--	342V/60Hz	47319	78.66	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	72	380V/50Hz	47319	71.69	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	72	380V/60Hz	47319	71.69	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	72	400V/50Hz	47219	68.43	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	72	400V/60Hz	47219	68.43	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	72	415V/50Hz	47569	66.07	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	72	415V/60Hz	47569	66.07	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	--	456.5/50Hz	47821	60.38	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	--	456.5//60Hz	47821	60.38	--	O/P: 400V, 50Hz, 76A, 45KW

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Clause	Requirement + Test				Result - Remark	Verdict

Input breaker	--	342V/50Hz	47344	78.70	--	O/P: 415V, 50Hz, 76A, 45KW
Input breaker	--	342V/60Hz	47344	78.70	--	O/P: 415V, 50Hz, 76A, 45KW
Input breaker	72	380V/50Hz	47344	71.73	--	O/P: 415V, 50Hz, 76A, 45KW
Input breaker	72	380V/60Hz	47344	71.73	--	O/P: 415V, 50Hz, 76A, 45KW
Input breaker	72	400V/50Hz	47319	68.58	--	O/P: 415V, 50Hz, 76A, 45KW
Input breaker	72	400V/60Hz	47319	68.58	--	O/P: 415V, 50Hz, 76A, 45KW
Input breaker	72	415V/50Hz	47269	65.65	--	O/P: 415V, 50Hz, 76A, 45KW
Input breaker	72	415V/60Hz	47269	65.65	--	O/P: 415V, 50Hz, 76A, 45KW
Input breaker	--	456.5/50Hz	47569	61.70	--	O/P: 415V, 50Hz, 76A, 45KW
Input breaker	--	456.5//60Hz	47569	61.70	--	O/P: 415V, 50Hz, 76A, 45KW
Input breaker	--	342V/50Hz	47368	78.74	--	O/P: 380V, 60Hz, 76A, 45KW
Input breaker	--	342V/60Hz	47368	78.74	--	O/P: 380V, 60Hz, 76A, 45KW
Input breaker	72	380V/50Hz	47368	71.77	--	O/P: 380V, 60Hz, 76A, 45KW
Input breaker	72	380V/60Hz	47368	71.77	--	O/P: 380V, 60Hz, 76A, 45KW
Input breaker	72	400V/50Hz	47269	68.51	--	O/P: 380V, 60Hz, 76A, 45KW
Input breaker	72	400V/60Hz	47269	68.51	--	O/P: 380V, 60Hz, 76A, 45KW
Input breaker	72	415V/50Hz	47619	66.14	--	O/P: 380V, 60Hz, 76A, 45KW
Input breaker	72	415V/60Hz	47619	66.14	--	O/P: 380V, 60Hz, 76A, 45KW
Input breaker	--	456.5/50Hz	47872	60.44	--	O/P: 380V, 60Hz, 76A, 45KW
Input breaker	--	456.5//60Hz	47872	60.44	--	O/P: 380V, 60Hz, 76A, 45KW
Input breaker	--	342V/50Hz	47319	78.66	--	O/P: 400V, 60Hz, 76A, 45KW

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

Input breaker	--	342V/60Hz	47319	78.66	--	O/P: 400V, 60Hz, 76A, 45KW
Input breaker	72	380V/50Hz	47319	71.69	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	72	380V/60Hz	47319	71.69	--	O/P: 400V, 60Hz, 76A, 45KW
Input breaker	72	400V/50Hz	47219	68.43	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	72	400V/60Hz	47219	68.43	--	O/P: 400V, 60Hz, 76A, 45KW
Input breaker	72	415V/50Hz	47569	66.07	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	72	415V/60Hz	47569	66.07	--	O/P: 400V, 60Hz, 76A, 45KW
Input breaker	--	456.5/50Hz	47821	60.38	--	O/P: 400V, 50Hz, 76A, 45KW
Input breaker	--	456.5//60Hz	47821	60.38	--	O/P: 400V, 60Hz, 76A, 45KW
Input breaker	--	342V/50Hz	47344	78.70	--	O/P: 415V, 60Hz, 76A, 45KW
Input breaker	--	342V/60Hz	47344	78.70	--	O/P: 415V, 60Hz, 76A, 45KW
Input breaker	72	380V/50Hz	47344	71.73	--	O/P: 415V, 60Hz, 76A, 45KW
Input breaker	72	380V/60Hz	47344	71.73	--	O/P: 415V, 60Hz, 76A, 45KW
Input breaker	72	400V/50Hz	47319	68.58	--	O/P: 415V, 60Hz, 76A, 45KW
Input breaker	72	400V/60Hz	47319	68.58	--	O/P: 415V, 60Hz, 76A, 45KW
Input breaker	72	415V/50Hz	47269	65.65	--	O/P: 415V, 60Hz, 76A, 45KW
Input breaker	72	415V/60Hz	47269	65.65	--	O/P: 415V, 60Hz, 76A, 45KW
Input breaker	--	456.5/50Hz	47569	60.06	--	O/P: 415V, 60Hz, 76A, 45KW
Input breaker	--	456.5//60Hz	47569	60.06	--	O/P: 415V, 60Hz, 76A, 45KW
Note(s): Please measure the input currents with normal load.						

5.1.1 and 2.1.1.7/RD	TABLE: discharge of capacitors in the primary circuit	P

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Clause	Requirement + Test	Result - Remark	Verdict

Condition	τ calculated (s)	τ measured (s)	t u→ 0V (s)	Comments
Input L1-N	--	0.48	1.92	Tested at online mode with batteries
Input L2-N	--	0.44	1.76	
Input L3-N	--	0.44	1.76	
Input L1-PE	--	0.46	1.84	
Input L2-PE	--	0.44	1.76	
Input L3-PE	--	0.42	1.68	
Input N-PE	--	0	0	
BAT+-PE	--	0.21	0.84	Battery mode to shut down
BAT--PE	--	0.23	0.92	
Input L1-N	--	0.25	1	Tested at bypass mode without batteries
Input L2-N	--	0.23	0.92	
Input L3-N	--	0.25	1	
Input L1-PE	--	0.48	1.92	
Input L2-PE	--	0.5	2	
Input L3-PE	--	0.5	2	
Input N-PE	--	0	0	
Note(s): Input 498/60Hz				

5.1.4	TABLE: Backfeed protection test			N/A
Condition	Voltage measured (V)/current (mA)			Comments
	A-N	A-G	N-G	
--	--	--	--	--
Note(s):				

5.2.1 and 2.2.2/RD	TABLE: SELV measurement (under normal conditions)			N/A
Transformer	Location	Voltage (max.) (V)		Voltage Limitation Component
		V peak	V d.c.	
--	--	--	--	--
Supplementary information:				

5.2.1 and 2.2.3/RD	TABLE: SELV measurement (under fault conditions)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Location	Voltage (max.) (V)	Comments
--	--	--
Supplementary information:		

5.2.3 and 2.4.2/RD	TABLE: Limited current circuit measurement					N/A
Location	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments	
--	--	--	--	--	--	
Supplementary information:						

5.2.5 and 2.5/RD	TABLE: Limited power source measurement		N/A
	Limits	Measured	Verdict
According to Table 2B/2C (normal condition)			
current (in A)	--	--	--
apparent power (in VA)	--	--	--
According to Table 2B/2C (single fault condition)			
current (in A)	--	--	--
apparent power (in VA)	--	--	--
Supplementary information:			

5.3.1 and 2.6.3.4/RD	TABLE: Resistance of earthing measurement		P
Location	Resistance measured (mΩ)	Comments	
--	--	--	
Supplementary information: Earthing continuity is achieved by sufficient conductor size. See relevant clauses.			

7.5 and 8.3	TABLE: fault condition tests				--		P
	ambient temperature (°C) ……:				--		
	model/type of power supply ……:				--		
	manufacturer of power supply ……:				--		
	rated markings of power supply ……:				--		
com-ponent No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result	

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

DR1 board						
Q45 (c-e)	s-c	415	1s	F1 on CP1 board	30	UPS output normally, fuse F1 opened, charger shut down. Q45 damaged. Output voltage: 397.3V.
Q45(g-e)	s-c	415	1s	F1 on CP1 board	30	UPS output normally, charger shut down. recoverable after fault removed, no damaged. Output voltage: 397.3V.
Q45(c-g)	s-c	415	1s	F1 on CP1 board	30	UPS output normally, fuse F1 opened, charger shut down. Q45 damaged. Output voltage: 397.3V.
DR2 board						
A+ IGBT(c-e)	s-c	415	1s	F1 on DR1 board	--	UPS output normally, fuse F1 opened, charger shut down. A+ IGBT damaged. Output voltage: 397.3V.
A+ IGBT (c-g)	s-c	415	1s	F1 on DR1 board	--	UPS output normally, fuse F1 opened, charger shut down. A+ IGBT damaged. Output voltage: 397.3V.
A+ IGBT (g-e)	s-c	415	10min	F1 on DR1 board	--	UPS output normally, charger shut down. recoverable after fault removed, no damaged. Output voltage: 397.3V.
BUS E-capacitor	s-c	415	1s	F1, F2, F3	--	UPS output normally, charger shut down. fuse F1/F2/F3 opened, IGBT of A/B/C phase hazards, No damaged. Output voltage: 397.3V.
CP1 board						

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

Bus Voltage detecting resistor R5	s-c	415	10min	--	--	UPS work normally, no hazards. Charge voltage: 576V, Output voltage: 397.3V.
Bus Voltage detecting resistor R5	o-c	415	10min	--	--	UPS output normally, charger shut down. Output voltage: 397.3V.
TF1 board						
Transformer T1 pin 9-10	s-c	415	10min	F1	--	UPS output and the charger operate normally, no damaged. Charge voltage: 576V, Output voltage: 397.3V.
Opto coupler U12 (pin1-2)	s-c	415	10min	---	--	UPS work normally, no damaged. Charge voltage: 576V, Output voltage: 397.3V.
Opto coupler U12 (pin3-4)	s-c	415	10min	--	--	UPS work normally, no damaged. Charge voltage: 576V, Output voltage: 397.3V.
Opto coupler U12 pin1	O-c	415	10min	--	--	UPS work normally, no damaged. Charge voltage: 576V, Output voltage: 397.3V.
Opto coupler U12 pin3	O-c	415	10min	--	--	UPS work normally, no damaged. Charge voltage: 576V, Output voltage: 397.3V.
D14	s-c	415	10min	--	--	UPS work normally, no damaged. Charge voltage:576V, Output voltage: 397.3V.
Whole unit						
Output	s-c	415	1s	--	-	UPS output shut down immediately, the charger operate normally, no damaged. Charge voltage: 576V, Output voltage: 0V.

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

Output	s-c	battery	1s	--	-	UPS output shut down immediately, no damaged. Charge voltage: 0V, Output voltage: 0V.
Output	o-l	415	15min	--	-	UPS output shut down at condition of 5min at 100% load + 5min at 117% load + 2s at 133% load.
Output	o-l	Battery mode	15min	--	--	UPS output shut down at condition of 5min at 100% load + 5min at 117% load + 2s at 133% load.
Ventilation openings	Block-ed	415	30min.	--	--	UPS shut down at temperature protection, after the temperature is below 60℃，UPS open up. Repeat the cycle continuously.
Ventilation openings	Block-ed	Battery mode	30min	--	--	UPS shut down at temperature protection, after the temperature is below 60℃，UPS open up. Repeat the cycle continuously.
Fan	Locked	415	30mins	--	--	UPS shut down at temperature protection, after the temperature is below 60℃，UPS open up. Repeat the cycle continuously.
Fan	Locked	Battery mode	30mins	--	--	UPS shut down at temperature protection, after the temperature is below 60℃，UPS open up. Repeat the cycle continuously.
Note(s): s-c means short circuit. o-l means overload. o-p means open circuit.						

5.7 and 2.10.2/RD	TABLE: working voltage measurement			N/A
Location		RMS voltage (V)	Peak voltage (V)	comments
--		--	--	--
Note:				

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

5.7 and 2.10.4/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)
Whole unit						
PS1203 CT1 PCB						
Under C142 traces	<420	<250	2.0	7.8	2.5	7.8
Under C143 traces	<420	<250	2.0	6.7	2.5	6.7
PS1203 EM1 PCB						
Under C83 traces	<420	<250	2.0	5.8	2.5	5.8
Under C53 traces	<420	<250	2.0	7.5	2.5	7.5
Under C57 traces	<420	<250	2.0	7.7	2.5	7.7
PE –J2 Pin	<420	<250	2.0	4.7	2.5	4.7
IGBT metal-heatsink (PE)	<420	<250	2.0	6.0	2.5	6.0
C7 Pin-heatsink (PE)	<420	<250	2.0	9.3	2.5	>9.3
Parts(C1, C3, C4, C5, C6, C7, C8, C93, C94)-top metal enclosure (PE)	<420	<250	2.0	3.7	2.5	3.7
PS1203 DR2 PCB						
PE (H6)-J1 traces	<420	<250	2.0	4.8	2.5	4.8
PE (H21)-L9 traces	<420	<250	2.0	8.2	2.5	8.2
PE (H14)-L7 traces	<420	<250	2.0	5.4	2.5	5.4
PE (H7)-L14 traces	<420	<250	2.0	5.4	2.5	5.4
PE (H1)-L1 traces	<420	<250	2.0	4.7	2.5	4.7
Parts Pin-bottom metal enclosure (PE)	<420	<250	2.0	>2.0 #	2.5	>2.5 #
PS1203 DR4 PCB						
PE (H1)-D53 Pin	<420	<250	2.0	5.4	2.5	5.4
PE (H2)-C64 Pin	<420	<250	2.0	5.6	2.5	5.6
PE (H5)-J13 traces	<420	<250	2.0	6.3	2.5	6.3
PE (H4)-J22 traces	<420	<250	2.0	4.8	2.5	4.8
PE (H3)-R194/J34 Pin	<420	<250	2.0	7.2	2.5	7.2
IGBT metal-heatsink (PE)	<420	<250	2.0	6.0	2.5	6.0
Parts(C100, C101, C102)-heatsink (PE)	<420	<250	2.0	7.5	2.5	>7.5

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

Parts(C86, C87, C88, C89, C90, C91, C92, C93, C94)-top metal enclosure (PE)	<420	<250	2.0	3.7	2.5	3.7
Parts(C96, C97)-top metal enclosure (PE)	<420	<250	2.0	2.7	2.5	2.7
PS1203 PW1 PCB						
PE (H1)-D2 Pin	<420	<250	2.0	4.2	2.5	4.2
PS1203 MN1 PCB						
PE (H1)-J2 Pin	<420	<250	2.0	4.1	2.5	4.1

Note(s):

1.) A minimum clearance of 1.75mm for each contact pair had been provided (required according to sub-clause 5.1.4: 1.4mm minimum).

2.) Shrink tubings are used to cover internal wires.

5.8, 2.1.1.3/RD and 2.10.5.1 /RD	TABLE: Distance through insulation measurements	N/A

Distance through insulation (DTI) at/of:	U peak (V)	U r.m.s. (V)	Test voltage (V)	Required DTI (mm)	DTI (mm)
--	--	--	--	--	--
Supplementary information:					

6, 8.2 and 9	TABLE: Electric strength tests, impulse tests and voltage surge tests	P

Test voltage applied between:	Voltage shape (AC, DC, impulse, surge)	Test voltage (V)	Breakdown Yes / No
Functional:			
--	--	--	--
Basic / supplementary:			
Primary to earthing	AC	1500	No
Reinforced:			
--	--	--	--
Supplementary information:			

7.4, 4.5.5/RD	TABLE: Ball pressure test of thermoplastic parts	N/A

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

	Allowed impression diameter (mm) .....:	≤ 2 mm	
Part		Test temperature (°C)	Impression diameter (mm)
--		--	--
Supplementary information:			

7.4.2,	Table: Enclosure opening measurements		P
Location		Size (mm)	Comments
Front		Diameter=3mm	Numerous oblong opening for ventilation
Rear		Diameter=3mm	Numerous hole for ventilation
Side		None	--
Top/bottom		None	--
Supplementary information:			

7.5	TABLE: resistance to fire				P
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	
--	--	--	--	--	
Supplementary information: see table 4.5					

7.7	TABLE: temperature rise measurements						
	Supply voltage (V) .....:	342/50 Hz*	440/50 Hz*	Battery mode	--	--	—
	Ambient T_{min} (°C) .....:	--	--	--	--	--	—
	Ambient T_{max} (°C) .....:	--	--	--	--	--	—
Maximum measured temperature T of part/at::		T (°C)					Allowed T_{max} (°C)
UPS internal							
Enclosure (plastic panel)		45.1	54.6	43.2	--	--	95
Enclosure (metal)		49.2	56.3	50.3	--	--	70
AC terminal		61.2	57.9	60.4	--	--	70
DC terminal		56.3	58.7	52.9	--	--	70
DC Fan		59.8	59.4	59.1	--	--	70
Battery wire '+''		47.3	55.2	58.5	--	--	105
Primary wire		56.9	57.8	57.7	--	--	105
DR1 board							
Y Capacitor		58.3	57.5	58.7	--	--	125

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

PCB near Q3	57.3	53.4	60.1	--	--	130
Transformer (T7) coil	56.3	55.7	58.4	--	--	110
Transformer (T7) core	51.2	51.0	52.8	--	--	110
Opto coupler (U5）	52.3	51.8	52.5	--	--	110
PCB near transformer (T7)	51.8	50.6	51.2	--	--	130
DR2 board						
Y Capacitor	50.8	49.4	50.7	--	--	125
PCB near Q1	46.6	44.5	48.1	--	--	130
Transformer (T3) coil	52.8	50.8	52.2	--	--	110
Transformer (T3) core	46.3	44.2	46.8	--	--	110
Opto coupler (U3）	44.9	42.1	45.5	--	--	110
PCB near transformer (T3)	42.4	40	42.1	--	--	130
Inductor	90.5	83.8	86.6	--	--	130
DR4 board						
Y Capacitor	49.6	46.4	50.2	--	--	125
PCB near Q1	60.5	57.4	58.7	--	--	130
Transformer (T2) coil	54.3	51.9	51.2	--	--	110
Transformer (T2) core	50.4	47.7	47.9	--	--	110
Opto coupler (U3）	47.9	44.4	45.7	--	--	110
PCB near transformer (T2)	48.4	46.6	47.5	--	--	130
E capacitor	61.1	60.2	58.8	--	--	105
EM1 board						
Y Capacitor	48.7	46.6	48.2	--	--	125
Transformer (T1) coil	51.8	49.2	52.4	--	--	110
Transformer (T1) core	48.3	45.6	46.3	--	--	110
PCB near transformer (T1)	44.4	42.5	42.9	--	--	130
Output relay on EM1 board	59.8	59.3	58.9	--	--	85
Ambient	40.0	40.0	40.0	--	--	--

Supplementary information:

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class
--	--	--	--	--	--	--	--

Supplementary information:
"*" output loading with 380V, 76A, 45KW

8.1	TABLE: touch current measurement	P

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

Measured between:	measured		Limit (mA)	Comments
	Line mode (mA)	Bypass (mA)		
Metal enclosure to terminal A (three phase balance)	0.20	0.18	3.5	TN system
Metal enclosure to terminal A under R-phase imbalance	0.20	0.18	3.5	TN system
Metal enclosure to terminal A under S-phase imbalance	0.20	0.18	3.5	TN system
Metal enclosure to terminal A under T-phase imbalance	0.21	0.19	3.5	TN system
Parallel port to terminal A	0.01	0.01	0.25	TN system
RS-232 terminal to terminal A	0.002	0.002	0.25	TN system
LCD to terminal A	0.003	0.003	0.25	TN system
Supplementary information:				

C.2/RD	Safety isolation transformer						N/A
Loc.	Tested insulation	Working voltage peak / V (2.10.2)	Working voltage rms / V (2.10.2)	Required electric strength (5.2)	Required clearance / mm (2.10.2)	Required creepage distance / mm (2.10.4)	Required distance thr. Insul. (2.10.5)
--	--	--	--	--	--	--	--
Loc.	Tested insulation	Working voltage peak / V (2.10.2)	Working voltage rms / V (2.10.2)	Required electric strength (5.2)	Required clearance / mm (2.10.2)	Required creepage distance / mm (2.10.4)	Required distance thr. Insul. (2.10.5)
--	--			--	--	--	--

--

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

M	Ventilation of battery compartments	P
	The required dimension for the ventilation openings will be calculated with the following formula:	
	A > K1 * Q with Q = (0.054 m³/Ah) * n * I * C	
	where: K1 : constant factor of 28 h * cm²/m³ Q : airflow in m³/h n : number of battery cells I : constant factor (0,2A/100Ah for valve regulated lead acid batteries) C : nominal capacity of the battery	
	With the specific data for the UPS the following dimension for the ventilation openings is required:	
	External battery pack n : 6 C : 12	
	A > 28 h * cm²/m³ * (0.054 m³/Ah) * n * 0.2 A/100 Ah * C	
	A > 0.22cm²	
	Verdict	
	The size of ventilation openings in battery cabinet exceeds the required airflow by far.	

Appendix 1

European group differences and national differences of EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

EN 62040-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
Contents	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions		P
ZA	**NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS** The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. Note: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD Applies.		—

Publication	Year	Title	EN/HD	Year
IEC 60364-4-42	-[1)]	Electrical installations of buildings - Part 4-42: Protection for safety - Protection against thermal effects	-	-
IEC 60417	Data-base	Graphical symbols for use on equipment	-	-
IEC 60529	-[1)]	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991[2)] 1993
IEC 60664	Series	Insulation coordination for equipment within low-voltage systems	EN 60664	Series
IEC/TR 60755	-[1)]	General requirements for residual current operated protective devices	-	-
IEC 60950-1 (mod)	2005	Information technology equipment - Safety - Part 1: General requirements	EN 60950-1	2006
IEC 61000-2-2	-[1)]	Electromagnetic compatibility (EMC) - Part 2-2: Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems	EN 61000-2-2	2002[2)]
IEC 61008-1 (mod)	-[1)]	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) - Part 1: General rules	EN 61008-1 + A11	2004[2)] 2007
IEC 61009-1 (mod)	-[1)]	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) - Part 1: General rules	EN 61009-1 + corr. July + A11	2004[2)] 2006 2008
IEC 62040-2	2005	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements	EN 62040-2 + corr. November	2006 2006
IEC 62040-3 (mod)	1999	Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements	EN 62040-3	2001

[1)] Undated reference.
[2)] Valid edition at date of issue.

Appendix 1

European group differences and national differences of EN 62040-1			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative)

SPECIAL NATIONAL CONDITIONS (EN)

The FI, NO and SE - SNCs originate from IEC 60950-1 2nd Edition, which is the reference document (RD) for IEC 62040-1. The national requirements are included in IEC 62040-1 through the following statement in the scope of the standard:
"National requirements additional to those in IEC 60950-1 apply and are found as notes under relevant clauses of the RD."

The national requirements have not been specifically listed in the EN 62040-1:2008.
If demanded, CLC/TC 22X will be requested to take proper measures to complete EN 62040-1 with Annexes ZB containing the SNCs as presented below.

EN 62040-1:2008 supersedes EN 62040-1-1:2003. As a reference, see also SNCs for Finland, Norway and Sweden as included in the earlier EN 62040-1-1:2003

Clause	Requirement + Test	Result - Remark	Verdict
4.7.3	In **Finland**, **Norway** and **Sweden**, when safety relies upon connection to the safety earth (see 5.3), a pluggable equipment type A UPS shall have a marking on the equipment, stating that the UPS must be connected to an earthed mains socket-outlet. The marking text in the applicable countries shall be as follows: In **Finland**: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In **Norway**: "Apparatet må tilkoples jordet stikkontakt" In **Sweden**: "Apparaten skall anslutas till jordat uttag"		P
4.7.11	In **Norway**, because of a widely used IT power system, equipment shall be designed or modified for connection to such a system and shall be marked by a label with the following wording in Norwegian: "Apparatet er egnet for tilkopling til et IT forsyningsnett"		P
9	In **Finland, Norway and Sweden** requirements of 6.1.2.1 and 6.1.2.2 in Annex ZB of EN 60950-1:2001 apply.		P

Appendix 2

Product photos

Fig. 1 – Front view for UPS module

Appendix 2

Product photos

Fig. 2 – Rear view for UPS module

Appendix 2

Product photos

Fig. 3 – Inside view for module

Appendix 2

Product photos

Fig. 4 – Inside view for module

Appendix 2

Product photos

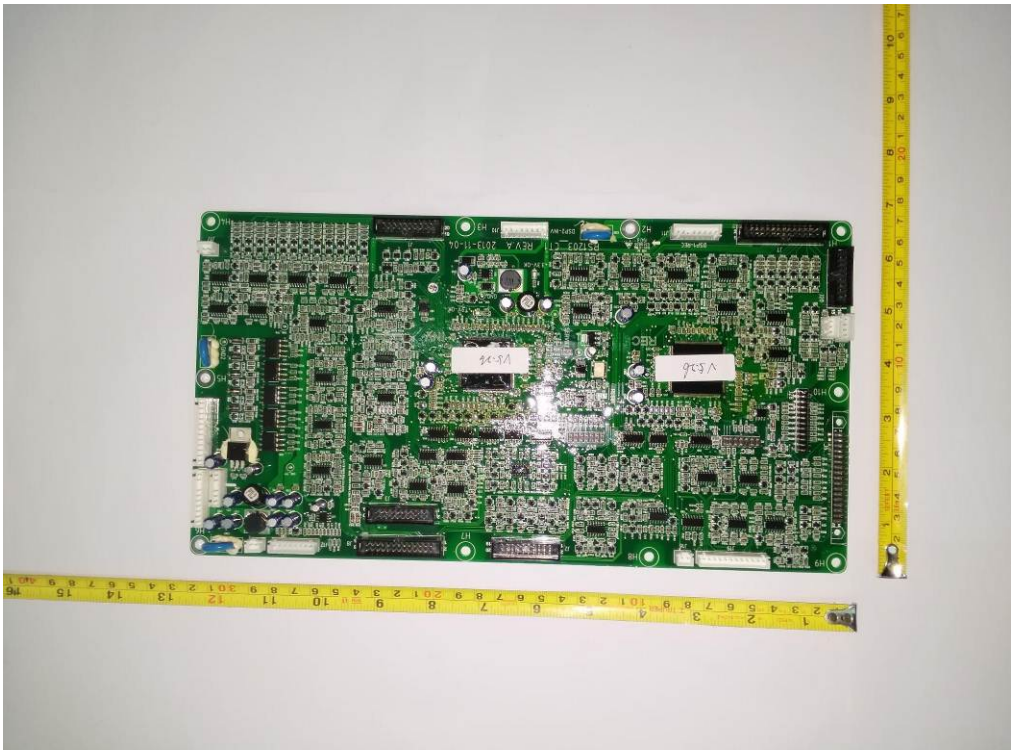

Fig. 5 –PS1203_CT1 board component view

Fig. 6 –PS1203_CT1 board trace view

Appendix 2

Product photos

Fig. 7 –PS1503_EM1 board component view

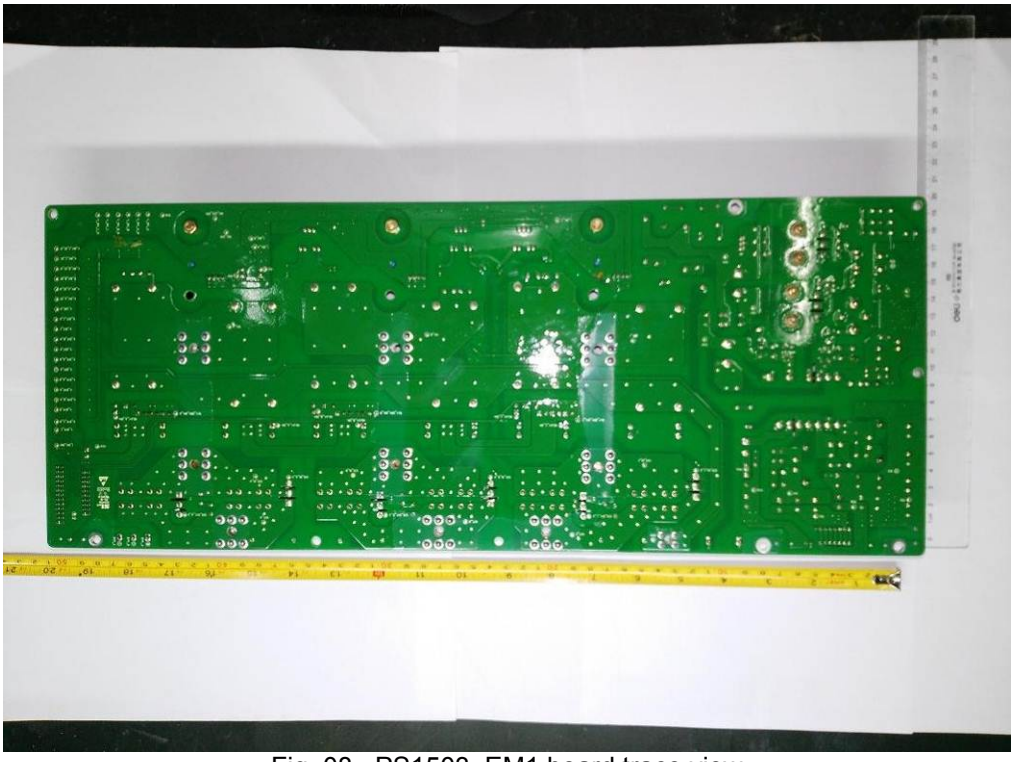

Fig. 08 –PS1503_EM1 board trace view

Appendix 2

Product photos

Fig. 09 –PS1503_DR2 board component view

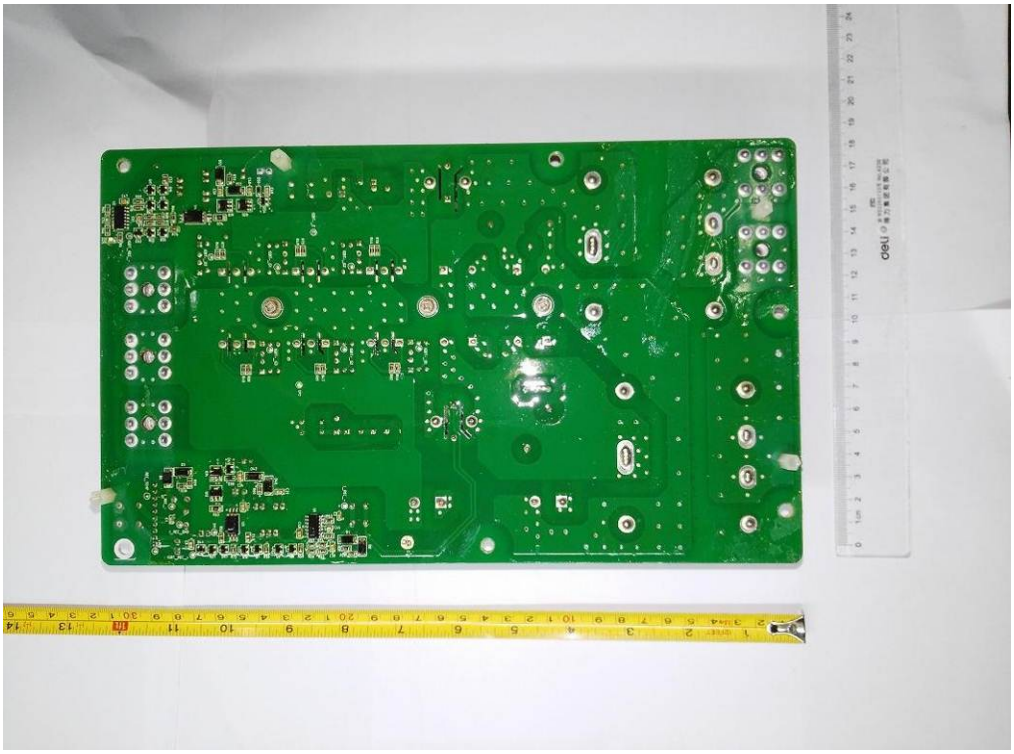

Fig. 10 –PS1503_DR2 board trace view

Appendix 2

Product photos

Fig. 11 –PS1503_DR1 board component view

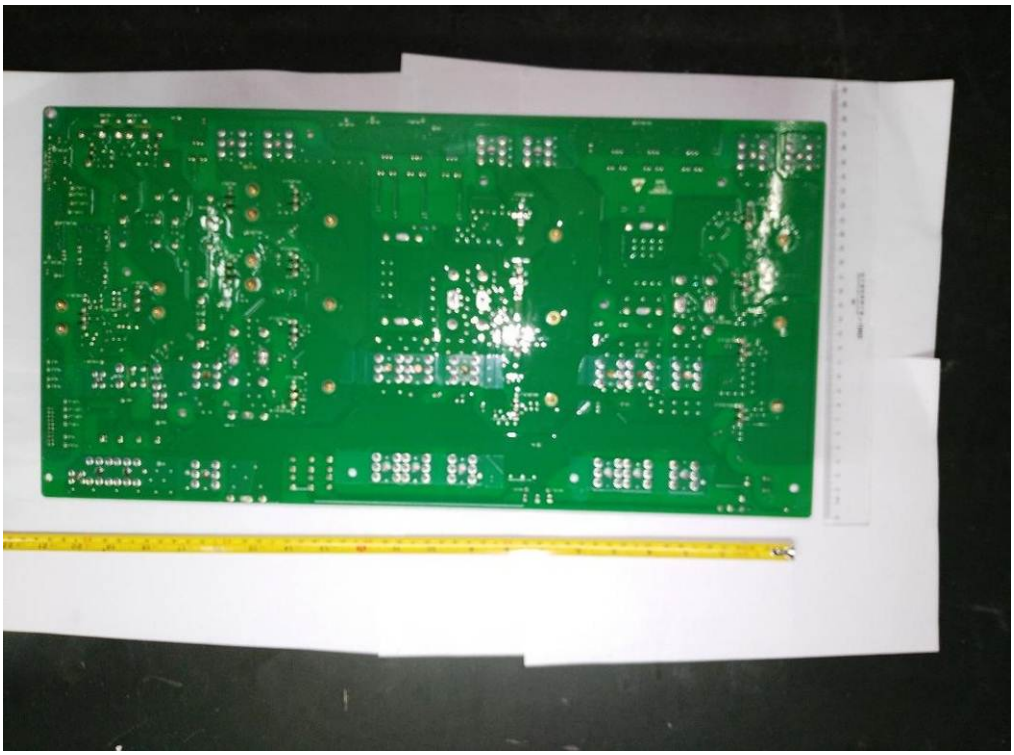

Fig. 12 –PS1503_DR1 board trace view

Appendix 2

Product photos

Fig. 13 –PS1503_DR4 board component view

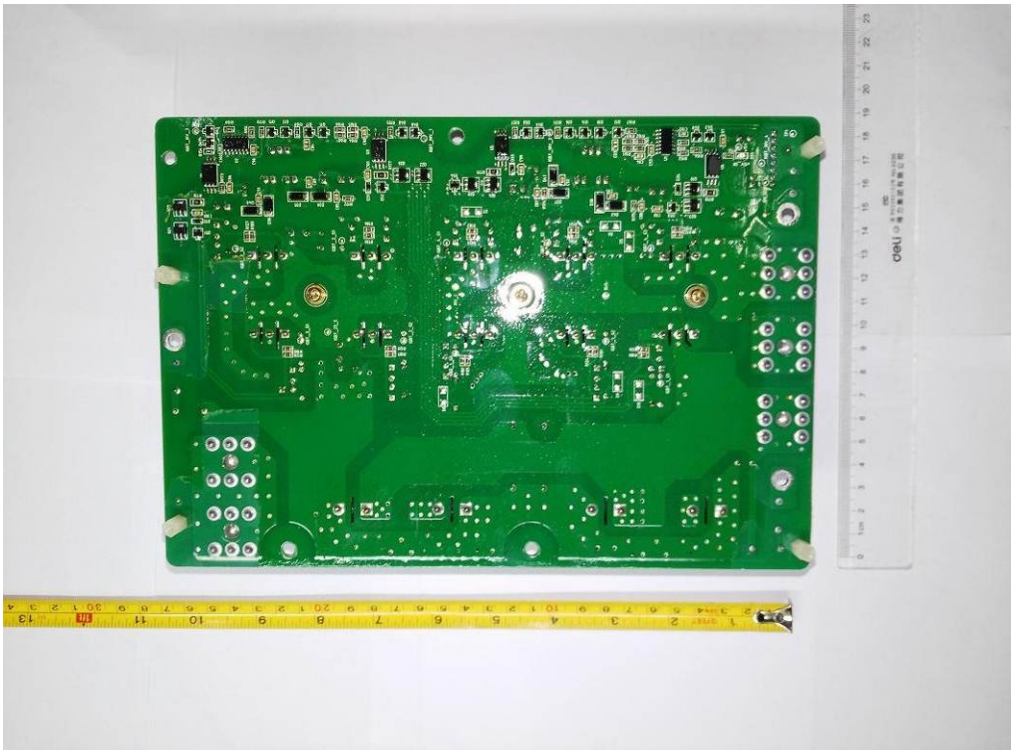

Fig. 14 –PS1503_DR4 board trace view

Appendix 2

Product photos

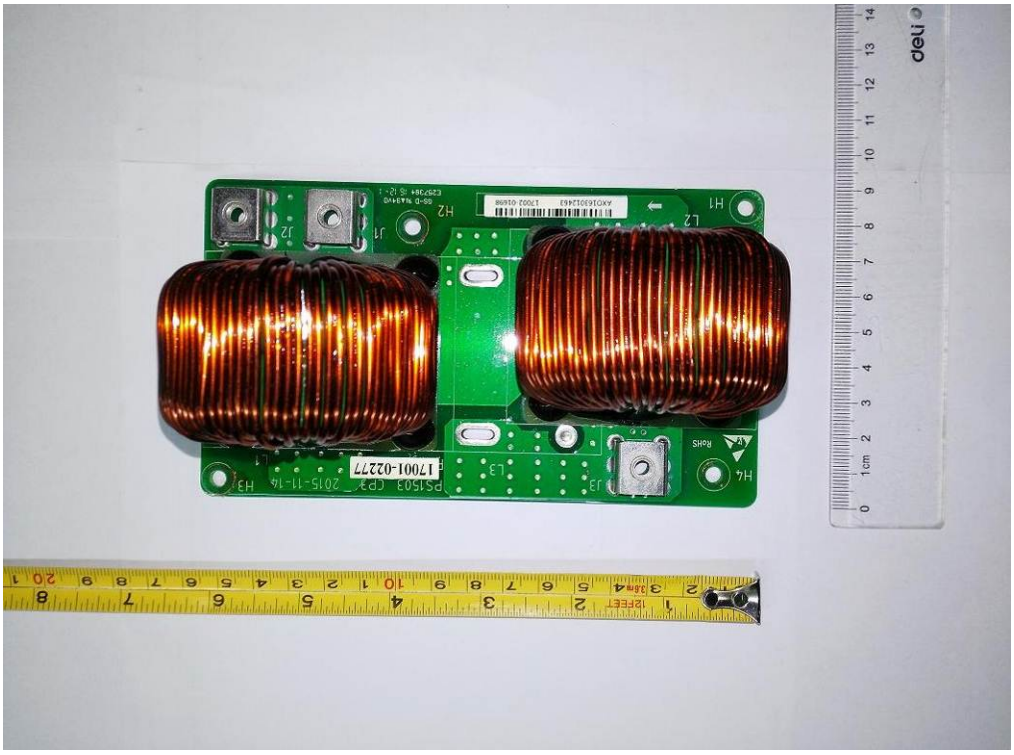

Fig. 15 – CTNL board component view

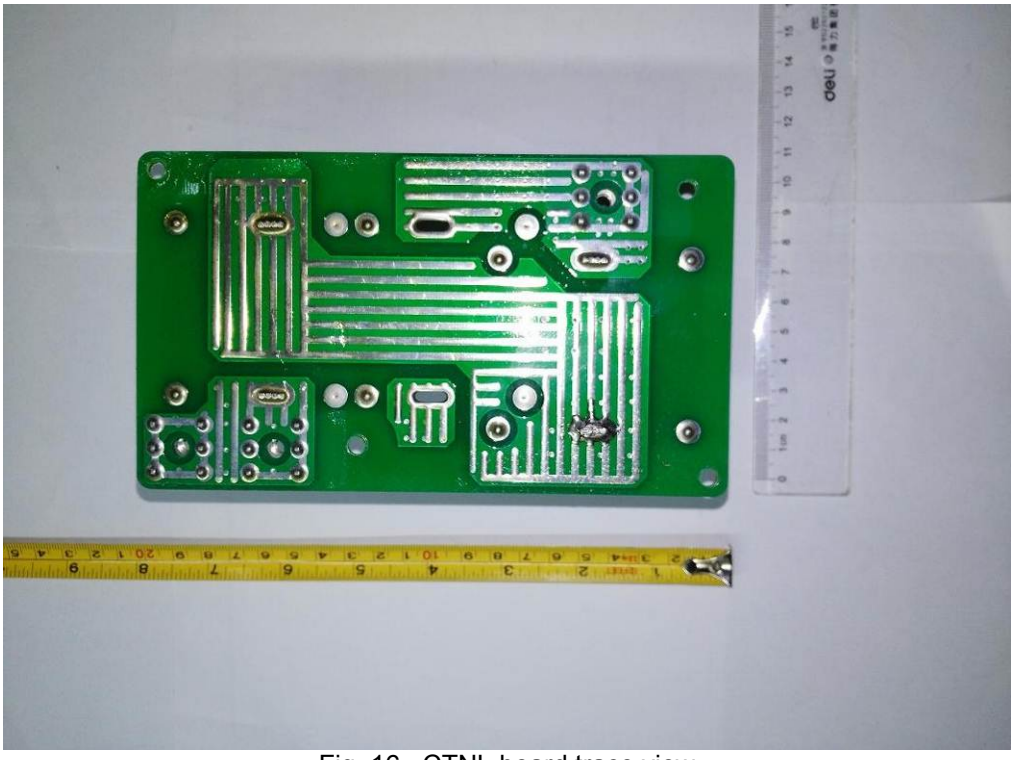

Fig. 16 –CTNL board trace view

Appendix 2

Product photos

Fig. 17–PS1203_PW5 board component view

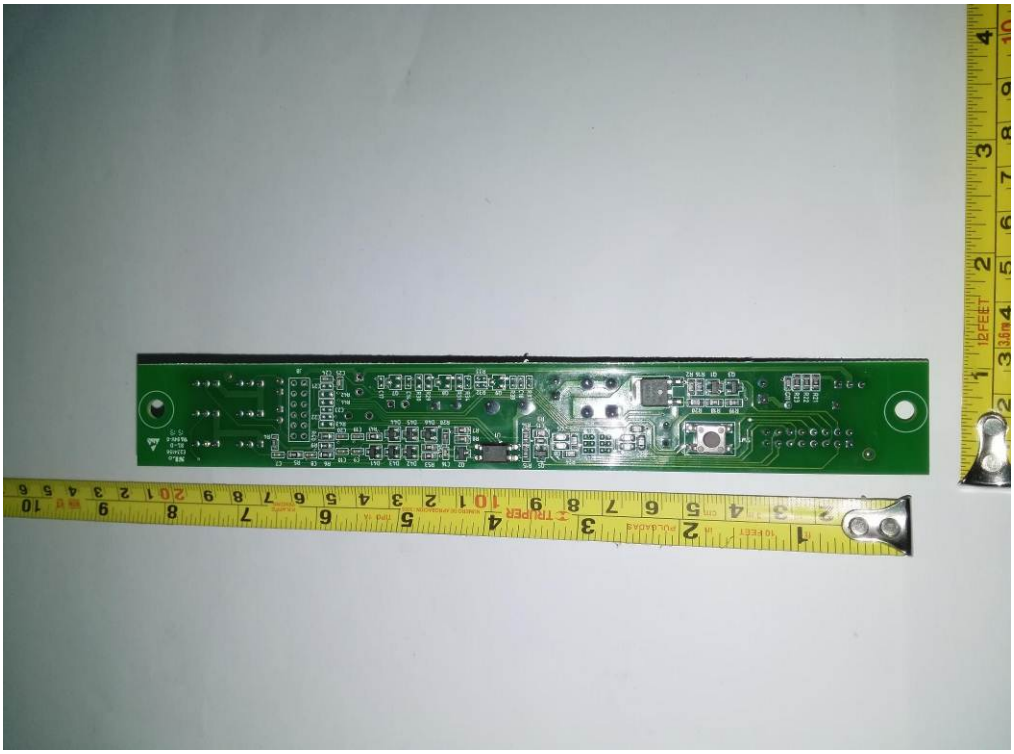

Fig. 18 –PS1203_PW5 board trace view