



TL-395

Test Report issued under the responsibility of:



**TEST REPORT**  
**IEC 62109-1**  
**Safety of Power Converter for use in Photovoltaic Power Systems**  
**Part 1: General requirements**

**Report Number..... :** 250114005GZU-001

**Date of issue..... :** 16 Jan 2025

**Total number of pages .....** 78 pages

**Name of Testing Laboratory preparing the Report .....** Intertek Testing Services Shenzhen Ltd. Guangzhou Branch  
Room101/301/401/102/202/302/402/502/602/702/802, No. 7-2,  
Caipin Road, Huangpu District, Guangzhou, Guangdong, China

**Applicant's name .....** Ningbo AUX Solar Technology Co., Ltd.

**Address..... :** No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo  
City, Zhejiang Province, China

**Test specification:**

**Standard .....** IEC/EN 62109-1:2010 (First Edition)

**Test procedure .....** LVD

**Non-standard test method .....** N/A

**Test Report Form No. .... :** IEC62109\_1B

**Test Report Form(s) Originator .... :** VDE Testing and Certification Institute

**Master TRF .....** Dated 2016-04

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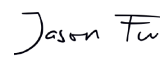
**General disclaimer:**

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

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Test item description..... :	Three phase on grid solar inverter																																																																																																																																	
Trade Mark..... :	<b>AUXSOL</b>																																																																																																																																	
Manufacturer .....	Same as applicant																																																																																																																																	
Model/Type reference .....	ASN-12TL-G2, ASN-15TL-G2, ASN-17TL-G2, ASN-20TL-G2, ASN-23TL-G2, ASN-25TL-G2, ASN-30TL-G2																																																																																																																																	
Ratings .....	<table><tr><td>MODEL</td><td>ASN-12TL-G2</td><td>ASN-15TL-G2</td><td>ASN-17TL-G2</td><td>ASN-20TL-G2</td></tr><tr><td colspan="5">Input (DC)</td></tr><tr><td>Max. input voltage</td><td colspan="4">1100V</td></tr><tr><td>Rated input voltage</td><td colspan="4">620V</td></tr><tr><td>MPPT operating voltage range</td><td colspan="4">150V-1000V</td></tr><tr><td>Max. input MPPT current</td><td colspan="4">40A/32A</td></tr><tr><td>Max. input short circuit current per MPPT</td><td colspan="4">50A/40A</td></tr><tr><td colspan="5">Output (AC)</td></tr><tr><td>Rated power</td><td>12kW</td><td>15kW</td><td>17kW</td><td>20kW</td></tr><tr><td>Max. AC apparent power</td><td>13.2kVA</td><td>16.5kVA</td><td>18.7kVA</td><td>22kVA</td></tr><tr><td>Rated output current</td><td>17.3A</td><td>21.7A</td><td>24.5A</td><td>28.9A</td></tr><tr><td>Max output current</td><td>19.1A</td><td>23.8A</td><td>27A</td><td>31.8A</td></tr><tr><td>Nominal grid voltage</td><td colspan="4">3N/PE, 220/380Vac, 230/400Vac</td></tr><tr><td>Nominal frequency</td><td colspan="4">50/60Hz</td></tr><tr><td>Power factor</td><td colspan="4">1 default (0.8 Leading...0.8 Lagging)</td></tr><tr><td>Ambient temperature range</td><td colspan="4">-30...+60℃</td></tr><tr><td>Degree of protection</td><td colspan="4">IP66</td></tr><tr><td>Protective Class</td><td colspan="4">Class I</td></tr><tr><td>Software Version</td><td colspan="4">DSP: D2301; ARM: A2301</td></tr><tr><td>MODEL</td><td>ASN-23TL-G2</td><td>ASN-25TL-G2</td><td colspan="2">ASN-30TL-G2</td></tr><tr><td colspan="5">Input (DC)</td></tr><tr><td>Max. input voltage</td><td colspan="4">1100V</td></tr><tr><td>Rated input voltage</td><td colspan="4">620V</td></tr><tr><td>MPPT operating voltage range</td><td colspan="4">150V-1000V</td></tr><tr><td>Max. input MPPT current</td><td colspan="3">40A/32A</td><td>40A/32A /32A</td></tr></table>					MODEL	ASN-12TL-G2	ASN-15TL-G2	ASN-17TL-G2	ASN-20TL-G2	Input (DC)					Max. input voltage	1100V				Rated input voltage	620V				MPPT operating voltage range	150V-1000V				Max. input MPPT current	40A/32A				Max. input short circuit current per MPPT	50A/40A				Output (AC)					Rated power	12kW	15kW	17kW	20kW	Max. AC apparent power	13.2kVA	16.5kVA	18.7kVA	22kVA	Rated output current	17.3A	21.7A	24.5A	28.9A	Max output current	19.1A	23.8A	27A	31.8A	Nominal grid voltage	3N/PE, 220/380Vac, 230/400Vac				Nominal frequency	50/60Hz				Power factor	1 default (0.8 Leading...0.8 Lagging)				Ambient temperature range	-30...+60℃				Degree of protection	IP66				Protective Class	Class I				Software Version	DSP: D2301; ARM: A2301				MODEL	ASN-23TL-G2	ASN-25TL-G2	ASN-30TL-G2		Input (DC)					Max. input voltage	1100V				Rated input voltage	620V				MPPT operating voltage range	150V-1000V				Max. input MPPT current	40A/32A			40A/32A /32A
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	Max. input short circuit current per MPPT	50A/40A		50A/40A /40A
	Output (AC)			
	Rated power	23kW	25kW	30kW
	Max. AC power	25.3kVA	27.5kVA	33kVA
	Rated output current	33.2A	36.1A	43.3A
	Max output current	36.5A	39.7A	47.6A
	Nominal grid voltage	3N/PE, 220/380Vac, 230/400Vac		
	Nominal frequency	50/60Hz		
	Power factor	1 default (0.8 Leading...0.8 Lagging)		
	Ambient temperature range	-30...+60 °C		
	Degree of protection	IP66		
	Protective Class	Class I		
	Software Version	DSP: D2301; ARM: A2301		

<b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b>		
<input checked="" type="checkbox"/>	<b>Testing Laboratory:</b>	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
<b>Testing location/ address .....</b>		Room101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guangdong, China
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	N/A
<b>Testing location/ address .....</b>		N/A
<b>Tested by (name, function, signature).....:</b>		Zeyu Yang Engineer 
<b>Approved by (name, function, signature)....:</b>		Jason Fu Supervisor 
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 1:</b>	N/A
<b>Testing location/ address .....</b>		N/A
<b>Tested by (name, function, signature).....:</b>		N/A
<b>Approved by (name, function, signature)....:</b>		N/A
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 2:</b>	N/A
<b>Testing location/ address .....</b>		N/A
<b>Tested by (name + signature) .....</b>		N/A
<b>Witnessed by (name, function, signature) .:</b>		N/A
<b>Approved by (name, function, signature)....:</b>		N/A
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 3:</b>	N/A
<input type="checkbox"/>	<b>Testing procedure: CTF Stage 4:</b>	N/A
<b>Testing location/ address .....</b>		N/A
<b>Tested by (name, function, signature).....:</b>		N/A
<b>Witnessed by (name, function, signature) .:</b>		N/A
<b>Approved by (name, function, signature)....:</b>		N/A
<b>Supervised by (name, function, signature) :</b>		N/A

<b>List of Attachments (including a total number of pages in each attachment):</b> N/A	
<b>Summary of testing:</b>	
<b>Tests performed (name of test and test clause):</b> All applicable tests	<b>Testing location:</b> Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guangdong, China
<b>Summary of compliance with National Differences (List of countries addressed):</b> N/A	
<input checked="" type="checkbox"/> <b>The product fulfils the requirements of IEC/EN 62109-1:2010 (First Edition)</b>	

**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.

AUXSOL

Three phase on grid solar inverter

ASN-30TL-G2

Max. input power	45kW	Rated output power	30kW
Max.input voltage	1100V	Max.output power	33kW
MPPT voltage range	150-1000V	Rated grid voltage	400V, 3/N/PE
Max.input current	40A/32A/32A	Rated output current	43.3A
Max.short circuit current	50A/40A/40A	Max.output current	47.6A
Rated grid frequency	50/60Hz	Power factor	1 (0.8 leading...0.8 lagging)

IP66, Outdoor, -30...+60°C

Overvoltage category: III[Mains], II[PV]

Ningbo AUX Solar Technology Co., Ltd.

Address: No.17 Fenglin Road,Cicheng Town, Jiangbei District,  
Ningbo City, Zhejiang Province, China

Tel.: 86-0574-8765-2201

web: [www.auxsol.com](http://www.auxsol.com)

Email: [info@auxsol.com](mailto:info@auxsol.com)

Postal Code:315031
Made in China

**Note:**

1. 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.
2. Label is attached on the side surface of enclosure and visible after installation.
3. Other labels are identical with above, except the ratings and model number.

<b>Test item particulars</b> ..... :			
<b>Equipment mobility</b> ..... :	<input type="checkbox"/> movable <input checked="" type="checkbox"/> fixed	<input type="checkbox"/> hand-held <input type="checkbox"/> transportable	<input type="checkbox"/> stationary <input type="checkbox"/> for building-in
<b>Connection to the mains</b> ..... :	<input type="checkbox"/> pluggable equipment <input checked="" type="checkbox"/> permanent connection		<input type="checkbox"/> direct plug-in <input type="checkbox"/> for building-in
<b>Environmental category</b> ..... :	<input checked="" type="checkbox"/> outdoor	<input type="checkbox"/> indoor unconditional	<input type="checkbox"/> indoor conditional
<b>Over voltage category Mains</b> ..... :	<input type="checkbox"/> OVC I	<input type="checkbox"/> OVC II	<input checked="" type="checkbox"/> OVC III <input type="checkbox"/> OVC IV
<b>Over voltage category PV</b> ..... :	<input type="checkbox"/> OVC I	<input checked="" type="checkbox"/> OVC II	<input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV
<b>Mains supply tolerance (%)</b> ..... :	-90 / +110 %		
<b>Tested for power systems</b> ..... :	TN systems		
<b>IT testing, phase-phase voltage (V)</b> ..... :	- - -		
<b>Class of equipment</b> ..... :	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III <input type="checkbox"/> Not classified		
<b>Mass of equipment (kg)</b> ..... :	Approx. 24.5Kg		
<b>Pollution degree</b> ..... :	Outside PD3; Inside PD2		
<b>IP protection class</b> ..... :	IP 66		
..... :			
<b>Possible test case verdicts:</b>			
- test case does not apply to the test object ..... : N/A			
- test object does meet the requirement ..... : P (Pass)			
- test object was not evaluated for the requirement..... : N/E			
- test object does not meet the requirement ..... : F (Fail)			
<b>Testing</b> ..... :			
<b>Date of receipt of test item</b> ..... : 14 Jan 2025			
<b>Date (s) of performance of tests</b> ..... : 14 Jan 2025 - 15 Jan 2025			

**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.

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**This report is based on and replaced report No.240814010GZU-001, dated 18 Oct 2024 to have following revision**

**1, Added alternative external photo's view**

**After evaluation, no tests are necessary.**

**This report shall be used together with report No. 250114005GZU-002.**

**Manufacturer's Declaration per sub-clause 4.2.5 of IEC62109-2:**

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) .....** : Ningbo AUX Solar Technology Co., Ltd.  
 No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China



### General product information:

The unit is a three-phase PV Grid-tied inverter, it can convert the high PV voltage to Grid voltage and feed into Grid network.

The unit is providing I/P and O/P filtering at the PV side and AC side. It does not provide galvanic separation from PV side to Grid.

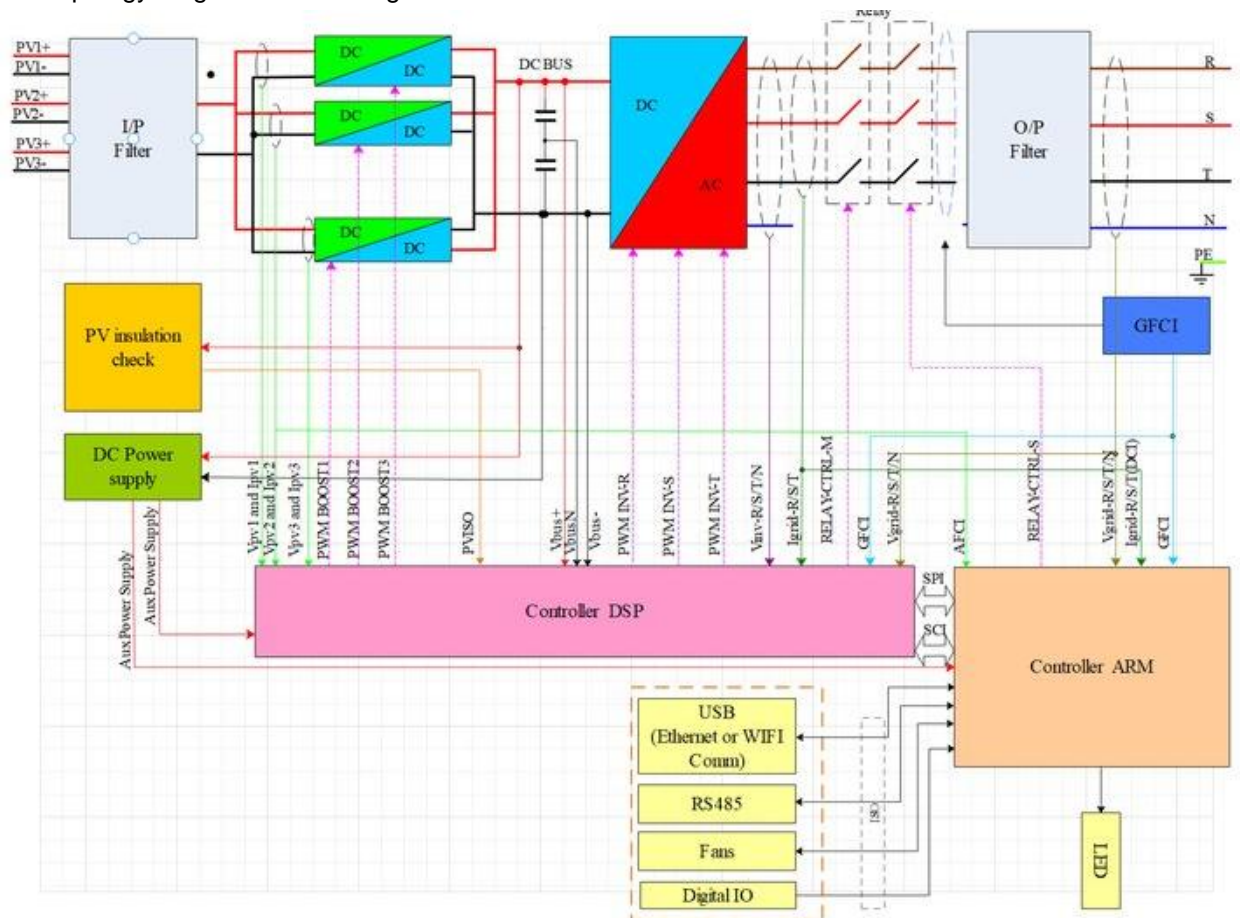
The unit has two controllers. The master controller DSP monitor the invert statue; measure the PV voltage and current, bus voltage, AC voltage, current, GFCI and frequency, also communicate with the slave controller DSP.

The slave controller DSP monitor AC voltage, current, frequency, GFCI and communicate with the master controller DSP.

The relays are designed on redundant structure that controlled by DSP separately.

The master controller and slave controller are used together to control relay open or close, if the single fault on one controller, the other controller can be capable of opening the relay, so that still providing safety means.

The topology diagram as following:



### Difference of the models:

All models have identical mechanical and electrical construction except the power is derated by software.

### The product was tested on:



The Hardware version: V0001

The Software version: DSP: D2301; ARM: A2301

Other than special notice, the model ASN-30TL-G2 is as the representative test model in this report and valid for other models.

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
<b>4</b>	<b>GENERAL TESTING REQUIREMENTS</b>		<b>P</b>
4.1	General		P
4.2	General conditions for testing		P
4.2.1	Sequence of tests		P
4.2.2	Reference test conditions		P
4.2.2.1	Environmental conditions	Max. 60°C rated ambient temperature tested.	P
4.2.2.2	State of equipment		P
4.2.2.3	Position of equipment	Be fixed in accordance with the manufacturer's instruction	P
4.2.2.4	Accessories		N/A
4.2.2.5	Covers and removable parts		N/A
4.2.2.6	Mains supply a) Voltage: b) Frequency: c) Polarity: d) Earthing: e) Over-current Protection:	(see appended table 4.2.2.6)	P
4.2.2.7	Supply ports other than the mains		P
4.2.2.7.1	Photovoltaic supply sources a) Open circuit voltage: b) Short-circuit current:	(see appended table 4.2.2.7)	P
4.2.2.7.2	Battery inputs		N/A
4.2.2.8	Conditions of loading for output ports		P
4.2.2.9	Earthing terminals		P
4.2.2.10	Controls		N/A
4.2.2.11	Available short circuit current		P
4.3	Thermal testing	(see appended table 4.3)	P
4.3.1	General		P
4.3.2	Maximum temperatures		P
4.3.2.1	General		P
4.3.2.2	Touch temperatures		P
4.3.2.3	Temperature limits for mounting surfaces		P
4.4	Testing in single fault condition	(see appended table 4.4)	P
4.4.1	General		P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
4.4.2	Test conditions and duration for testing under fault conditions		P
4.4.2.1	General		P
4.4.2.2	Duration of tests		P
4.4.3	Pass/fail criteria for testing under fault conditions		P
4.4.3.1	Protection against shock hazard		P
4.4.3.2	Protection against the spread of fire		P
4.4.3.3	Protection against other hazards		P
4.4.3.4	Protection against parts expulsion hazards		P
4.4.4	Single fault conditions to be applied	(See appended tables)	P
4.4.4.1	Component fault tests		P
4.4.4.2	Equipment or parts for short-term or intermittent operation	Not for short-term or intermittent operation	N/A
4.4.4.3	Motors		N/A
4.4.4.4	Transformer short circuit tests		N/A
4.4.4.5	Output short circuit		P
4.4.4.6	Backfeed current test for equipment with more than one source of supply	The backfeed current of the inverter is 0A and less than rated current.	P
4.4.4.7	Output overload		P
4.4.4.8	Cooling system failure	Blanketing test for the heatsink according to IEC 62109-2 Clause 4.4.4.17	P
4.4.4.9	Heating devices	No heating devices	N/A
4.4.4.10	Safety interlock systems	No safety interlock	N/A
4.4.4.11	Reverse d.c. connections	Reverse DC+ and DC-, the PCE cannot start-up. No damage.	P
4.4.4.12	Voltage selector mismatch	No voltage selector	N/A
4.4.4.13	Mis-wiring with incorrect phase sequence or polarity	Mis-wiring: L to N, normal operation	P
4.4.4.14	Printed wiring board short-circuit test		P
4.5	Humidity preconditioning	(see appended table 7.5)	P
4.5.1	General		P
4.5.2	Conditions	95% R.H. 40°C. 48H	P
4.6	Backfeed voltage protection		P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
4.6.1	Backfeed tests under normal conditions	The max. DC input and output are less than 60V, disconnected DC inputs and main	P
4.6.2	Backfeed tests under single-fault conditions	PV input is separated from Main with basic insulation under normal and single-fault conditions with disconnection method evaluated to EN62109-2  Also,  is presented on the marking label means that “After disconnect must wait for 5 mins can touch with PCE terminal”	P
4.6.3	Compliance with backfeed tests		P
4.7	Electrical ratings tests	(see appended table 4.2.2.6)	P
4.7.1	Input ratings		P
4.7.1.1	Measurement requirements for DC input ports		P
4.7.2	Output ratings		P
<b>5</b>	<b>MARKING AND DOCUMENTATION</b>		P
5.1	Marking		P
5.1.1	General		P
	Equipment shall bear markings as specified in 5.1 and 5.2	Label is marked on PCE and graphic symbol is explained in user manual	P
	Graphic symbols may be used and shall be in accordance with Annex C or IEC 60417 as applicable.		P
	Graphic symbols shall be explained in the documentation provided with the PCE.		P
5.1.2	Durability of markings		P
	Markings required by this clause to be located on the PCE shall remain clear and legible under conditions of NORMAL USE and resist the effects of cleaning agents specified by the manufacturer		P
5.1.3	Identification		P
	The equipment shall, as a minimum, be permanently marked with:		P
	a) the name or trade mark of the manufacturer or supplier	Trade mark: 	P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
	b) model number, name or other means to identify the equipment		P
	c) a serial number, code or other marking allowing identification of manufacturing location and the manufacturing batch or date within a three month time period.	Within three months	P
5.1.4	Equipment ratings	See below	P
	Unless otherwise specified in another part of IEC 62109, the following ratings, as applicable shall be marked on the equipment:		P
	– input voltage, type of voltage (a.c. or d.c.), frequency, and max. continuous current for each input	Refer to the marking label	P
	– output voltage, type of voltage (a.c. or d.c.), frequency, max. continuous current, and for a.c. outputs, either the power or power factor for each output	Refer to the marking label	P
	– the ingress protection (IP) rating as in 6.3 below	IP 66	P
5.1.5	Fuse identification	No fuse inside	N/A
	Marking shall be located adjacent to each fuse or fuseholder, or on the fuseholder, or in another location provided that it is obvious to which fuse the marking applies, giving the fuse current rating and where fuses of different voltage rating value could be fitted, the fuse voltage rating.		N/A
	Where fuses with special fusing characteristics such as time delay or breaking capacity are necessary, the type shall also be indicated		N/A
	For fuses not located in operator access areas and for soldered-in fuses located in operator access areas, it is permitted to provide an unambiguous cross-reference (for example, F1, F2, etc.) to the servicing instructions which shall contain the relevant information.		N/A
5.1.6	Terminals, Connections, and Controls		P
	If necessary for safety, an indication shall be given of the purpose of Terminals, connectors, controls, and indicators, and their various positions, including any connections for coolant fluids such as water and drainage. The symbols in Annex C may be used, and where there is insufficient space, symbol 9 of Annex C may be used.	“PV+” and “PV-” marked on the DC input terminal “L” “N” and “GND” marked on AC output connector	P
	Push-buttons and actuators of emergency stop devices, and indicator lamps used only to indicate a		P

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict
	warning of danger or the need for urgent action shall be coloured red.		
	A multiple-voltage unit shall be marked to indicate the particular voltage for which it is set when shipped from the factory. The marking is allowed to be in the form of a paper tag or any other non-permanent material.	The PCE is not intended to connect to multiple-voltage and there is no voltage setting device.	N/A
	A unit with d.c. terminals shall be plainly marked indicating the polarity of the connections, with:		P
	– the sign “+” for positive and “-”, for negative; or		
	– a pictorial representation illustrating the proper polarity where the correct polarity can be unambiguously determined from the representation	Not provided	N/A
5.1.6.1	Protective Conductor Terminals		P
	The means of connection for the protective earthing conductor shall be marked with:	The protective earthing terminal is connected via AC connector.	P
	– symbol 7 of Annex C; or		P
	– the letters “PE”; or		N/A
	– the colour coding green-yellow.		P
5.1.7	Switches and circuit-breakers	DC switch	P
	The on and off-positions of switches and circuits breakers shall be clearly marked. If a push-button switch is used as the power switch, symbols 10 and 16 of Annex C may be used to indicate the on-position, or symbols 11 and 17 to indicate the off-position, with the pair of symbols (10 and 16, or 11 and 17) close together.		P
5.1.8	Class II Equipment	Class I	N/A
	Equipment using Class II protective means throughout shall be marked with symbol 12 of Annex C. Equipment which is only partially protected by DOUBLE INSULATION or REINFORCED INSULATION shall not bear symbol 12 of Table Annex C.		N/A
	Where such equipment has provision for the connection of an earthing conductor for functional reasons (see 7.3.6.4) it shall be marked with symbol 6 of Annex C		N/A
5.1.9	Terminal boxes for External Connections		N/A
	Where required by note 1 of Table 2 as a result of high temperatures of terminals or parts in the wiring		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	compartment, there shall be a marking, visible beside the terminal before connection, of either:		
	a) the minimum temperature Rating and size of the cable to be connected to the TERMINALS; or		N/A
	b) a marking to warn the installer to consult the installation instruction. Symbol 9 of Table D-1 is an acceptable marking		N/A
5.2	Warning markings		P
5.2.1	Visibility and legibility requirements for warning markings		P
	Warning markings shall be legible, and shall have minimum dimensions as follows:		P
	– Printed symbols shall be at least 2,75 mm high		P
	– Printed text characters shall be at least 1.5 mm high and shall contrast in colour with the background		P
	– Symbols or text that are moulded, stamped or engraved in a material shall have a character height of at least 2,0 mm, and if not contrasting in colour from the background, shall have a depth or raised height of at least 0,5 mm.		P
	If it is necessary to refer to the instruction manual to preserve the protection afforded by the equipment, the equipment shall be marked with symbol 9 of Annex C	The manual provides necessary information for warning marking	P
	Symbol 9 of Annex C is not required to be used adjacent to symbols that are explained in the manual		P
5.2.2	Content for warning markings		P
5.2.2.1	Ungrounded heat sinks and similar parts	Grounded heatsink	N/A
	An ungrounded heat sink or other part that may be mistaken for a grounded part and involves a risk of electric shock in accordance with 7.3 shall be marked with symbol 13 of Annex C, or equivalent. The marking may be on or adjacent to the heat sink and shall be clearly visible when the PCE is disassembled to the extent that a risk of contact with the heat sink exists.		N/A
5.2.2.2	Hot Surfaces		P
	A part of the PCE that exceeds the temperature limits specified in 4.3.2 shall be marked with symbol 14 of Annex C or equivalent.		P



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Clause	Requirement – Test	Result – Remark	Verdict
5.2.2.3	Coolant	Coolant is not used	N/A
	A unit containing coolant that exceeds 70 °C shall be legibly marked externally where readily visible after installation with symbol 15 of Annex C. The documentation shall provide a warning regarding the risk of burns from hot coolant, and either:		N/A
	a) statement that coolant system servicing is to be done only by SERVICE PERSONNEL, or		N/A
	b) instructions for safe venting, draining, or otherwise working on the cooling system, if these operations can be performed without OPERATOR access to HAZARDS internal to the equipment		N/A
5.2.2.4	Stored energy		P
	Where required by 7.3.9.2 or 7.4.2 the PCE shall be marked with Symbol 21 of Annex C and the time to discharge capacitors to safe voltage and energy levels shall accompany the symbol.		P
5.2.2.5	Motor guarding		N/A
	Where required by 8.2 a marking shall be provided where it is visible to service personnel before removal of a guard, warning of the hazard and giving instructions for safe servicing (for example disconnection of the source before removing the guard).		N/A
5.2.3	Sonic hazard markings and instructions	Hazardous noise is not produced	N/A
	If required by 10.2.1 a PCE shall:		N/A
	a) be marked to warn the operator of the sonic pressure hazard; or		N/A
	b) be provided with installation instructions that specify how the installer can ensure that the sound pressure level from equipment at its point of use after installation, will not reach a value, which could cause a hazard. These instructions shall include the measured sound pressure level, and shall identify readily available and practicable protective materials or measures which may be used.		N/A
5.2.4	Equipment with multiple sources of supply		P
	A PCE with connections for multiple energy sources shall be marked with symbol 13 of Annex C and the manual shall contain the information required in 5.3.4.		P



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Clause	Requirement – Test	Result – Remark	Verdict
	The symbol shall be located on the outside of the unit or shall be prominently visible behind any cover giving access to hazardous parts.		P
5.2.5	Excessive touch current		N/A
	Where required by 7.3.6.3.7 the PCE shall be marked with symbol 15 of Annex C. See also 5.3.2 for information to be provided in the installation manual.		N/A
5.3	Documentation		P
5.3.1	General		P
	The documentation provided with the PCE shall provide the information needed for the safe operation, installation, and (where applicable) maintenance of the equipment. The documentation shall include the items required in 5.3.2 through 5.3.4, and the following:		P
	a) explanations of equipment makings, including symbols used		P
	b) location and function of terminals and controls		P
	c) all ratings or specifications that are necessary to safely install and operate the PCE, including the following environmental ratings along with an explanation of their meaning and any resulting installation requirements:		P
	– ENVIRONMENTAL CATEGORY as per 6.1	Outdoor	P
	– WET LOCATIONS classification for the intended external environment as per 6.1	Suitable for wet location	P
	– POLLUTION DEGREE classification for the intended external environment as per 6.2	Outside: PD3, Inside: PD2	P
	– INGRESS PROTECTION rating as per 6.3	IP 66	P
	– Ambient temperature and relative humidity ratings	Max. -25°C - +60°C and 100% R.H.	P
	– MAXIMUM altitude rating	4000m	P
	– OVERVOLTAGE CATEGORY assigned to each input and output port as per 7.3.7.1.2, accompanied by guidance regarding how to ensure that the installation complies with the required overvoltage categories;	OVC II(PV), OVC III(Mains)	P
	d) a warning that when the photovoltaic array is exposed to light, it supplies a d.c. voltage to the PCE		P

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Clause	Requirement – Test	Result – Remark	Verdict
5.3.1.1	Language	English provides	P
	Instructions related to safety shall be in a language that is acceptable in the country where the equipment is to be installed.	For other country language further evaluated is needed	N/A
5.3.1.2	Format		P
	In general, the documentation must be provided in printed form and is to be delivered with the equipment.	Printed form provided	P
	For equipment which requires the use of a computer for both installation and operation, documentation may be provided in electronic format without accompanying printed format.		N/A
5.3.2	Information related to installation		P
	The documentation shall include installation and where applicable, specific commissioning instructions and, if necessary for safety, warnings against hazards which could arise during installation or commissioning of the equipment. The information provided shall include:		P
	a) assembly, location, and mounting requirements;		P
	b) ratings and means of connection to each source of supply and any requirements related to wiring and external controls, colour coding of leads, disconnection means, or overcurrent protection needed, including instructions that the installation position shall not prevent access to the disconnection means;		P
	c) ratings and means of connection of any outputs from the PCE, and any requirements related to wiring and external controls, colour coding of leads, or overcurrent protection needed;		P
	d) explanation of the pin-out of connectors for external connections, unless the connector is used for a standard purpose (e.g. RS 232)		P
	e) ventilation requirements;		P
	f) requirements for special services, for example cooling liquid;		N/A
	g) instructions and information relating to sound pressure level if required by 10.2.1;		N/A
	h) where required by 14.8.1.3, instructions for the adequate ventilation of the room or location in which PCE containing vented or valve-regulated batteries is located, to prevent the accumulation of hazardous gases;		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	i) tightening torque to be applied to wiring terminals;		N/A
	j) values of backfeed short-circuit currents available from the PCE on input and output conductors under fault conditions, if those currents exceed the max. rated current of the circuit, as per 4.4.4.6;	Not exceeds the max. rated current.	N/A
	k) for each input to the PCE, the max value of short-circuit current available from the source, for which the PCE is designed; and		P
	l) compatibility with RCD and RCM;	Internal RCM is used	N/A
	m) instructions for protective earthing, including the information required by 7.3.6.3.7 if a second protective earthing conductor is to be installed:	Touch current is not exceeded limit	N/A
	n) where required by 7.3.8, the installation instructions shall include the following or equivalent wording:		N/A
	“This product can cause a d.c. current in the external protective earthing conductor. Where a residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in a case of direct or indirect contact, only an RCD or RCM of Type B is allowed on the supply side of this product.”	Type B RCD is recommended for external use	N/A
	o) for PCE intended to charge batteries, the battery nominal voltage rating, size, and type	Grid interactive	N/A
	p) PV array configuration information, such as ratings, whether the array is to be grounded or floating, any external protection devices needed, etc.		N/A
5.3.3	Information related to operation		P
	Instructions for use shall include any operating instructions necessary to ensure safe operation, including the following, as applicable:		P
	– Instructions for adjustment of controls including the effects of adjustment;		P
	– Instructions for interconnection to accessories and other equipment, including indication of suitable accessories, detachable parts and any special materials;		P
	– Warnings regarding the risk of burns from surfaces permitted to exceed the temperature limits of 4.3.2 and required operator actions to reduce the risk; and		P

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Clause	Requirement – Test	Result – Remark	Verdict
	– Instructions, that if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.		P
5.3.4	Information related to maintenance		P
	Maintenance instructions shall include the following:		P
	– Intervals and instructions for any preventive maintenance that is required to maintain safety (for example air filter replacement or periodic re-tightening of terminals);		P
	– Instructions for accessing operator access areas, if any are present, including a warning not to enter other areas of the equipment;	No such part	P
	– Part numbers and instructions for obtaining any required operator replaceable parts;		N/A
	– Instructions for safe cleaning (if recommended)		N/A
	– Where there is more than one source of supply energizing the PCE, information shall be provided in the manual to indicate which disconnect device or devices are required to be operated in order to completely isolate the equipment.		P
5.3.4.1	Battery maintenance	No battery inside	N/A
	Where required by 14.8.5, the documentation shall include the applicable items from the following list of instructions regarding maintenance of batteries:		N/A
	– Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions		N/A
	– When replacing batteries, replace with the same type and number of batteries or battery packs		N/A
	– General instructions regarding removal and installation of batteries		N/A
	– CAUTION: Do not dispose of batteries in a fire. The batteries may explode.		N/A
	– CAUTION: Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.		N/A
	– CAUTION: A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	when working on batteries:		
	a) Remove watches, rings, or other metal objects.		N/A
	b) Use tools with insulated handles.		N/A
	c) Wear rubber gloves and boots.		N/A
	d) Do not lay tools or metal parts on top of batteries		N/A
	e) Disconnect charging source prior to connecting or disconnecting battery terminals		N/A
	f) Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).		N/A
<b>6</b>	<b>ENVIRONMENTAL REQUIREMENTS AND CONDITIONS</b>		<b>P</b>
	The manufacturer shall rate the PCE for the following environmental conditions:		<b>P</b>
	– ENVIRONMENTAL CATEGORY, as in 6.1 below	Outdoor used	<b>P</b>
	– Suitability for WET LOCATIONS or not	Yes	<b>P</b>
	– POLLUTION DEGREE rating in 6.2 below	Outside PD3, Inside PD2	<b>P</b>
	– INGRESS PROTECTION (IP) rating, as in 6.3 below	IP 66	<b>P</b>
	– Ultraviolet (UV) exposure rating, as in 6.4 below		<b>P</b>
	– Ambient temperature and relative humidity ratings, as in 6.5 below	Max. 60°C, 100%R.H.	<b>P</b>
6.1	Environmental categories and minimum environmental conditions		<b>P</b>
6.1.1	Outdoor		<b>P</b>
6.1.2	Indoor, unconditioned		<b>N/A</b>
6.1.3	Indoor, conditioned		<b>N/A</b>
6.2	Pollution degree		<b>P</b>
6.3	Ingress Protection		<b>P</b>
6.4	UV exposure		<b>P</b>
6.5	Temperature and humidity		<b>P</b>
<b>7</b>	<b>PROTECTION AGAINST ELECTRIC SHOCK AND ENERGY HAZARDS</b>		<b>P</b>

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Clause	Requirement – Test	Result – Remark	Verdict
7.1	General		P
7.2	Fault conditions	Normal and single fault condition are considered	P
7.3	Protection against electric shock		P
7.3.1	General	In the PCE the metal enclosure is evaluated by means of basic insulation and earthing from DVC C circuit DVC A circuit and unearthed accessible parts are evaluated by means of reinforced insulation from DVC C DVC C circuit: The PV input and the Main output DVC A circuit: The signal communication output ports.	P
7.3.2	Decisive voltage classification		P
7.3.2.1	Use of decisive voltage class (DVC)	Working voltage and protective measure and considered	P
7.3.2.2	Limits of DVC (according table 6)	Wet location is considered for PCE outside only	P
7.3.2.3	Short-terms limits of accessible voltages under fault conditions		P
7.3.2.4	Requirements for protection (according table 7)	Single fault condition is considered	P
7.3.2.5	Connection to PELV and SELV circuits	The external signal communication port is considered as SELV	P
7.3.2.6	Working voltage and DVC		P
7.3.2.6.1	General	Transients and voltage fluctuation are disregarded. And worst-case normal operation condition is considered	P
7.3.2.6.2	AC working voltage (see Figure 2)		P
7.3.2.6.3	DC working voltage (see Figure 3)		P
7.3.2.6.4	Pulsating working voltage (see Figure 4)		P
7.3.3	protective separation	In the PCE the metal enclosure is evaluated by means of basic insulation and earthing from DVC C circuit DVC A circuit and unearthed accessible parts are evaluated	P

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Clause	Requirement – Test	Result – Remark	Verdict
		by means of reinforced insulation from DVC C DVC C circuit: The PV input and the Main output DVC A circuit: The signal communication output ports.	
	Protective separation shall be achieved by:		P
	<ul style="list-style-type: none"> <li>double or reinforced insulation, or</li> </ul>		P
	<ul style="list-style-type: none"> <li>protective screening, i.e. by a conductive screen connected to earth by protective bonding in the PCE, or connected to the protective earth conductor itself, whereby the screen is separated from live parts by at least basic insulation, or</li> </ul>		P
	<ul style="list-style-type: none"> <li>protective impedance comprising limitation of current per 7.3.5.3 and of discharged energy per 7.3.5.4, or</li> </ul>		P
	<ul style="list-style-type: none"> <li>limitation of voltage according to 7.3.5.4.</li> </ul>		N/A
	The protective separation shall be fully and effectively maintained under all conditions of intended use of the PCE		P
7.3.4	Protection against direct contact		P
7.3.4.1	General		P
	Protection against direct contact is employed to prevent persons from touching live parts that do not meet the requirements of 7.3.5 and shall be provided by one or more of the measure given in 7.3.4.2 (enclosures and barriers) and 7.3.4.3 (insulation).	Metal enclosure provided	P
	Open type sub-assemblies and devices do not require protective measures against direct contact but the instruction provided with the equipment must indicate that such measures must be provided in the end equipment or in the installation.		N/A
	Product intended for installation in CLOSED ELECTRICAL OPERATING AREAS, (see 3.9) need not have protective measures against direct contact, except as required by 7.3.4.2.4.	Not use under this condition	N/A
7.3.4.2	Protection by means of enclosures and barriers		P
	The following requirements apply where protection against contact with live parts is provided by enclosures or barriers, not by insulation in accordance with 7.3.4.3.	Enclosure provided to prevent access to inside live parts	P
7.3.4.2.1	General		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Parts of enclosures and barriers that provide protection in accordance with these requirements shall not be removable without the use of a tool (see 7.3.4.2.3).	Secured by screws	P
	Polymeric materials used to meet these requirements shall also meet the requirements of 13.6	The plastic material used on enclosure is evaluated via clause 13.6	P
7.3.4.2.2	Access probe criteria		P
	Protection is considered to be achieved when the separation between the test probes and live parts, when tested as described below, is as follows:		P
	a) decisive voltage classification A, (DVC A) - the probe may touch the live parts	The signal is considered as DVC A	P
	b) decisive voltage classification B, (DVC B) - the probe must not touch bare live parts	The DVC B circuit is not accessible by probe	P
	c) decisive voltage classification C, (DVC C) – the probe must have adequate clearance to live parts, based on the clearance for Basic insulation using the recurring peak working voltage involved,	The DVC C circuit is not accessible by probe	P
7.3.4.2.3	Access probe tests		P
	Compliance with 7.3.4.2.1 is checked by all of the following:		P
	a) Inspection; and		P
	b) Tests with the test finger (Figure D.1) and test pin (Figure D.2) of 0E, the results of which shall comply with the requirements of 7.3.4.2.1 a), b), and c) as applicable. Probe tests are performed on openings in the enclosures after removal of parts that can be detached or opened by an operator without the use of a tool, including fuseholders, and with operator access doors and covers open. It is permitted to leave lamps in place for this test. Connectors that can be separated by an operator without use of a tool, shall also be tested during and after disconnection. Any movable parts are to be put in the most unfavourable position.		P
	The test finger and the test pin are applied as above, without appreciable force, in every possible position, except that floor-standing equipment having a mass exceeding 40 kg is not tilted.		P
	Equipment intended for building-in or rack mounting, or for incorporation in larger		N/A



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Clause	Requirement – Test	Result – Remark	Verdict
	equipment, is tested with access to the equipment limited according to the method of mounting detailed in the installation instructions.		
	c) Openings preventing the entry of the jointed test finger ( Figure E-1 of 0E) during test b) above, are further tested by means of straight unjointed test finger (Figure E-3 of 0E), applied with a force of 30 N. If the unjointed finger enters, the test with the jointed finger is repeated except that the finger is applied using any necessary force up to 30 N.		N/A
	d) In addition to a) – c) above, top surfaces of enclosure shall be tested with the IP3X probe of IEC 60529. The test probe shall not penetrate the top surface of the enclosure when probed from the vertical direction $\pm 5^\circ$ only.		N/A
7.3.4.2.4	Service access areas	Inside PCE are not intentionally touched with energized part when installation and maintenance. Symbol 21 of Annex C are marked on PCE and explained in user manual	P
7.3.4.3	Protection by means of insulation of live parts	The metal enclosure is with basic insulation from the live parts inside	P
	Where the requirements of 7.3.4.2 are not met, live parts shall be provided with insulation if:		P
	– their working voltage is greater than the maximum limit of decisive voltage class A, or		P
	– for a DVC A or B circuit, protective separation from adjacent circuit of DVC C is not provided (see note “†” under Table 7)		P
7.3.5	Protection in case of direct contact	The single communication port is direct contact and evaluated with reinforced insulation from live part	P
7.3.5.1	General		P
	Protection in case of direct contact is required to ensure that contact with live parts does not produce a shock hazard.		P
	The protection against direct contact according to 7.3.4 is not required if the circuit contacted is separated from other circuits according to 7.3.2.3, and:	Considered	P

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Clause	Requirement – Test	Result – Remark	Verdict
	– is of decisive voltage class A and complies with 7.3.5.2, or	The single communication port is DVC A and reinforced insulation from the live part by means of isolation transformer and optocoupler	P
	– is provided with protective impedance according to 7.3.5.3, or		N/A
	– is limited in voltage according to 7.3.5.4		N/A
	In addition to the measures as given in 7.3.5.2 to 7.3.5.4, it shall be ensured that in the event of error or polarity reversal of connectors no voltages that exceed DVC A can be connected into a circuit with protective separation. 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 (key) or which are accessible without the use of a tool.	Considered	P
	Conformity is checked by visual inspection and trial insertion.		P
7.3.5.2	Protection using decisive voltage class A	The communication port is DVC A and reinforced insulation from the live part by means of isolation transformer and optocoupler	P
7.3.5.3	Protection by means of protective impedance	Protective impedance not used as protective separation in the PCE	N/A
	Circuits and conductive parts do not require protection against direct contact if any connection to circuits of DVC-B or DVC-C is through protective impedance, and the accessible circuit or part is otherwise provided with protective separation from circuits of DVC-B or DVC-C according 7.3.3.		N/A
7.3.5.3.1	Limitation of current through protective impedance		N/A
	The current available through protective impedance to earth and between simultaneously accessible parts, measured at the accessible live parts, shall not exceed a value of 3,5 mA a.c. or 10 mA d.c. under normal and single-fault conditions.		N/A
7.3.5.3.2	Limitation of discharging energy through protective impedance		N/A
	The discharging energy available between simultaneously accessible parts protected by protective impedance shall not exceed the charging voltage and capacitance limits given in Table 9, which applies to both wet and dry locations, under		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	normal and single fault conditions. Refer to figure 8.		
7.3.5.4	Protection by means of limited voltages	No such design	N/A
	That portion of a circuit that has its voltage reduced to DVC-A by a voltage divider that complies with the following requirements, and that is otherwise provided with protective separation from circuits of DVC-B or DVC-C according to 7.3.3, does not require protection against direct contact.		N/A
	The voltage divider shall be designed so that under normal and single fault conditions, including faults in the voltage division circuit, the voltage across the output of the voltage divider does not exceed the limit for DVC-A.		N/A
	This type of protection shall not be used in case of protective class II or unearthed circuits, because it relies on protective earth being connected.		N/A
7.3.6	Protection against indirect contact		P
7.3.6.1	General		P
	Protection against indirect contact is required to prevent shock- hazardous current being accessible from conductive parts during an insulation failure. This protection shall comply with the requirements for protective class I (basic insulation plus protective earthing), class II (double or reinforced insulation) or class III (limitation of voltages)		P
	That part of a PCE meets the requirements of 7.3.6.2 and 7.3.6.3 is defined as protective class I	The earthed heatsink meets this requirement	P
	That part of a PCE meets the requirements of 7.3.6.4 is defined as protective class II.	The LED cover meets this requirement	P
	That part of PCE which meets the requirements of decisive voltage class A and in which no hazardous voltages are derived, is defined as protective class III. No shock hazard is present in such circuits.		N/A
	Where protection against indirect contact is dependent on means provided during installation, the installation instructions shall provide details of the required means and shall indicate the associated hazards.	The manual requires the PCE must be securely earthed	P
7.3.6.2	Insulation between live parts and accessible conductive parts		P
	Accessible conductive parts of equipment shall be separated from live parts by insulation meeting the requirements of Table 7 or by clearances as specified in 7.3.7.4 and creepages as specified in	See Cl. 7.3.7.4 and Cl. 7.3.7.5	P

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Clause	Requirement – Test	Result – Remark	Verdict
	7.3.7.5		
7.3.6.3	Protective class I – Protective bonding and earthing		P
7.3.6.3.1	General		P
	Equipment of protective class I shall be provided with protective earthing, and with protective bonding to ensure electrical contact between accessible conductive parts and the means of connection for the external protective earthing conductor, except bonding is not required for:		P
	a) accessible conductive parts that are protected by one of the measures in 7.3.5.2 to 7.3.5.4, or		N/A
	b) accessible conductive parts are separated from live parts of DVC-B or -C using double or reinforced insulation.		N/A
7.3.6.3.2	Requirements for protective bonding		P
	Electrical contact with the means of connection of the external protective earthing conductor shall be achieved by one or more of the following means:		P
	a) through direct metallic contact;		P
	b) through other conductive parts which are not removed when the PCE or sub-units are used as intended ;		N/A
	c) through a dedicated protective bonding conductor;		P
	d) through other metallic components of the PCE		N/A
	Where direct metallic contact is used and one or both of the parts involved is painted or coated, the paint or coating shall be removed in the area of contact, or reliably penetrated, to ensure metal to metal contact.	The metal heatsink is reliably penetrated earthed	P
	For moving or removable parts, hinges or sliding contacts designed and maintained to have a low resistance are examples of acceptable means if they comply with the requirements of 7.3.6.3.3.	No such design	N/A
	Metal ducts of flexible or rigid construction and metallic sheaths shall not be used as protective bonding conductors, unless the device or material has been investigated as suitable for protective bonding purposes.	No such design	N/A
7.3.6.3.3	Rating of protective bonding		P
	Protective bonding shall withstand the highest thermal and dynamic stresses that can occur to the PCE item(s) concerned when they are subjected to		P

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Clause	Requirement – Test	Result – Remark	Verdict
	a fault connecting live parts to accessible conductive parts. The protective bonding shall 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.		
	Protective bonding shall meet following requirements:		P
	a) For PCE with an overcurrent protective device rating of 16 A or less, the impedance of the protective bonding means shall not exceed 0,1 $\Omega$ during or at the end of the test below.		N/A
	b) For PCE with an overcurrent protective device rating of more than 16 A, the voltage drop in the protective bonding test shall not exceed 2,5 V during or at the end of the test below.		P
	As alternative to a) and b) the protective bonding may designed according to the requirements for the external protective earthing conductor in 7.3.6.3.5, in which case no testing is required.	Test done	N/A
	The impedance of protective bonding means shall be checked by passing a test current through the bond for a period of time as specified below. The test current is based on the rating of the overcurrent protection for the equipment or part of the equipment under consideration, as follows:		P
	a) 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);		N/A
	b) For pluggable equipment type B and fixed equipment, the maximum rating of the overcurrent protective device specified in the equipment installation instructions to be provided external to the equipment;		P
	c) For a circuit or part of the equipment for which an overcurrent protective device is provided as part of the equipment, the rating of the provided overcurrent device.	In the end installation, the overcurrent device will be provided	P
	Voltages are measured from the protective earthing terminal to all parts whose protective bonding means are being considered. The impedance of the protective earthing conductor is not included in the measurement. However, if the protective earthing conductor is supplied with the equipment, it is permitted to include the conductor in the test circuit	Measured form the farthest part of earthed metal enclosure to the input earth terminal	P

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Clause	Requirement – Test	Result – Remark	Verdict
	but the measurement of the voltage drop is made only from the main protective earthing terminal to the accessible part required to be earthed.		
	On equipment where the protective earth connection to a subassembly or to a separate unit is part of a cable that also supplies power to that subassembly or unit, the resistance of the protective bonding conductor in that cable is not included in the protective bond impedance measurements for the subassembly or separate unit, as shown in Figure 11. However, this option is only permitted if the cable is protected by a suitably rated protective device that takes into account the size of the conductor. Otherwise the impedance of the protective bonding conductor between the separate units is to be included, by measuring to the protective earthing terminal where the power source enters the first unit in the system, as shown in Figure 12.		P
7.3.6.3.3.1	Test current, duration, and acceptance criteria		P
	The test current, duration of the test and acceptance criteria are as follows:	(see appended table 7.3.6.3.3)	P
	a) For PCE with an overcurrent protective device rating of 16 A or less, the test current is 200% of the overcurrent protective device rating, but not less than 32 A, applied for 120s. The impedance of the protective bonding means during and at the end of the test shall not exceed 0,1 $\Omega$ .		N/A
	b) For PCE with an overcurrent protective device rating of more than 16 A, the test current is 200% of the overcurrent protective device rating and the duration of the test is as shown in Table 10 below. The voltage drop in the protective bonding means, during and at the end of the test, shall not exceed 2,5 V.		P
	c) During and after the test, there shall be no melting, loosening, or other damage that would impair the effectiveness of the protective bonding means.		P
	The test current is derived from an a.c or d.c supply source, the output of which is not earthed.		P
	As an alternative to Table 10, where the time-current characteristic of the overcurrent protective device that limits the fault current in the protective bonding means is known because the device is either provided in the equipment or fully specified in the installation instructions, the test duration may		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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.		
7.3.6.3.4	Protective bonding impedance (routine test)	Manufacture declaration for this	N/A
	If the continuity of the protective bonding is achieved at any point by a single means only (for example a single conductor or single fastener), or if the PCE is assembled at the installation location, then the impedance of the protective bonding shall also be tested as a routine test. The test shall be as in 7.3.6.3.3, except for the following:		N/A
	<ul style="list-style-type: none"> <li>the test current may be reduced to any convenient value greater than 10 A sufficient to allow measurement or calculation of the impedance of the protective bonding means:</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>the test duration may be reduced to no less than 2 s</li> </ul>		N/A
	For equipment subject to the type test in 7.3.6.3.3.1a), the impedance during the routine test shall not exceed 0,1Ω.		N/A
	For equipment subject to the type test in 7.3.6.3.3.1b) the impedance during the routine test shall not exceed 2,5 V divided by the test current required by 7.3.6.3.3.1b).		N/A
7.3.6.3.5	External protective earthing conductor		P
	A protective earthing conductor shall be connected at all times when power is supplied to PCE of protective class I. Unless local wiring regulations state otherwise, the protective earthing conductor cross-sectional area shall be determined from Table 11 or by calculation according to IEC 60364-5-54.	Table 11 used	P
	If the external protective earthing 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.		P
	The cross-sectional area of every external protective earthing conductor which does not form part of the supply cable or cable enclosure shall, in any case, be not less than:		P
	<ul style="list-style-type: none"> <li>2,5 mm<sup>2</sup> if mechanical protection is provided;</li> </ul>		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	<ul style="list-style-type: none"> <li>4 mm<sup>2</sup> if mechanical protection is not provided.</li> </ul>		P
	For cord-connected equipment, provisions shall be made so that the external protective earthing conductor in the cord shall, in the case of failure of the strain-relief mechanism, be the last conductor to be interrupted.	Not cord-connected equipment.	N/A
7.3.6.3.6	Means of connection for the external protective earthing conductor		P
7.3.6.3.6.1	General		P
	<p>The means of connection for the external protective earthing conductor shall be located near the terminals for the respective live conductors. The means of connections shall be corrosion-resistant and shall be suitable for the connection of cables according to 7.3.6.3.5.</p> <p>The means of connection for the protective earthing conductor shall not be used as a part of the mechanical assembly of the equipment or for other connections.</p> <p>A separate means of connection shall be provided for each external protective earthing conductor.</p> <p>Connection and bonding points shall be so designed 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.</p>		P
	The means of connection for the protective earthing conductor shall be permanently marked with:		P
	<ul style="list-style-type: none"> <li>symbol 7 of Annex C; or</li> </ul>		P
	<ul style="list-style-type: none"> <li>the colour coding green-yellow</li> </ul>		N/A
	Marking shall not be done on easily changeable parts such as screws.		P
7.3.6.3.7	Touch current in case of failure of the protective earthing conductor		P
	The requirements of this sub-clause shall be satisfied to maintain safety in case of damage to or disconnection of the protective earthing conductor.		P
	For pluggable equipment type A, the touch current measured in accordance with 7.5.4 shall not exceed 3,5 mA a.c. or mA d.c.	(see appended table 7.3.6.3.7)	P
	For all other PCE, one or more of the following measure shall be applied, unless the touch current		P



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Clause	Requirement – Test	Result – Remark	Verdict
	measured in accordance with 7.5.4 using the test network of IEC 60990 test figure 4 shall not exceed 3,5 mA a.c. or 10 mA d.c.		
	a) Permanently connected wiring, and:	Not exceed 3.5mA a.c.	N/A
	<ul style="list-style-type: none"> <li>a cross-section of the protective earthing conductor of at least 10 mm<sup>2</sup> Cu or 16 mm<sup>2</sup> Al; or</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>automatic disconnection of the supply in case of discontinuity of the protective earthing conductor; or</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>provision of an additional terminal for a second protective earthing conductor of the same cross-sectional area as the original protective earthing conductor and installation instruction requiring a second protective earthing conductor to be installed or</li> </ul>		N/A
	b) Connection with an industrial connector according to IEC 60309 and a minimum protective earthing conductor cross-section of 2,5 mm <sup>2</sup> as part of a multi-conductor power cable. Adequate strain relief shall be provided.		N/A
	In addition, the caution symbol 15 of Annex C shall be fixed to the product and the installation manual shall provide details of the protective earthing measures required in the installation as required in 5.3.2.		N/A
	When it is intended and allowed to connect two or more PCEs in parallel using one common PE conductor, the above touch current requirements apply to the maximum number of the PCEs to be connected in parallel, unless one of the measures in a)		N/A
	or b) above is used. The maximum number of parallel PCEs is used in the testing and has to be stated in the installation manual.		N/A
7.3.6.4	Protective Class II – Double or Reinforced Insulation		P
	Equipment or parts of equipment designed for protective class II shall have insulation between live parts and accessible surfaces in accordance with 7.3.4.3. The following requirements also apply:	Signal communication ports are evaluated with reinforced insulation form live parts inside	P
	<ul style="list-style-type: none"> <li>equipment designed to protective class II shall not have means of connection for the external protective earthing conductor. However this does not apply if the external protective</li> </ul>		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	earthing conductor is passed through the equipment to equipment series-connected beyond it. In the latter event, the external protective earthing conductor and its means for connection shall be insulated with basic insulation from the accessible surface of the equipment and from circuits that employ protective separation, extra-low voltage, protective impedance and limited discharging energy, according to 7.3.5. This basic insulation shall correspond to the rated voltage of the series-connected equipment;		
	<ul style="list-style-type: none"> <li>metal-encased equipment of protective class II may have provision on its enclosure for the connection of an equipotential bonding conductor;</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>equipment of protective class II may have provision for the connection of an earthing conductor for functional reasons or for damping of overvoltages; it shall, however, be insulated as though it is a live part;</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>equipment employing protective class II shall be marked according to 5.1.8.</li> </ul>		N/A
7.3.7	Insulation Including Clearance and Creepage Distance		P
7.3.7.1	General		P
	This subclause gives minimum requirements for insulation, based on the principles of IEC 60664.		P
	Manufacturing tolerances shall be taken into account during measurement of creepage, clearance, and insulation distance in the PCE.		P
	Insulation shall be selected after consideration of the following influences:		P
	<ul style="list-style-type: none"> <li>pollution degree</li> </ul>	PD3 outside, PD2 inside	P
	<ul style="list-style-type: none"> <li>overvoltage category</li> </ul>	PV (OVC II), Main (OVC III)	P
	<ul style="list-style-type: none"> <li>supply earthing system</li> </ul>	TN	P
	<ul style="list-style-type: none"> <li>insulation voltage</li> </ul>	PV input: max. 1100Vdc and Main:230Vac	P
	<ul style="list-style-type: none"> <li>location of insulation</li> </ul>	See table 7.3.7.4 and 7.3.7.5 for detail	P
	<ul style="list-style-type: none"> <li>type of insulation</li> </ul>	See table 7.3.7.4 and 7.3.7.5 for detail	P
	Compliance of insulation, creepage distances, and clearance distances, shall be verified by		P

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Clause	Requirement – Test	Result – Remark	Verdict
	measurement or visual inspection, and the tests of 7.5.		
7.3.7.1.3	Supply earthing systems		P
	Three basic types of earthing system are described in IEC 60364-1. They are:	Inverter is intended to install in TN system	P
	<ul style="list-style-type: none"> <li>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 systems, TN-C, TN-S and TN-C-S, are defined according to the arrangement of the neutral and protective conductor.</li> </ul>		P
	<ul style="list-style-type: none"> <li>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;</li> </ul>		N/A
	<ul style="list-style-type: none"> <li>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 earthing system.</li> </ul>		N/A
7.3.7.1.4	Insulation voltages	See table 7.3.7.4 and 7.3.7.5 for detail	P
	Table 12 makes use of the circuit system voltage and overvoltage category to define the impulse withstands voltage and the temporary overvoltage.		P
7.3.7.2	Insulation between a circuit and its surroundings		P
7.3.7.2.1	General	<p>230V, OVC III (4000V impulse voltage, 1500Vrms temporary overvoltage) for the AC output terminal.</p> <p>1100V, OVC II (4772V impulse voltage, no temporary overvoltage) for PV input terminal.</p> <p>No isolation between PV and AC main output. Maximum 1100Vdc working voltage is assumed at DVC A circuit and DVC C circuit</p>	P
7.3.7.2.2	Circuits connected directly to the mains	System voltage for mains is 300Vrms according to table 1	P
7.3.7.2.3	Circuits other than mains circuits	System voltage for PV is	P

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Clause	Requirement – Test	Result – Remark	Verdict
		1100Vdc.	
7.3.7.2.4	Insulation between circuits	4000V impulse voltage, 1500Vrms temporary overvoltage is calculated from table 12 for clearance. 1100Vdc working voltage across insulation is used for creepage	P
7.3.7.3	Functional insulating		P
7.3.7.4	Clearance distances	(see appended table 7.3.7)	P
7.3.7.4.1	Determination	Designed for use in altitudes 4000m and below.	P
7.3.7.4.2	Electric field homogeneity	Inhomogeneous electric field is considered for PCE	N/A
7.3.7.4.3	Clearance to conductive enclosures		P
7.3.7.5	Creepage distances	(see appended table 7.3.7)	P
7.3.7.5.1	General	PV maximum 1100V system voltage is used for the RMS voltage across insulation	P
7.3.7.5.2	Voltage	If Working voltage less than system voltage, system voltage is used for creepage according to IEC60664-1	P
7.3.7.5.3	Materials	Certified PWB used. Other materials are considered IIIb. The inside part is considered Pollution degree 2	P
7.3.7.6	Coating		N/A
7.3.7.7	PWB spacings for functional insulating	V-0 and short circuit test are considered	P
7.3.7.8	Solid insulating	(see appended table 7.3.7)	P
7.3.7.8.1	General		P
7.3.7.8.2	Requirements for electrical withstand capability of solid insulation		P
7.3.7.8.2.1	Basic, supplemental, reinforced, and double insulation	1100V peak. Impulse voltage test and voltage test are considered for solid insulation	P
7.3.7.8.2.2	Functional insulation		P
7.3.7.8.3	Thin sheet or tape material		P
7.3.7.8.3.1	General		P

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Clause	Requirement – Test	Result – Remark	Verdict
7.3.7.8.3.2	Material thickness not less than 0,2 mm	Impulse test and voltage test are considered for insulation on IGBT as basic insulation	P
7.3.7.8.3.3	Material thickness less than 0,2 mm		N/A
7.3.7.8.3.4	Compliance		N/A
7.3.7.8.4	Printed wiring boards		P
7.3.7.8.4.1	General		P
7.3.7.8.4.2	Use of coating materials		N/A
7.3.7.8.5	Wound components	Varnish is not considered as insulation and voltage test performed as routine test.	P
7.3.7.8.6	Potting materials		N/A
7.3.7.9	Insulation requirements above 30 kHz		N/A
7.3.8	Residual Current-operated protective (RCD) or monitoring (RCM) device compatibility	Internal RCM is used. An external built RCD is not necessary	P
	RCD and RCM are used to provide protection against insulation faults in some domestic and industrial installations, additional to that provided by the installed equipment.		N/A
7.3.9	Capacitor discharge		P
7.3.9.1	Operator access area	Accessible signal communication port is DVA circuit.	P
	Equipment shall be so designed that there is no risk of electric shock in operator access areas from charge stored on capacitors after disconnection of the PCE.		P
7.3.9.2	Service access areas	Inside capacitor discharge to DVC A and no energy hazard level within 300s	P
	Capacitors located behind panels that are removable for servicing, installation, or disconnection shall present no risk of electric shock or energy hazard from charge stored on capacitors after disconnection of the PCE.	Warning symbol 21 of annex C is marked on PCE with 5min.	P
7.4	Protection against energy hazards		P
7.4.1	Determination of hazardous energy level	No such high energy level presented in the operator access area.	P
	A hazardous energy level is considered to exist if		P

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Clause	Requirement – Test	Result – Remark	Verdict
	a) The voltage is 2 V or more, and power available after 60 s exceeds 240 VA.		N/A
	b) The stored energy in a capacitor is at a voltage. U of 2 V or more, and the stored energy. E, calculated from the following equation, exceeds 20J:  $E = 0,5 CU^2$		N/A
7.4.2	Operator Access Areas	No energized parts access by user	P
	Equipment shall be so designed that there is no risk of energy hazard in operator access areas from accessible circuits.		P
7.4.3	Services Access Areas	The capacitor inside the equipment stored hazardous energy. A symbol 21 of Annex C is provided.	P
7.5	Electrical tests related to shock hazard	(see appended table 7.5)	P
7.5.1	Impulse voltage test (type test)		P
7.5.2	Voltage test (dielectric strength test)		P
7.5.2.1	Purpose of test		P
7.5.2.2	Value and type of test voltage		P
7.5.2.3	Humidity pre-conditioning		P
7.5.2.4	Performing the voltage test		P
7.5.2.5	Duration of the a.c. or d.c. voltage test		P
7.5.2.6	Verification of the a.c. or d.c. voltage test		P
7.5.3	Partial discharge test		N/A
7.5.4	Touch current measurement (type test)		P
	The touch current shall be measured if required by 7.3.6.3.7 and shall not be greater than 3.5 Ma a.c. or 10 Ma d.c. or special measures of protection as given in 7.3.6.3.7 are required.	(see appended table 7.3.6.3.7)	P
	For type tests on PCE for which wet locations requirements apply according to 6.1, the humidity pre-conditioning of 4.5 shall be performed immediately prior to the touch current test.		P
7.5.5	Equipment with multiple sources of supply		P
<b>8</b>	<b>PROTECTION AGAINST MECHANICAL HAZARDS</b>		<b>P</b>
8.1	General		P

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Clause	Requirement – Test	Result – Remark	Verdict
	Operation shall not lead to a mechanical HAZARD in NORMAL CONDITION or SINGLE FAULT CONDITION. Edges, projections, corners, openings, guards, handles and the like, that are accessible to the operator shall be smooth and rounded so as not to cause injury during normal use of the equipment.		P
	Conformity is checked as specified in 8.2 to 8.6.		P
8.2	Moving parts		P
	Moving parts shall not be able to crush, cut or pierce parts of the body of an OPERATOR likely to contact them, nor severely pinch the OPERATOR's skin. Hazardous moving parts of equipment, that is moving parts which have the potential to cause injury, shall be so arranged, enclosed or guarded as to provide adequate protection against the risk of personal injury.		P
8.2.1	Protection of service persons		P
	Protection shall be provided such that unintentional contact with hazardous moving parts is unlikely during servicing operations. If a guard over a hazardous moving part may need to be removed for servicing, the marking of symbol 15 of Table D-1 shall be applied on or near the guard.		P
8.3	Stability		N/A
	Equipment and assemblies of equipment not secured to the building structure before operation shall be physically stable in NORMAL USE.	Wall mounted	N/A
8.4	Provisions for lifting and carrying		P
	If carrying handles or grips are fitted to, or supplied with, the equipment, they shall be capable of withstanding a force of four times the weight of the equipment.		P
	Equipment or parts having a mass of 18 kg or more shall be provided with a means for lifting and carrying or directions shall be given in the manufacturer's documentation.		P
8.5	Wall mounting		P
	Mounting brackets on equipment intended to be mounted on a wall or ceiling shall withstand a force of four times the weight of the equipment.		P
8.6	Expelled parts		N/A
	Equipment shall contain or limit the energy of parts that could cause a HAZARD if expelled in the event		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	of a fault.		
<b>9</b>	<b>PROTECTION AGAINST FIRE HAZARDS</b>		<b>P</b>
9.1	Resistance to fire		<b>P</b>
	This subclause specifies requirements intended to reduce the risk of ignition and the spread of flame, both within the equipment and to the outside, by the appropriate use of materials and components and by suitable construction.	Components are witnessed at normal condition and abnormal test are verified	<b>P</b>
9.1.1	Reducing the risk of ignition and spread of flame		<b>P</b>
	For equipment or a portion of equipment, there are two alternative methods of providing protection against ignition and spread of flame that could affect materials, wiring, wound components and electronic components such as integrated circuits, transistors, thyristors, diodes, resistors and capacitors.	Method 1 used	<b>P</b>
9.1.2	Conditions for a fire enclosure		<b>P</b>
	A FIRE ENCLOSURE is required for equipment or parts of equipment for which Method 2 is not fully applied and complied with.		<b>P</b>
9.1.2.1	Parts requiring a fire enclosure		<b>P</b>
	Except where Method 2 is used, or as permitted in 9.1.2.2, the following are considered to have a risk of ignition and, therefore, require a FIRE ENCLOSURE:		<b>P</b>
	– components in PRIMARY CIRCUITS		<b>P</b>
	– components in SECONDARY CIRCUITS supplied by power sources which exceed the limits for a LIMITED POWER SOURCE as specified in 9.2;		<b>P</b>
	– components in SECONDARY CIRCUITS supplied by a LIMITED POWER SOURCE as specified in 9.2, but not mounted on a material of FLAMMABILITY CLASS V-1;		<b>N/A</b>
	– components within a power supply unit or assembly having a limited power output complying with the criteria for a LIMITED POWER SOURCE as specified in 9.2, including overcurrent protective devices, limiting impedances, regulating networks and wiring, up to the point where the LIMITED POWER SOURCE output criteria are met;		<b>N/A</b>
	– components having unenclosed arcing parts, such as open switch and relay contacts and	Enclosed relay	<b>N/A</b>



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Clause	Requirement – Test	Result – Remark	Verdict
	commutators, in a circuit at HAZARDOUS VOLTAGE or at a HAZARDOUS ENERGY LEVEL; and		
	– insulated wiring, except as permitted in 9.1.2.2.	PVC wire	N/A
9.1.2.2	Parts not requiring a fire enclosure	Metal heatsink	N/A
9.1.3	Materials requirements for protection against fire hazard		P
9.1.3.1	General		P
	ENCLOSURES, components and other parts shall be so constructed, or shall make use of such materials, that the propagation of fire is limited.		P
9.1.3.2	Materials for fire enclosures		P
	If an enclosure material is not classified as specified below, a test may be performed on the final enclosure or part of the enclosure, in which case the material shall additionally be subjected to periodic SAMPLE testing.		P
9.1.3.3	Materials for components and other parts outside fire enclosures		P
	Except as otherwise noted below, materials for components and other parts (including MECHANICAL ENCLOSURES, ELECTRICAL ENCLOSURES and DECORATIVE PARTS); located outside FIRE ENCLOSURES, shall be of FLAMMABILITY CLASS HB.		P
9.1.3.4	Materials for components and other parts inside fire enclosures		P
9.1.3.5	Materials for air filter assemblies		N/A
9.1.4	Openings in fire enclosures	No opening	N/A
9.1.4.1	General		N/A
	For equipment that is intended to be used or installed in more than one orientation as specified in the product documentation, the following requirements apply in each orientation.		N/A
	These requirements are in addition to those in the following sections:		N/A
	– 7.3.4, Protection against direct contact;		N/A
	– 7.4, Protection against energy hazards;		N/A
	– 13.5, Openings in enclosures		N/A
9.1.4.2	Side openings treated as bottom openings		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
9.1.4.3	Openings in the bottom of a fire enclosure		N/A
	The bottom of a FIRE ENCLOSURE or individual barriers, shall provide protection against emission of flaming or molten material under all internal parts, including partially enclosed components or assemblies, for which Method 2 of 9.1.1 has not been fully applied and complied with.		N/A
9.1.4.4	Equipment for use in a CLOSED ELECTRICAL OPERATING AREA		N/A
	The requirements of 9.1.4.3 do not apply to FIXED EQUIPMENT intended only for use in a CLOSED ELECTRICAL OPERATING AREA and to be mounted on a concrete floor or other non-combustible surface. Such equipment shall be marked as follows:		N/A
	WARNING: FIRE HAZARD SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY		N/A
9.1.4.5	Doors or covers in fire enclosures		N/A
9.1.4.6	Additional requirements for openings in transportable equipment		N/A
9.2	LIMITED POWER SOURCES		N/A
9.2.1	General		N/A
9.2.2	Limited power source tests		N/A
9.3	Short-circuit and overcurrent protection		P
9.3.1	General		P
	The PCE shall not present a hazard, under short-circuit or overcurrent conditions at any port, including phase-to-phase, phase-to-earth and phase-to-neutral, and adequate information shall be provided to allow proper selection of external wiring and external protective devices.		P
9.3.2	Protection against short-circuits and overcurrents shall be provided for all input circuits, and for output circuits that do not comply with the requirements for limited power sources in 9.2, except for circuits in which no overcurrent hazard is presented by short-circuits and overloads.	DC wires are designed for the short circuit rating of the array	P
9.3.3	Protective devices provided or specified shall have adequate breaking capacity to interrupt the maximum short circuit current specified for the port to which they are connected. If protection that is provided integral to the PCE for an input port is not rated for the short-circuit current of the circuit in		P

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Clause	Requirement – Test	Result – Remark	Verdict
	which it is used, the installation instructions shall specify that an upstream protective device, rated for the prospective short-circuit current of that port, shall be used to provide backup protection.		
<b>10</b>	<b>PROTECTION AGAINST SONIC PRESSURE HAZARDS</b>		N/A
10.1	General		N/A
	The equipment shall provide protection against the effect of sonic pressure. Conformity tests are carried out if the equipment is likely to cause such HAZARDS.		N/A
10.2	Sonic pressure and Sound level		N/A
10.2.1	Hazardous Noise Levels		N/A
<b>11</b>	<b>PROTECTION AGAINST LIQUID HAZARDS</b>		N/A
11.1	Liquid Containment, Pressure and Leakage		N/A
	The liquid containment system components shall be compatible with the liquid to be used.		N/A
	There shall be no leakage of liquid onto live parts as a result of:		N/A
	a) Normal operation, including condensation;		N/A
	b) Servicing of the equipment; or		N/A
	c) Inadvertent loosening or detachment of hoses or other cooling system parts over time.		N/A
11.2	Fluid pressure and leakage		N/A
11.2.1	Maximum pressure		N/A
11.2.2	Leakage from parts		N/A
11.2.3	Overpressure safety device		N/A
11.3	Oil and grease		N/A
<b>12</b>	<b>CHEMICAL HAZARDS</b>		N/A
12.1	General		N/A
<b>13</b>	<b>PHYSICAL REQUIREMENTS</b>		P
13.1	Handles 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 might 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		N/A

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	might result in hazard.		
13.1.1	Adjustable controls	No such setting control	N/A
13.2	Securing of parts		P
13.3	Provisions for external connections		P
13.3.1	General	Certified PV and AC connectors are used Installation manual provide information for the disconnection means	P
13.3.2	Connection to an a.c. Mains supply	An industrial AC connector used, and it is detachable with tool	P
13.3.2.1	General		P
	For safe and reliable connection to a MAINS supply, equipment shall be provided with one of the following:	See above	P
	– terminals or leads or a non-detachable power supply cord for permanent connection to the supply; or		N/A
	– a non-detachable power supply cord for connection to the supply by means of a plug		N/A
	– an appliance inlet for connection of a detachable power supply cord; or		P
	– a mains plug that is part of direct plug-in equipment as in 13.3.8		N/A
13.3.2.2	Permanently connected equipment		N/A
13.3.2.3	Appliance inlets		P
13.3.2.4	Power supply cord		N/A
13.3.2.5	Cord anchorages and strain relief		N/A
	For equipment with a non-detachable power supply cord, a cord anchorage shall be supplied such that:		N/A
	– the connecting points of the cord conductors are relieved from strain; and		N/A
	– the outer covering of the cord is protected from abrasion.		N/A
13.3.2.6	Protection against mechanical damage		P
13.3.3	Wiring terminals for connection of external conductors		N/A
13.3.3.1	Wiring terminals		N/A

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13.3.3.2	Screw terminals		N/A
13.3.3.3	Wiring terminal sizes		N/A
13.3.3.4	Wiring terminal design		N/A
13.3.3.5	Grouping of wiring terminals		N/A
13.3.3.6	Stranded wire		N/A
13.3.4	Supply wiring space		N/A
13.3.5	Wire bending space for wires 10 mm <sup>2</sup> and greater		N/A
13.3.6	Disconnection from supply sources		P
13.3.7	Connectors, plugs and sockets		P
13.3.8	Direct plug-in equipment		N/A
13.4	Internal wiring and connections		P
13.4.1	General		P
13.4.2	Routing	Internal wire is routed to avoid sharp edge and overheat	P
13.4.3	Colour coding	Green-yellow wire used as protective bonding only	P
13.4.4	Splices and connections		P
13.4.5	Interconnections between parts of the PCE		P
13.5	Openings in enclosures		N/A
13.5.1	Top and side openings		N/A
	Openings in the top and sides of ENCLOSURES shall be so located or constructed that it is unlikely that objects will enter the openings and create hazards by contacting bare conductive parts.		N/A
13.6	Polymeric Materials		P
13.6.1	General		P
13.6.1.1	Thermal index or capability		P
13.6.2	Polymers serving as enclosures or barriers preventing access to hazards		P
13.6.2.1	Stress relief test		P
13.6.3	Polymers serving as solid insulation		P
13.6.3.1	Resistance to arcing		N/A
13.6.4	UV resistance		P
	Polymeric parts of an OUTDOOR ENCLOSURE required for compliance with this standard shall be sufficiently resistance to degradation by ultra-violet	The top enclosure rated UV resistance according to UL 746C	P

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	(UV) radiation		
13.7	Mechanical resistance to deflection, impact, or drop		P
13.7.1	General		P
13.7.2	250-N deflection test for metal enclosures		P
13.7.3	7-J impact test for polymeric enclosures		P
13.7.4	Drop test		N/A
13.8	Thickness requirements for metal enclosures		P
13.8.1	General		P
13.8.2	Cast metal		N/A
13.8.3	Sheet metal	For heatsink	P

<b>14</b>	<b>COMPONENTS</b>		P
14.1	General	(see appended table 14)	P
	Where safety is involved, components shall be used in accordance with their specified RATINGS unless a specific exception is made. They shall conform to one of the following:		P
	a) applicable safety requirements of a relevant IEC standard. Conformity with other requirements of the component standard is not required. If necessary for the application, components shall be subjected to the test of this standard, except that it is not necessary to carry out identical or equivalent tests already performed to check conformity with the component standard;		P
	b) the requirements of this standard and, where necessary for the application, any additional applicable safety requirements of the relevant IEC component standard;		P
	c) if there is no relevant IEC standard, the requirements of this standard;		P
	d) applicable safety requirements of a non-IEC standard which are at least as high as those of the applicable IEC standard, provided that the component has been approved to the non-IEC standard by a recognized testing authority.		P
	Components such as optocouplers, capacitors, transformers, and relays connected across basic, supplemental, reinforced, or double insulation shall comply with the requirements applicable for the grade of insulation being bridged, and if not		P

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	previously certified to the applicable component safety standard shall be subjected to the voltage test of 7.5.2 as routine test.		
14.2	Motor Over temperature Protection		N/A
	Motors which, when stopped or prevented from starting (see 4.4.4.3), would present an electric shock HAZARD, a temperature HAZARD, or a fire HAZARD, shall be protected by an over temperature or thermal protection device meeting the requirements of 14.3.		N/A
14.3	Over temperature protection devices		N/A
14.4	Fuse holders		N/A
14.5	MAINS voltage selecting devices		N/A
14.6	Printed circuit boards		P
	Printed circuit boards shall be made of material with a flammability classification of V-1 of IEC 60707 or better.	V-0	P
	This requirement does not apply to thin-film flexible printed circuit boards that contain only circuits powered from limited power sources meeting the requirements of 9.2.		P
	Conformity of the flammability RATING is checked by inspection of data on the materials. Alternatively, conformity is checked by performing the V-1 tests specified in IEC 60707 on three samples of the relevant parts.		P
14.7	Circuits or components used as transient overvoltage limiting devices		N/A
	If control of transient overvoltage is employed in the equipment, any overvoltage limiting component or circuit shall be tested with the applicable impulse withstand voltage of Table 7-10 using the test method from 7.5.1 except 10 positive and 10 negative impulses are to be applied and may be spaced up to 1 min apart.		N/A
14.8	Batteries		N/A
	Equipment containing batteries shall be designed to reduce the risk of fire, explosion and chemical leaks under normal conditions and after a single fault in the equipment including a fault in circuitry within the equipment battery pack.		N/A
14.8.1	Battery Enclosure Ventilation		N/A
14.8.1.1	Ventilation requirements		N/A
14.8.1.2	Ventilation testing		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
14.8.1.3	Ventilation instructions		N/A
14.8.2	Battery Mounting		N/A
	Compliance is verified by the application of the force to the battery's mounting surface. The test force is to be increased gradually so as to reach the required value in 5 to 10 s, and is to be maintained at that value for 1 min. A non-metallic rack or tray shall be tested at the highest normal condition operating temperature.		N/A
14.8.3	Electrolyte spillage		N/A
	Battery trays and cabinets shall have an electrolyte-resistant coating.		N/A
	The ENCLOSURE or compartment housing a VENTED BATTERY shall be constructed so that spillage or leakage of the electrolyte from one battery will be contained within the ENCLOSURE and be prevented from:		N/A
	a) reaching the PCE outer surfaces that can be contacted by the USER		N/A
	b) contaminating adjacent electrical components or materials; and		N/A
	c) bridging required electrical distances		N/A
14.8.4	Battery Connections		N/A
	Reverse battery connection of the terminals shall be prevented if reverse connection could result in a hazard within the meaning of this Standard		N/A
14.8.5	Battery maintenance instructions		N/A
	The information and instructions listed in 5.3.4.1 shall be included in the operator manual for equipment in which battery maintenance is performed by the operator, or in the service manual if battery maintenance is to be performed by service personnel only.		N/A
14.8.6	Battery accessibility and maintainability		N/A
	Battery terminals and connectors shall be accessible for maintenance with the correct TOOLS. Batteries with liquid electrolyte, requiring maintained shall be so located that the battery cell caps are accessible for electrolyte tests and readjusting of electrolyte levels.		N/A
15	Software and firmware performing safety functions	Refer to annex B for details	P



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Clause	Requirement – Test	Result – Remark	Verdict

4.2.2.6/4.7	TABLE: mains supply electrical data in normal condition/ Electrical ratings test						P
Type	U (V)	I (A) DC	P (W) DC	U (V)	I (A) AC	P (W) AC	
ASN-30TL-G2	501.32	62.42	30217.21	207.33	47.78	29348.66	
ASN-30TL-G2	501.36	62.72	30678.27	230.18	43.62	29808.67	
ASN-30TL-G2	502.36	52.44	30695.56	253.07	39.73	29810.91	
ASN-30TL-G2	617.81	51.71	30178.09	207.35	47.79	29217.87	
ASN-30TL-G2	617.63	51.52	30826.91	230.19	43.79	29920.89	
ASN-30TL-G2	619.36	51.08	30684.19	253.07	39.79	29852.25	
ASN-30TL-G2	852.21	37.49	30181.58	207.35	47.63	29124.72	
ASN-30TL-G2	848.37	45.11	31314.99	230.36	46.47	30585.24	
ASN-30TL-G2	848.38	41.99	30589.75	253.16	41.20	30009.66	

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Clause	Requirement – Test	Result – Remark	Verdict

4.3 TABLE: Thermal testing					P
temperature t of part/at:	t (°C)				permitted t (°C)
test Condition :	500Vdc input, 207Vac output, Output full loading	500Vdc input, 207Vac output, Output derating	500Vdc input, 253Vac output, Output full loading	500Vdc input, 253Vac output, Output derating	—
Ambient	44.6	60.1	45.3	63.1	--
BUS capacitor C56	79.8	84.1	79.6	84.2	105
BUS capacitor C57	77.8	84.1	77.5	83.3	105
Current sensor HCT4	72.8	82.4	71.4	83.3	105
Current sensor HCT3	73.8	83.3	72.5	81.1	105
Current sensor HCT5	71.8	81.3	71.3	82.8	105
BUS capacitor C66	75.0	82.6	74.7	81.2	105
Current sensor HCT2A	76.4	83.1	74.1	81.3	105
Current sensor HCT1A	76.0	83.3	74.4	81.4	105
Optocoupler U5	83.9	89.9	81.4	89.7	125
Transformer T34	83.2	89.3	81.7	86.7	110
Optocoupler U1	82.0	86.2	77.6	85.8	125
Internal ambient temperature	74.0	83.8	75.1	83.0	For reference
PCB close to Q11	87.1	89.8	86.0	89.7	130
MCU DSP	78.0	86.5	78.0	83.8	For reference
Output common choke L9	86.2	89.9	87.6	89.6	110
Y capacitor C367	75.0	84.2	75.6	82.1	85
Optocoupler U4	84.4	90.2	88.0	91.8	125
PCB close to Q12	84.2	90.1	83.7	87.8	130
PV common choke L6	81.2	91.2	81.3	86.4	110
Relay K1	80.4	82.9	80.7	83.8	85
Relay K2	81.5	82.8	81.8	83.1	85
Relay K3	80.8	82.5	80.6	82.4	85
Relay K5	80.5	82.7	80.8	83.6	85
MCU ARM	77.5	83.1	77.5	81.7	For reference

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Clause	Requirement – Test		Result – Remark		Verdict
Relay K4	81.4	82.4	81.8	82.4	85
Relay K6	79.9	82.1	80.8	81.1	85
Fan	52.6	64.4	52.2	62.6	70
Film capacitor C343	76.2	83.0	77.1	81.2	85
PCB close to D9	79.9	89.8	81.5	89.6	130
PCB close to D10	87.0	91.2	83.7	90.3	130
PCB close to Q11	86.1	91.7	85.1	89.4	130
PCB close to Q12	82.6	96.6	82.7	94.3	130
PCB close to Q10	92.6	94.7	89.6	93.3	130
PCB close to Q13	91.0	95.4	88.6	95.1	130
PCB close to IGBT8	90.5	98.5	90.1	97.6	130
PCB close to IGBT9	91.5	94.8	90.9	89.0	130
PCB close to IGBT3	93.5	85.7	93.6	82.0	130
PCB close to IGBT12	86.6	86.1	86.3	83.8	130
PCB close to IGBT6	77.4	89.8	76.5	86.5	130
PCB close to IGBT7	79.0	90.5	77.2	86.5	130
PCB close to IGBT2	81.5	90.9	81.6	87.1	130
PCB close to IGBT11	80.7	90.1	80.7	84.5	130
PCB close to IGBT4	81.9	92.8	81.6	93.7	130
PCB close to IGBT5	79.6	91.4	78.1	89.7	130
PCB close to IGBT1	80.0	100.3	83.6	97.7	130
PCB close to IGBT10	79.6	83.8	83.6	81.0	130
Optocoupler U24	80.2	92.8	79.5	89.8	125
Boost T1 coil	99.7	107.1	100.9	108.1	130
Boost T2 coil	100.5	102.7	97.3	99.8	130
INV S core	97.6	101.4	98.7	102.8	130
INV S coil	87.9	93.3	88.7	94.7	130
INV T core	94.2	92.1	95.8	101.1	130
INV T coil	86.0	87.4	85.2	89.4	130
INV R core	95.2	96.5	94.7	100.3	130
INV R coil	89.3	93.6	89.3	96.3	130
Mounting surface	59.7	73.9	60.3	76.5	90
Enclosure, top	64.0	75.7	64.3	77.1	100*

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Clause	Requirement – Test			Result – Remark	Verdict
Enclosure, bottom	59.6	74.5	60.3	76.8	100*
Enclosure, right	62.7	75.3	63.3	77.9	100*
Enclosure, Left	64.9	73.9	65.5	79.2	100*
Enclosure, front	62.9	75.2	63.5	80.0	100*
AC terminal	45.8	61.3	46.5	64.3	75
DC terminal	49.2	64.6	49.9	67.7	75
DC switch	47.0	62.5	47.7	65.5	85
Varistor SPD4	47.6	62.7	48.1	66.1	85
Y capacitor C371	50.1	65.1	50.6	68.6	85
External Fan	48.3	61.4	49.8	66.8	70
LED display panel	57.0	71.4	57.5	74.0	90
PV led wires	72.7	81.9	73.4	84.2	105
GFCI T5	86.1	89.3	87.0	89.7	110
Supplementary information:					
*The parts are marked with the hot surface marking of symbol 14 of Annex C.					

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Clause	Requirement – Test	Result – Remark	Verdict

4.3 TABLE: Thermal testing					P
temperature t of part/at:	t (°C)				permitted t (°C)
test Condition :	850Vdc input, 207Vac output, Output full loading	850Vdc input, 207Vac output, Output derating	850Vdc input, 253Vac output, Output full loading	850Vdc input, 253Vac output, Output derating	—
Ambient	46.2	59.7	45.0	59.8	--
BUS capacitor C56	77.8	81.6	76.3	84.6	105
BUS capacitor C57	73.4	78.9	72.7	81.6	105
Current sensor HCT4	70.7	76.7	70.1	77.2	105
Current sensor HCT3	73.2	80.3	72.4	82.0	105
Current sensor HCT5	72.3	78.0	71.5	80.4	105
BUS capacitor C66	75.9	80.8	74.8	79.9	105
Current sensor HCT2A	73.1	80.3	71.4	81.8	105
Current sensor HCT1A	74.4	80.2	73.1	79.8	105
Optocoupler U5	76.9	85.7	78.6	86.0	125
Transformer T34	84.2	88.3	79.7	88.6	110
Optocoupler U1	78.6	84.4	78.8	87.6	125
Internal ambient temperature	78.0	83.5	75.6	83.9	For reference
PCB close to Q11	85.1	93.2	83.0	88.0	130
MCU DSP	79.0	86.5	78.3	84.3	For reference
Output common choke L9	75.3	85.0	74.5	81.8	110
Y capacitor C367	75.8	81.1	74.7	82.1	85
Optocoupler U4	87.6	95.1	85.0	90.8	125
PCB close to Q12	84.9	92.8	82.8	89.4	130
PV common choke L6	84.4	89.7	83.6	91.1	110
Relay K1	81.6	83.3	80.9	81.7	85
Relay K2	81.3	82.0	81.4	80.7	85
Relay K3	79.4	83.4	80.5	81.6	85
Relay K5	81.4	83.3	81.3	82.1	85
MCU ARM	78.8	86.1	76.1	82.3	For reference

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Clause	Requirement – Test		Result – Remark		Verdict
Relay K4	81.0	82.8	80.5	80.6	85
Relay K6	80.4	83.1	78.2	81.1	85
Fan	52.1	63.7	53.5	62.8	70
Film capacitor C343	75.8	79.0	72.8	78.5	85
PCB close to D9	74.5	85.0	75.2	83.9	130
PCB close to D10	80.1	88.8	81.5	89.8	130
PCB close to Q11	79.4	87.3	80.1	88.8	130
PCB close to Q12	76.6	84.9	76.6	85.1	130
PCB close to Q10	95.7	99.0	90.3	95.7	130
PCB close to Q13	92.2	95.4	89.5	95.0	130
PCB close to IGBT8	91.1	94.1	88.3	94.3	130
PCB close to IGBT9	92.7	96.6	90.2	93.3	130
PCB close to IGBT3	96.0	100.8	93.5	97.5	130
PCB close to IGBT12	90.2	96.4	84.2	95.4	130
PCB close to IGBT6	86.5	93.3	84.0	93.5	130
PCB close to IGBT7	86.4	92.5	84.2	94.4	130
PCB close to IGBT2	92.4	95.5	86.9	98.3	130
PCB close to IGBT11	91.4	95.7	86.2	98.7	130
PCB close to IGBT4	93.6	97.3	88.4	97.9	130
I PCB close to GBT5	89.0	94.4	86.2	93.9	130
PCB close to IGBT1	92.8	97.3	87.2	93.6	130
PCB close to IGBT10	82.2	91.7	84.9	87.0	130
Optocoupler U24	84.8	98.3	84.1	89.8	125
Boost T1 coil	115.1	117.0	113.1	114.9	130
Boost T2 coil	111.4	110.4	109.9	112.4	130
INV S core	112.9	115.0	112.2	116.0	130
INV S coil	74.1	83.1	73.5	83.2	130
INV T core	74.0	83.3	73.2	82.7	130
INV T coil	85.4	90.5	85.1	91.1	130
INV R core	82.3	89.6	81.9	89.2	130
INV R coil	83.7	91.4	83.5	92.8	130
Mounting surface	66.8	76.6	66.5	73.1	90
Enclosure, top	63.3	76.2	63.1	69.8	100*

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Clause	Requirement – Test			Result – Remark	Verdict

Enclosure, bottom	63.6	76.4	63.3	71.0	100*
Enclosure, right	64.1	76.9	63.8	71.5	100*
Enclosure, Left	63.4	76.3	63.2	70.9	100*
Enclosure, front	63.7	76.6	63.4	71.1	100*
AC terminal	47.5	60.9	46.2	61.0	75
DC terminal	50.9	64.3	49.6	64.3	75
DC switch	48.7	62.1	47.4	62.1	85
Varistor SPD4	49.1	62.5	47.8	62.5	85
Y capacitor C371	51.6	65.0	50.3	65.0	85
External Fan	51.8	60.9	49.3	62.2	70
LED display panel	57.6	70.6	53.6	61.7	90
PV led wires	66.6	74.9	66.6	75.2	105
GFCI T5	87.2	91.2	82.7	91.6	110

Supplementary information:

\*The parts are marked with the hot surface marking of symbol 14 of Annex C.

<b>TABLE: Heating test, resistance method</b>					N/A
Test voltage (V)..... :					—
Ambient, t <sub>1</sub> (°C) ..... :					—
Ambient, t <sub>2</sub> (°C) ..... :					—
Temperature rise of winding	R <sub>1</sub> (Ω)	R <sub>2</sub> (Ω)	ΔT (K)	Max. Dt (K)	Insulation class

Supplementary information:

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Clause	Requirement – Test	Result – Remark	Verdict

4.4		TABLE: fault condition tests					P
		ambient temperature (°C) .....: 25					—
No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result
1	K1	S-C before start up	Input:850Vdc Output:230Vac	10min	-	-	Fault applied before operating, after applied the fault, the unit protected, software shown the fault "Grid Relay Fault". After remove the fault, the unit restart normally. No damage, no hazard. No fire.
2	K2	S-C before start up	Input:850Vdc Output:230Vac	10min	-	-	Fault applied before operating, after applied the fault, the unit protected, software shown the fault "Grid Relay Fault". After remove the fault, the unit restart normally. No damage, no hazard. No fire.
3	K3	S-C before start up	Input:850Vdc Output:230Vac	10min	-	-	Fault applied before operating, after applied the fault, the unit protected, software shown the fault "Grid Relay Fault". After remove the fault, the unit restart normally. No damage, no hazard. No fire.
4	K4	S-C before start up	Input:850Vdc Output:230Vac	10min	-	-	Fault applied before operating, after applied the fault, the unit protected, software shown the fault "Grid Relay Fault". After remove the fault, the unit restart normally. No damage, no hazard. No fire.
5	K5	S-C before start up	Input:850Vdc Output:230Vac	10min	-	-	Fault applied before operating, after applied the fault, the unit protected, software shown the fault "Grid Relay Fault". After remove the fault, the unit restart normally. No damage, no hazard. No fire.
6	K6	S-C before start up	Input:850Vdc Output:230Vac	10min	-	-	Fault applied before operating, after applied the fault, the unit protected, software shown the fault "Grid Relay Fault". After remove the fault, the unit restart normally. No damage, no hazard. No fire.



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Clause	Requirement – Test					Result – Remark	Verdict
7	Drive Optocoupler U22	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. software shown the fault "SCI fault." After remove the fault, the unit restart. No damage, no hazard. No fire.
8	Drive Optocoupler U22	O-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. software shown the fault "SCI fault." After remove the fault, the unit restart. No damage, no hazard. No fire.
9	Drive Optocoupler U25	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. software shown the fault "SCI fault." After remove the fault, the unit restart. No damage, no hazard. No fire.
10	Drive Optocoupler U25	O-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. software shown the fault "SCI fault." After remove the fault, the unit restart. No damage, no hazard. No fire.
11	AC voltage grid voltage sampling circuit R554 short circuit	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. software shown the fault "Grid VoltFault" After remove the fault, the unit restart. No damage, no hazard. No fire.
12	GFCI detection circuit R520	S-C before start up	Input:850Vdc Output:230Vac	10min	-	-	Fault applied before operating, after applied the fault, the unit protected, software shown the fault "GFCI fault". After remove the fault, the unit restart normally. No damage, no hazard. No fire.
13	BUS capacitor C56	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. After remove the fault, the unit can't restart. Unit damaged, no hazard. No fire.

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Clause	Requirement – Test					Result – Remark	Verdict
14	BUS capacitor C65	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. After remove the fault, the unit can't restart. Unit damaged, no hazard. No fire.
15	IGBT8 G-E	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. After remove the fault, the unit can't restart. Unit damaged, no hazard. No fire.
16	IGBT2 G-E	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. After remove the fault, the unit can't restart. Unit damaged, no hazard. No fire.
17	Transformer T34	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. After remove the fault, the unit can't restart. No fire.
18	AC output Circuit L-N	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. No damaged, no hazard. No fire.
19	AC output Circuit L-PE	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. No damaged, no hazard. No fire.
20	AC output Circuit N-PE	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit normal operate. No damaged, no hazard. No fire.
21	AC output Circuit L-N	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. No damaged, no hazard. No fire.
22	DC Input circuit	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. No damaged, no hazard. No fire.
23	AC output	110% overload	Input:850Vdc Output:230Vac	10min	-	-	The inverter is running normally, output rated power, and the green light is on. No damage, no fire

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Clause	Requirement – Test				Result – Remark		Verdict
24	capacitor X C147	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. Display fault. After remove the fault, the unit can't restart. Unit damaged, no hazard. No fire.
25	capacitor Y C150	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit shut down. Display fault. After remove the fault, the unit can't restart. Unit damaged, no hazard. No fire.
26	Fan	S-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit operate. Display alarm. Yellow light flashing. No damage, no hazard. No fire.
27	Fan	O-C	Input:850Vdc Output:230Vac	10min	-	-	Fault applied during operating, after applied the fault, the unit operate. Display alarm. Yellow light flashing. No damage, no hazard. No fire.
28	PV input	Mis-wiring	Input:850Vdc Output:230Vac	1 s	--	--	PCE not work. No hazards
29	AC output	Mis-wiring	Input:850Vdc Output:230Vac	1 s	--	--	PCE works normally.
30	MCU U36	Loss of power	Input:850Vdc Output:230Vac	1s	--	--	PCE protected immediately. No hazards.
31	MCU U48	Loss of power	Input:850Vdc Output:230Vac	1s	--	--	PCE protected immediately. No hazards.
<p>Supplementary information</p> <p>S/C: Short circuit, O/C: Open circuit</p> <p>During the test:</p> <p>Fire do not propagate beyond the PCE.</p> <p>Equipment do not emit molten metal.</p> <p>Enclosures do not deform to cause non-compliance with the standard.</p> <p>Pass the dielectric test.</p>							

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Clause	Requirement – Test	Result – Remark	Verdict

<b>7.3.6.3.3</b>	<b>TABLE: protective equipotential bonding</b>			<b>P</b>
Measured between:	Test current (A)	Voltage drop (V)	Resistance (mΩ)	result
Earthed terminal and the end of metal enclosure	125	2.38	19.0	PASS
Supplementary information				

7.3.6.3.7	TABLE: touch current measurement			P
Measured between:		Measured (mA)	Limit (mA)	Comments/conditions
Live parts and enclosure		2.23	3.5	N/A
Live parts and communication ports		2.55	3.5	N/A
Supplementary information				

<b>7.3.7</b>	<b>TABLE: clearance and creepage distance measurements</b>						<b>P</b>
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)	
PV circuit and earthed heatsink (BI)	1100Vdc	1100Vdc 230Vac	5.16	11.03	11.0	12.48	
AC circuit and earthed heatsink (BI)	1100Vdc	1100Vdc 230Vac	5.16	11.03	11.0	12.48	
Between hazard live parts and earthed terminal on PCB (BI)	1100Vdc	1100Vdc 230Vac	5.16	7.42	5.52	7.42	
Between hazard live parts and communication circuits on PCB (RI)	1100Vdc	1100Vdc 230Vac	8.34	8.51	11.04	11.34	
Between pri. and sec. of communication isolated optocoupler on PCB (RI)	1100Vdc	1100Vdc 230Vac	8.34	8.63	11.04	12.78	
Between primary and secondary of isolated transformer T34 (RI)	1100Vdc	1100Vdc 230Vac	8.34	8.82	22.0	23.23	
Between primary and secondary of isolated transformer T34 on PCB (RI)	1100Vdc	1100Vdc 230Vac	8.34	8.43	11.04	11.10	
Live parts IGBT and earthed screw (RI)	1100Vdc	1100Vdc 230Vac	5.16	5.78	5.52	5.78	
Remarks:							

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Clause	Requirement – Test	Result – Remark	Verdict

7.3.7	TABLE: clearance and creepage distance measurements	P
<p>1) FI: function insulation BI: Basic insulation SI: Supplementary insulation RI: Reinforced insulation</p> <p>2) A force of 10 N applied to the internal components and 250 N applied to the enclosure for measure</p> <p>3) For PV circuit, system voltage is 1100V and overvoltage Category is OVCII, impulse voltage corresponding to PV circuit is 4772V.</p> <p>4)For AC main circuit, nominal voltage is 300V and overvoltage category is OVC III, impulse voltage is corresponding to main circuit is 4000V.</p> <p>5) For relay across main output . RMS voltage used for creepage is rationalized to 1100V and overvoltage category is OVCII. For other insulation between live parts, which PV circuit and main circuit is not isolated PV system voltage 1100V is considered for the maximum working voltage.</p> <p>6) The PCE enclosure is rated IP66 and the pollution degree inside enclosure is reduced from PD3 to PD2.</p> <p>7) The disconnection devices are two relay in series at line. Clearance between contacts of each relay rated min. 1.5mm. each relay with two contact gaps together to withstand the PV impulse voltage according to IEC 62109-2 Clause 4.4.4.15.2.2. Thus, the clearance requirement for each contact is half of the requirement.</p>		

<b>7.3.7</b>	<b>TABLE: distance through insulation measurement</b>				<b>P</b>
distance through insulation di at/of:		U r.m.s. (V)	test voltage (V)	required di (mm)	di (mm)
Optocoupler		230Vac	3000V	--	certified

<b>7.5</b>	<b>TABLE: electric strength measurements, impulse voltage test and partial discharge test</b>				<b>P</b>
test voltage applied between:		test voltage (V)	impulse withstand voltage (V)	partial discharge extinction voltage (V)	result
PV input and Ground (BI)		1500Vac	4800V	N/A	No breakdown
PV input and communication output port(RI)		3000Vac	6800V	N/A	No breakdown
AC mains output and Ground (BI)		1500Vac	4800V	N/A	No breakdown
AC mains and communication output port(RI)		3000Vac	6800V	N/A	No breakdown

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Clause	Requirement – Test	Result – Remark	Verdict

9.2	TABLE: Limited power sources					N/A
Circuit output tested:						
Note: Measured Uoc (V) with all load circuits disconnected:						
Components	Sample No.	Uoc (V)	I <sub>sc</sub> (A)		VA	
			Meas.	Limit	Meas.	Limit
supplementary information:						
Sc=Short circuit, Oc=Open circuit						

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Clause	Requirement – Test	Result – Remark	Verdict

14	TABLE: list of critical components					P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>	
Metal Enclosure	Ningbo hongyong Intelligent Technology Co., Ltd.	AL5052	405x510x109.5 mm Thickness:2mm	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance	
(Alternative)	Jiangsu DHT Electronic Technology CO.,LTD	AL5052	405x510x109.5 mm Thickness:2mm	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance	
DC switch	ProJoy Electric Co., Ltd.	PEDS150H-HM50-6F	1500Vdc/50A	EN 60947-3	TUV AN 50435013	
Current sensor1 HCT1A, HCT2A, HCT3A	Xinjin Electronics Co., Ltd	CC6924SG-5FB065	60A/5V, 12.5 mV/A	UL 508	UL E526186	
(Alternative)	Ningbo CRRC Times Sensing Technology Co., LTD	NACA.50T-P6/VN	50A /5V, 12.5mV/A, 110℃	UL 508	UL E317702	
(Alternative)	Sinomags Technologies Co.,Ltd.	STK-50PL/A	50A /5V, 12.5mV/A, 110℃	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance	
(Alternative)	LEM Electronics(China)Co.,Ltd	R HLSR 50-P	50A /5V, 12.5mV/A, 110℃	UL 508	UL E189713	
Current sensor2 (HCT3, HCT4, HCT5)	Ningbo CRRC Times Sensing Technology Co., LTD	NACA.80T-P6/VN	80A 10mV/A	UL 508	UL E317702	
(Alternative)	Ningbo CRRC Times Sensing Technology Co., LTD	NACGL.75T-P6/VN	75A /5V	UL 508	UL E317702	
(Alternative)	Ningbo CRRC Times Sensing Technology Co., LTD	NACA.50T-P6/VN	50A 16mV/A	UL 508	UL E317702	
(Alternative)	Sinomags Technologies Co.,Ltd.	STB-75CAS/K/F	75A /5V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance	
(Alternative)	Sinomags Technologies Co.,Ltd.	STK-50PL/Z	50A/5V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance	
GFCI	Guangzhou	AUX00	6uH ,130℃	IEC/EN 62109-1	Tested with	

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict

object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>
transformer GFCI (T5)	Deloop Electronic Device Ltd.			IEC/EN 62109-2	appliance
(Alternative)	Ningbo AUX Solar Technology Co., Ltd.	AUX GFCI- W539	6uH ,130℃	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Wuhan Chenyang Electronic Technology Co., Ltd.	AUX01	6uH ,130℃	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Huizhou Baohui Electronics Technology Co., Ltd.	AUX02	6uH ,130℃	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Qingdao Yunlu Energy Technology Co. Ltd.	AUX03	6uH ,130℃	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
CM Inductor 1(Output) (L9)	Guangzhou Deloop Electronic Device Ltd.	AUX00	0.9mH/0.3mH, Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Ningbo AUX Solar Technology Co., Ltd.	AUX 25K- T5020	0.9mH/0.3mH, Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Wuhan Chenyang Electronic Technology Co., Ltd.	AUX01	0.9mH/0.3mH, Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Huizhou Baohui Electronics Technology Co., Ltd.	AUX02	0.9mH/0.3mH, Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Qingdao Yunlu Energy Technology Co. Ltd.	AUX03	0.9mH/0.3mH, Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
CM Inductor 2(Input) (L6)	Guangzhou Deloop Electronic Device Ltd.	AUX00	0.6mH, Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance



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Clause	Requirement – Test	Result – Remark	Verdict

object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>
(Alternative)	Ningbo AUX Solar Technology Co., Ltd.	AUX 25K- T5020	0.6mH, Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Wuhan Chenyang Electronic Technology Co., Ltd.	AUX01	0.6mH, Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Huizhou Baohui Electronics Technology Co., Ltd.	AUX02	0.6mH, Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Qingdao Yunlu Energy Technology Co. Ltd.	AUX03	0.6mH, Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
BST and INV Inductor	HUIZHOU INDUCTANCE ELECTRONICS TECHNOLOGY CO.,LTD/Lianda Mingci	AUX BST+INV	630uH/32A *2 660uH/38A *1 (350uH/40A *1) 397uH/45A*3 Class H	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Wuhan Chenyang Electronic Technology Co.,Ltd.	AUX BST+INV	630uH/32A *2 660uH/38A *1 (350uH/40A *1) 397uH/45A*3 Class H	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Ningbo AUX Solar Technology Co., Ltd.	AUX BST+INV	630uH/32A *2 660uH/38A *1 (350uH/40A *1) 397uH/45A*3, Class H	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Guangzhou Deloop Electronic Device Ltd.	AUX BST+INV	630uH/32A *2 660uH/38A *1 (350uH/40A *1) 397uH/45A*3 Class H	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Qingdao Yunlu Energy Technology Co.,Ltd	AUX BST+INV	630uH/32A *2 660uH/38A *1 (350uH/40A *1) 397uH/45A*3Cla ss H	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	HUIZHOU BAOHUI ELECTRONIC	AUX BST+INV	630uH/32A *2 660uH/38A *1 (350uH/40A *1)	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance

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Clause	Requirement – Test	Result – Remark	Verdict

object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>
	TECHNOLGY CO LTD		397uH/45A*3Class H		
(Alternative)	Huizhou Indate electronic Technology Co., LTD	AUX BST+INV	630uH/32A *2 660uH/38A *1 (350uH/40A *1) 397uH/45A*3 Class H	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
HF Transformer (T34)	Wuhan Chenyang Electronic Technology Co., Ltd.	AUX01	ER35-1200uH Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Ningbo AUX Solar Technology Co., Ltd.	AUX T- ER28/28	ER35-1200uH Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Guangzhou Deloop Electronic Device Ltd.	AUX00	ER35-1200uH Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Huizhou Baohui Electronics Technology Co., Ltd.	AUX02	ER35-1200uH Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Qingdao Yunlu Energy Technology Co. Ltd.	AUX03	ER35-1200uH Class B	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
-Bobbin	CHANGCHUN PLASITC CORPORATIO N	T375HF	130°C	UL 1446	UL E59481
(Alternative)	Interchangeable	Interchangeable	Min 130°C	UL 1446	UL
-MAGNET WIRE	Dongguan Hilde Electronics Co., Ltd	THW-F	155°C	UL 1446	E356133
(Alternative)	Interchangeable	Interchangeable	Min 130°C	UL 1446	UL
-TAPE	JINGYI ADHESIVE PRODUCTS CO LTD	LY-XX	130°C	UL 1446	E246950
(Alternative)	Interchangeable	Interchangeable	130°C	UL 1446	UL
-VARNISH	Jiaxing Tianyi Insulation Materials Co.,	FUYA831- M/FUYA101	150°C	UL 1446	UL E227128

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Clause	Requirement – Test	Result – Remark	Verdict

object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>
	Ltd				
(Alternative)	Interchangeable	Interchangeable	130°C	UL 1446	UL
PV connector	Dongguan vaconn Electronics Technlgy Co.,Ltd.	VP-D4C- PHSM0/VP- D4C-PHSF0	1000VDC 35A	IEC 62852	TUV R 50396796
(Alternative)	Stäubli (Hangzhou) Mechatronic Co., Ltd.	PV-ADSP4-S2- UR/6 PV-ADBP4-S2- UR/6	1250VDC 39A	IEC 62852	TUV RH R 60127181
AC connector-1	Shenzhen Kangnite Electronics Co., LTD	PVTB190-05- S01	600V, 50A	UL 1059	UL E304128
DSP chip U36	Texas Instruments	TMS320F28075 PTP	3.3V, 120MHz	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
ARM chip U48	Gigadevice Semiconductor Inc	GD32F303VGT 6	3.3V, 8MHz	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
INV IGBT (IGBT1, IGBT2, I GBT3 IGBT10, IGBT11 , IGBT12, Q16)	China Resources Microelectronics Co., Ltd	CRG75T120AX 3HD	1200V 75A	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	WUXI NCE POWER CO., LTD.	NCE100TD120 VTP	1200V 100A	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Infineon	IKQ100N120CH 7	1200V 100A	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Infineon	IKQ75N120CH3	1200V 75A	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	ON Semiconductor	FGY100T120S WD	1200V 100A	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
INV IGBT (IGBT4, IGBT5, I GBT6)	JILIN SINO- MICROELECTR ONICS CO.,	JT075N065WE D	650V 75A -40~175°C	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance

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Clause	Requirement – Test	Result – Remark	Verdict

object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>
IGBT7,IGBT8,I GBT9)	LTD.				
(Alternative)	China Resources Microelectronics Limited	CRG100T65AX 5SD	650V, 100.0A; -55 to +175℃	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Infineon	IKWH100N65E H7	650V, 100.0A; -55 to +175℃	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	ON Semiconductor	FGY100T65SC DT	650V, 100.0A; -55 to +175℃	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Shenzhen Shangyang Tong CO.,LTD.	SRE100N065F SU2DBT-G2	650V, 100.0A; -55 to +175℃	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
Boost IGBT (Q10, Q12,Q11,Q13)	China Resources Microelectronics Co., Ltd	CRG50T120AX 3HD	1200V 50A	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	China Resources Microelectronics Co., Ltd	CRG40T120AX3 HD	1200V 40A	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	WUXI NCE POWER CO.,LTD.	NCE50TD120V T	1200V 50A	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	WUXI NCE POWER CO.,LTD.	NCE50TD120VT	1200V 40A	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
Optocoupler (U2,U3,U10,U3 2,U30,U33,U34, U36,U37,U39,U 44,U45,U46,U4 7,U48)	Lite-on Optoelectronics (Changzhou) Co., LTD	LTV-816S-TP- D3-TXCU	5000V/Viso, -40℃ to +110℃	EN 60747-5-5	VDE 40015248
(Alternative)	EVERLIGHT ELECTRONICS CO., LTD	EL816S1	5000V/Viso	EN 60747-5	VDE 132249
Fan (outside)	NMB	08025DE12QC MD2	12V, 520mm	EN 60950	VDE 1507300
(Alternative)	Kaimei Electronic Corp.	SF0825B1TQW 334LRURPH	12V, 520mm	EN 60950	TUV R 50029788
(Alternative)	Mibei Mitsumi Co., LTD	08025DE-12N- CMD-3	12V, 520mm	UL 507	UL E89936
(Alternative)	Shenzhen Huaxia Hengtai	DA8025B12HA	12V, 520mm	UL 507	UL E254715

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Clause	Requirement – Test		Result – Remark		Verdict
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>
(Alternative)	Delta	JQ8025H12B (SH)	12V, 520mm	UL 507	UL E523334
Fan (inside)	Shenzhen Huaxia Hengtai	DA06025B12U R	12V, 200mm	EN 60950	TUV R 50473371
(Alternative)	Kemi Electric Co., LTD	JF0625B1UA01 34LUBRY5	12V, 200mm	EN 60950	TUV:R 50029788
(Alternative)	Taiwan Yongli	MGT6012YB- R25	12V, 200mm	UL 507	E187236
(Alternative)	Zhaoqing Shenghui	CHT6012BH- R25C	12VDC	UL 507	E496370
PV internal wires	New Asia Electronics	UL11627	1500V, 10/12AW G	UL 758	UL E170689
(Alternative)	Interchangeable	UL11627	1500V, 10/12AW G	UL 758	UL
AC output wires	New Asia Electronics	UL 10269	8AWG	UL 758	UL E170689
(Alternative)	Interchangeable	UL 10269	8AWG	UL 758	UL
Capacitor 1 (C27, C28)	Ai Huaxin power Capacitor (Suzhou) Co., LTD	FGC3RK224G2 12GL5	0.22uF ±10% 1250V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Xiamen Fara Electronics Co., LTD	C823A224KB0C 350	0.22uF ±10% 1000V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
Capacitor 2 (C363, C364, C3 65)	Ai Huaxin power Capacitor (Suzhou) Co., LTD	FXT40K225G34 2GL5	2.2uF 400V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Nantong Jianghai Capacitor Co., Ltd.	FCS4AAN225**I F2700*	2.2uF 400V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Xiamen Fara Electronics Co., LTD	C4HG2225KF0 C450	2.2uF 400V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
Y Capacitor (C14, C16, C18, C174, C175, C176, C243, C245, C247, C347, C418, C476, C477, C478, C589)	Handan Aoneng Electronics Co., LTD	JD472M2GY5V S10L	4.7nF ±10% 400VAC	EN 60384-14	VDE 40041436
(Alternative)	Interchangeable	Interchangeable	4.7nF ±10%	EN 60384-14	S, VDE or

IEC 62109-1					
Clause	Requirement – Test		Result – Remark		Verdict
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>
			400VAC		relevant certified marks
Y Capacitor(C13, C15,C17,C590)	Walsin Technology Corporation	YP5AH101K060 *	100pF ±10% 500VAC	EN 60384-14	ENEC-01966
(Alternative)	Interchangeable	Interchangeable	100pF ±10% 500VAC	EN 60384-14 EN 61071 EN61881-1	S, VDE or relevant certified marks
Y Capacitor(C367, C371,C374)	XIAMEN FARATRONIC CO.,LTD	C43Q1333M- 6S*	33nF ±20% 300VAC	IEC/EN 60384- 14	TUV R 50266108
(Alternative)	Interchangeable	Interchangeable	33nF ±20% 300VAC	IEC/EN 60384- 14	S, VDE or relevant certified marks
SPD(GAS1,GA S4)	TDK Electronics	EF1500X8S	1500V 2P	UL497B	UL E163070
Varistor(SPD3, SPD4,SPD5 SPD6,SPD8,SP D9, SPD10,SPD11)	CHENGDU TIEDA ELECTRONICS CORPORATIO N	MYN23-751K- CaF3ZH	Φ25mm 750V ±10%	IEC61051-1 IEC61051-2 IEC61051-2-2	VDE:40008571
(Alternative)	Brightking (SHENZHEN)	TVR20821KSY	820V; 10KA	IEC61051-1 IEC61051-2 IEC61051-2-2	VDE:40027827
AC filter capacitor(C341, C342,C343)	XIAMEN FARATRONIC CO.,LTD	C6AR8805KF20 382	8uF ±10% 380VAC	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Aihua Infinity Capacitors (Suzhou) Co., Ltd	FAG38K805K32 2KL5	8uF ±10% 380VAC	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
AC Relay(K1,K2,K3 ,K4,K5,K6)	Xiamen Hongfa Electroacoustic Co.,Ltd.	R HF161F- 40W/12- HTF(967)(A38)	50A 12V	IEC 61810-1	TUV R50475730
(Alternative)	TE Electronics	T9VV1K15-12S	50A 12V	IEC 61810-1	TUV R 50499133
(Alternative)	Mingguang Sanyou Power Technology Co., Ltd	SMIC-S- 112GM1	50A 12V	EN 61810-1	TUV R 50540861
DC Relay(K8)	Xiamen Hongfa Electroacoustic Co.,Ltd.	HFD3/12	12V 1500VDC	EN 61810-1	TUV R 50475730
DC	Xiamen Hongfa	JQX-115F/012-	12V 300VDC	EN 61810-1	TUV R

IEC 62109-1			
Clause	Requirement – Test	Result – Remark	Verdict

object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity <sup>1)</sup>
Relay(RLY1, RLY2)	Electroacoustic Co.,Ltd.	2ZS4(551) 12V			50475730
BUS capacitor(C56,C 57,C58 C65,C66,C67)	Hunan Aihua Group Co.,Ltd	FAD2KK756M7 24MDDRSS1	75 $\mu$ F $\pm$ 10% 600V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	XIAMEN FARATRONIC CO.,LTD	C3D3T147KMIA 452	140 $\mu$ F $\pm$ 10% 550V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Wuxi Chenrui New Energy Technology Co., Ltd	DPS5060600K4 12103	50 $\mu$ F $\pm$ 10% 600V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	NANTONG JIANGHAI CAPACITOR CO.,LTD	FCS2YDS147*A KA5220D	140 $\mu$ F $\pm$ 10% 550V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
(Alternative)	Aihua Infinity Capacitors (Suzhou) Co., Ltd	FDA2JK147M23 4MD5	140 $\mu$ F $\pm$ 10% 550V	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance
PCB	Kingboard Laminates Holdings Limited	ASN-30TL	2.0mm $\pm$ 0.18mm FR-4	UL 94	UL E503744
(Alternative)	SHENGYI TECHNOLOGY CO., LTD	ASN-30TL	2.0mm $\pm$ 0.18mm FR-4	UL 94 EN 60695-11-10	VDE or UL
(Alternative)	Interchangeable	Interchangeable	2.0mm $\pm$ 0.18mm FR-4, 130°C	UL 94 EN 60695-11-10	VDE or UL

<sup>1)</sup> an asterisk indicates a mark which assures the agreed level of surveillance



Appendix 1: Photos



Top view



Rear view





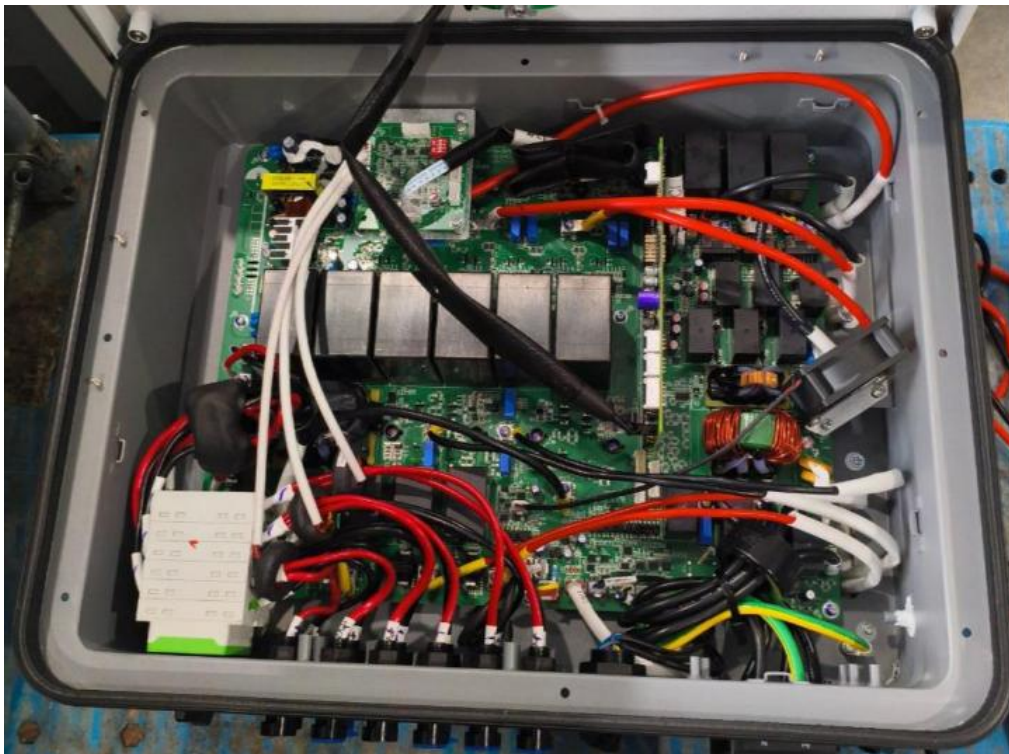
Side view



Side view

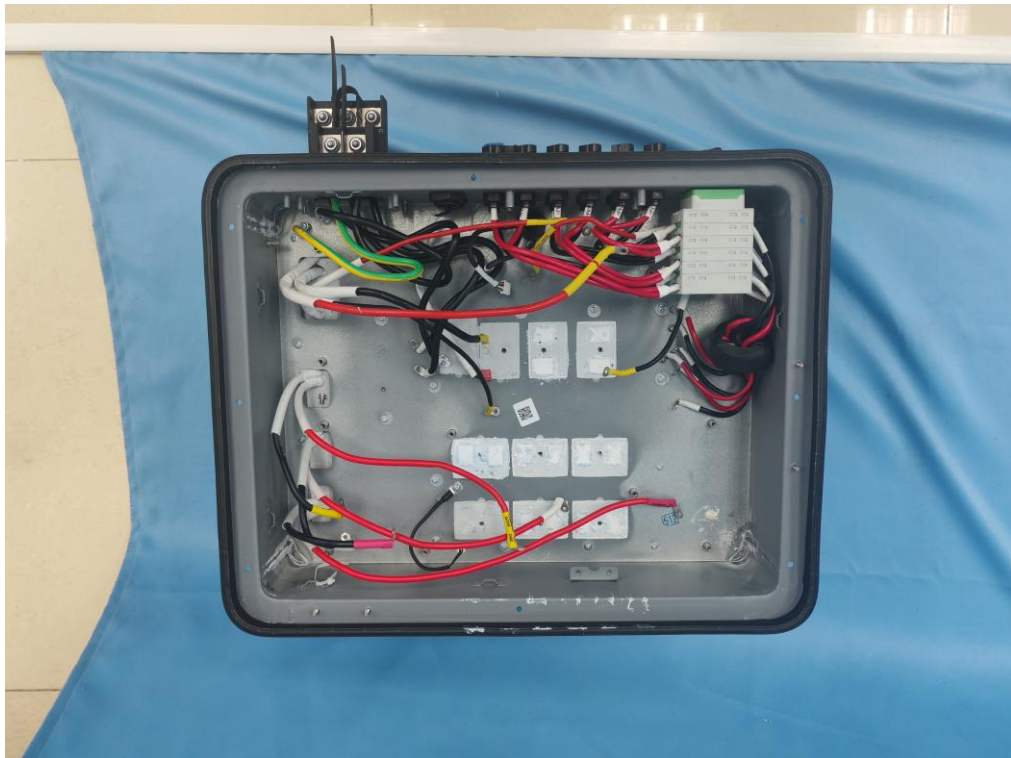


Front view

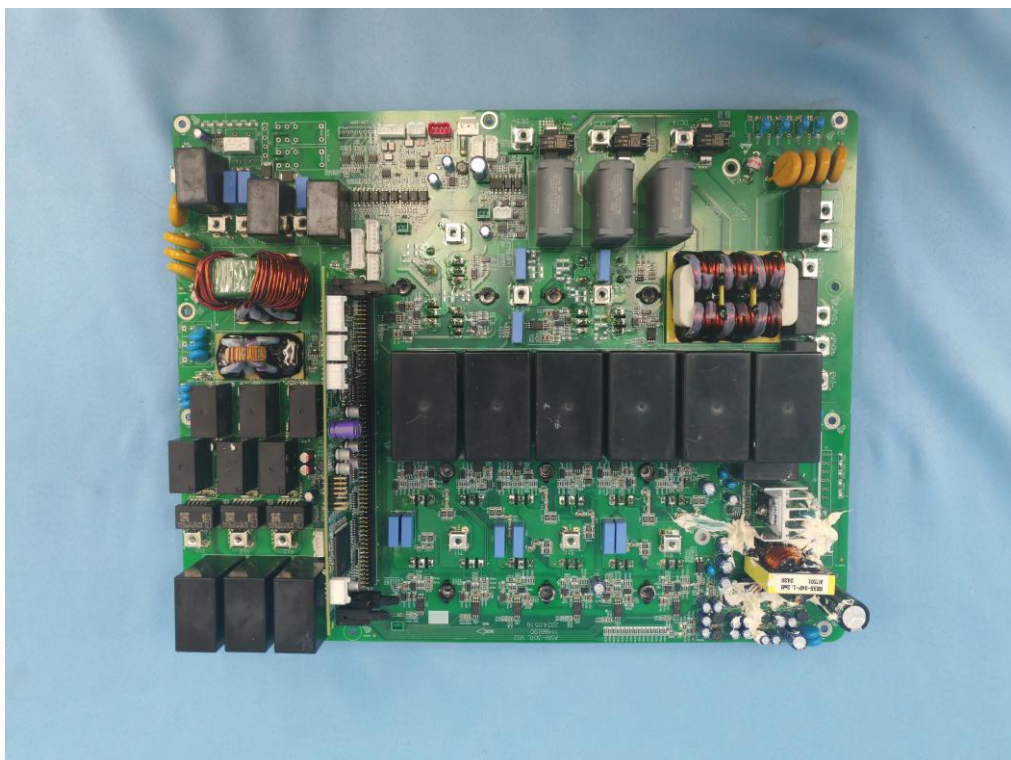


Internal view -1

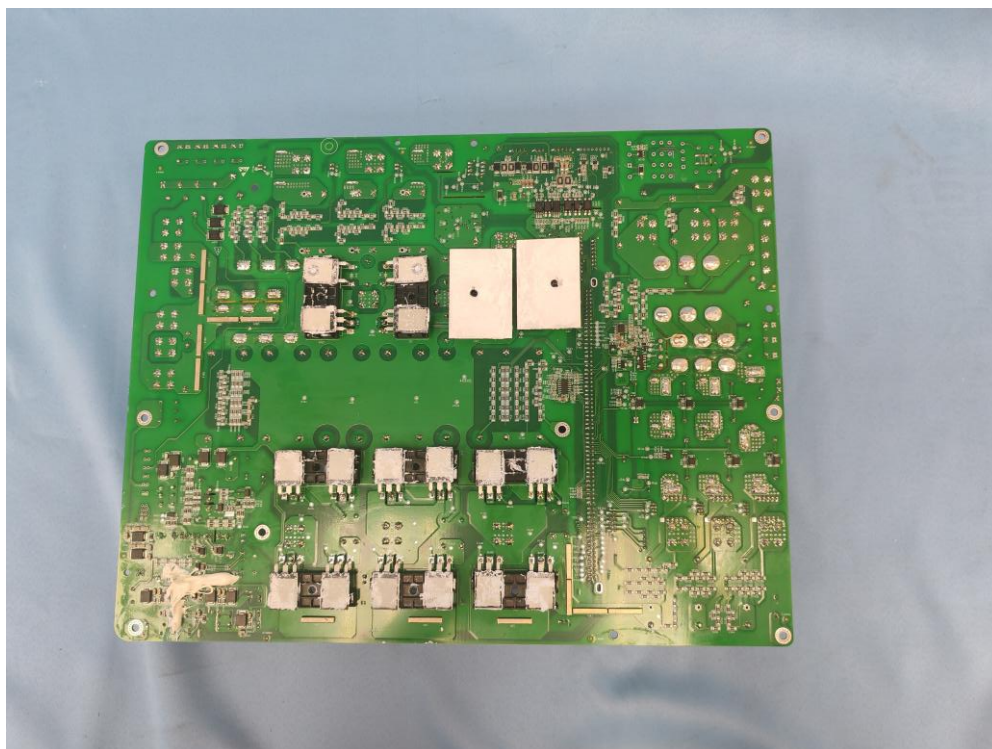




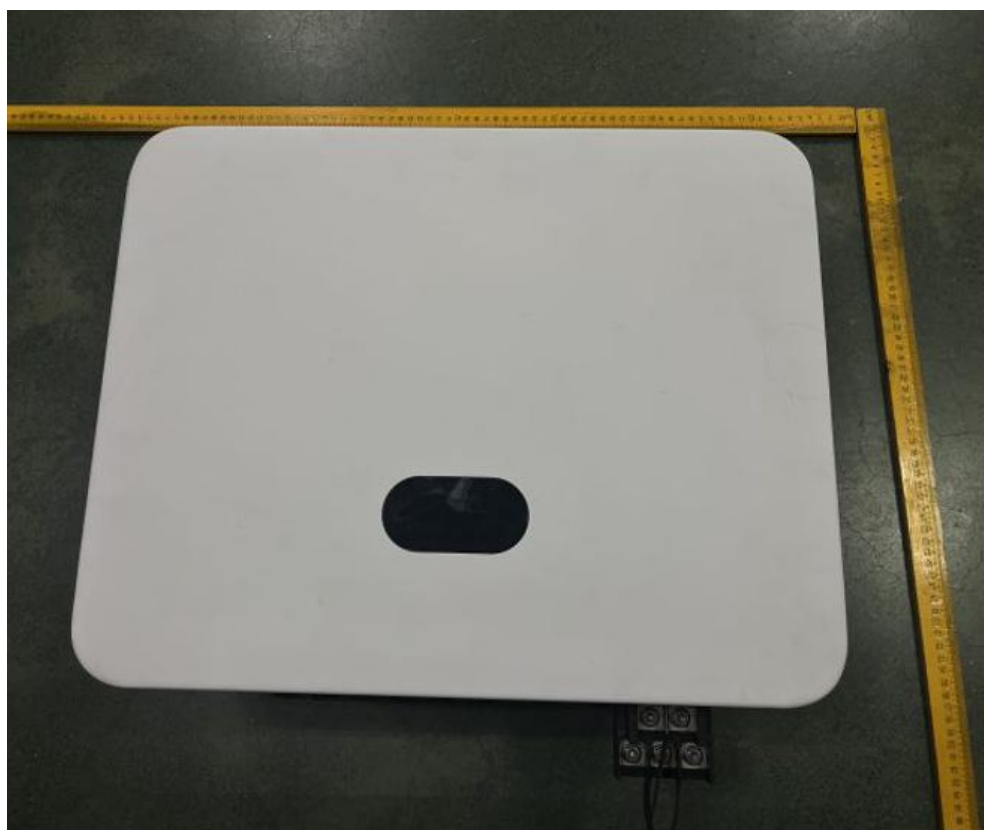
## Internal view -2



### Power board view (Components side)



Power board view (Soldered side)



Alternative front view



Alternative side view



Alternative side view





Alternative top view



Alternative interface view

(End of report)