

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.....	GZES241202371801
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Name of Testing Laboratory preparing the Report.....	SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch
Address	198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China
Applicant's name	Shenzhen EEnovance Energy Technology Co., Ltd.
Address	Room 401, Building 2, Yufengda Industrial Park, No. 1008 Guangqiao Avenue, Yulu Community, Yutang Streets, Guangming District, Shenzhen, Guangdong, China
Test specification:	
Standard	IEC 62109-1: 2010 (First Edition) EN 62109-1: 2010 (First Edition)
Test procedure	SGS-CSTC
Non-standard test method	N/A
Test Report Form No.....	IEC62109_1B
Test Report Form(s) Originator	SGS-CSTC
Master TRF	Dated 2016-04
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Test item description	Rechargeable Lithium ion Battery Cabinet
Trade Mark.....	
Manufacturer	Shenzhen EEnovance Energy Technology Co., Ltd.
Address	Room 401, Building 2, Yufengda Industrial Park, No. 1008 Guangqiao Avenue, Yulv Community, Yutang Streets, Guangming District, Shenzhen, Guangdong, China
Model/Type reference	E-MATE 50-61-A, E-MATE 50-5.12-A, E-MATE 50-10.24-A, E-MATE 50-15.36-A, E-MATE 50-20.48-A, E-MATE 50-25.60-A, E-MATE 50-30.72-A, E-MATE 50-35.84-A, E-MATE 50-40.96-A, E-MATE 50-46.08-A, E-MATE 50-51.20-A, E-MATE 50-56.32-A, E-MATE 29.9-61-A, E-MATE 29.9-5.12-A, E-MATE 29.9-10.24-A, E-MATE 29.9-15.36-A, E-MATE 29.9-20.48-A, E-MATE 29.9-25.60-A, E-MATE 29.9-30.72-A, E-MATE 29.9-35.84-A, E-MATE 29.9-40.96-A, E-MATE 29.9-46.08-A, E-MATE 29.9-51.20-A, E-MATE 29.9-56.32-A, E-MATE 30-61-A, E-MATE 30-5.12-A, E-MATE 30-10.24-A, E-MATE 30-15.36-A, E-MATE 30-20.48-A, E-MATE 30-25.60-A, E-MATE 30-30.72-A, E-MATE 30-35.84-A, E-MATE 30-40.96-A, E-MATE 30-46.08-A, E-MATE 30-51.20-A, E-MATE 30-56.32-A, E-MATE 37.5-61-A, E-MATE 37.5-5.12-A, E-MATE 37.5-10.24-A, E-MATE 37.5-15.36-A, E-MATE 37.5-20.48-A, E-MATE 37.5-25.60-A, E-MATE 37.5-30.72-A, E-MATE 37.5-35.84-A, E-MATE 37.5-40.96-A, E-MATE 37.5-46.08-A, E-MATE 37.5-51.20-A, E-MATE 37.5-56.32-A, E-MATE 40-61-A, E-MATE 40-5.12-A, E-MATE 40-10.24-A, E-MATE 40-15.36-A, E-MATE 40-20.48-A, E-MATE 40-25.60-A, E-MATE 40-30.72-A, E-MATE 40-35.84-A, E-MATE 40-40.96-A, E-MATE 40-46.08-A, E-MATE 40-51.20-A, E-MATE 40-56.32-A
Ratings	Refer to the rating on page 9 to page 25 of the report. Serial number: SQEC006110E0118001

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	Testing Laboratory:	SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch
	Location/ address :	198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China
	Tested by (name, function, signature)	Joker Li (Project Engineer) 
	Approved by (name, function, signature ...)	Colin Chen (Technical Reviewer) 

List of Attachments (including a total number of pages in each attachment):		
50 Hz		
Attachment #	Description	Pages
Attachment I	Pictures of the EUT and Electrical Schemes	14 pages
Attachment II	Testing Information	2 pages
Summary of testing:		
Tests performed (name of test and test clause): The equipment has been tested according to the standard: IEC 62109-1:2010 and EN 62109-1: 2010. Testing has been carried out at 50 Hz. All applicable tests according to the above specified standard have been carried out. From the result of inspection and tests on the submitted sample, we conclude that it complies with the requirements of the standard.		Testing location: Dongguan BALUN Testing Technology Co., Ltd. Room 104, 204, 205, Building 1, No. 6, Industrial South Road, Songshan Lake District, Dongguan, Guangdong, China. (All clauses expect 6.3) Clauses 6.3 test at Shenzhen BALUN Technology Co., Ltd. Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province. P.R. China
Summary of compliance with National Differences (List of countries addressed): No National Differences are addressed to this test report		

Copy of marking plate:

EENOVANCE Rechargeable Lithium ion Battery Cabinet
Model: E-MATE 50-61-A

Battery Parameters	100Ah,61.44kWh,480V~700.8V DC	PV Parameters	50kW,150Vdc~850Vdc
Bat.Max.Charge/Discharge Current	80A/80A	Bat.Max.Charge/Discharge Power	50kW/50kW
Grid Parameters	50kW/400VAC/3P+N+PE	Back-up Parameters	50kW/400VAC/3P+N+PE
Rated AC Current	76A	Antiseptic rank	C4
Rated AC Frequency	50Hz/60Hz	Protection class	Class I
Series Number	SQEC006110E0118001	IP Level	IP55

Shenzhen EEnovance Energy Technology co.,LTD
Room 401,Building 2,Yufengda Industrial Park,No.1008 Guangqiao Avenue,
Yulu Community,Yutang Streets,Guangming District,SHENZHEN,PRC.

CE    

EENOVANCE Rechargeable Lithium ion Battery Cabinet
Model: E-MATE 40-61-A

Battery Parameters	100Ah,61.44kWh,480V~700.8V DC	PV Parameters	40kW,150Vdc~850Vdc
Bat.Max.Charge/Discharge Current	66A/66A	Bat.Max.Charge/Discharge Power	40kW/40kW
Grid Parameters	40kW/400VAC/3P+N+PE	Back-up Parameters	40kW/400VAC/3P+N+PE
Rated AC Current	60.8A	Antiseptic rank	C4
Rated AC Frequency	50Hz/60Hz	Protection class	Class I
Series Number	SQEC006110E0818001	IP Level	IP55

Shenzhen EEnovance Energy Technology co.,LTD
Room 401,Building 2,Yufengda Industrial Park,No.1008 Guangqiao Avenue,
Yulu Community,Yutang Streets,Guangming District,SHENZHEN,PRC.

CE    

EENOVANCERechargeable Lithium ion Battery Cabinet
Model: E-MATE 37.5-61-A

Battery Parameters	100Ah,61.44kWh,480V~700.8V DC	PV Parameters	37.5kW,150Vdc~850Vdc
Bat.Max.Charge/Discharge Current	62A/62A	Bat.Max.Charge/Discharge Power	37.5kW/37.5kW
Grid Parameters	37.5kW/400VAC/3P+N+PE	Back-up Parameters	37.5kW/400VAC/3P+N+PE
Rated AC Current	57A	Antiseptic rank	C4
Rated AC Frequency	50Hz/60Hz	Protection class	Class I
Series Number	SQEC006110E0918001	IP Level	IP55

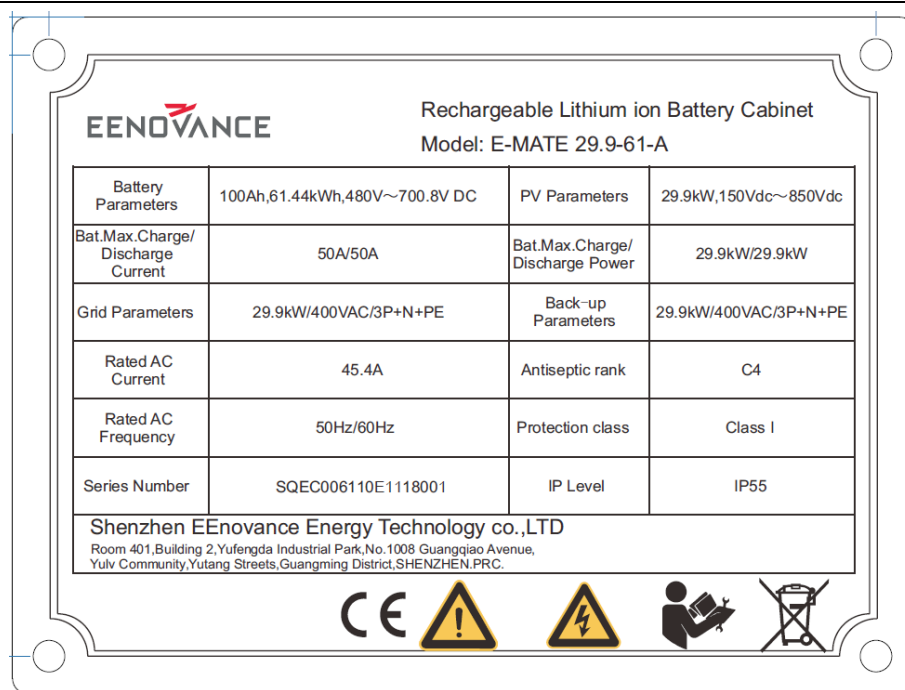
Shenzhen EEnovance Energy Technology co.,LTD

Room 401,Building 2,Yufengda Industrial Park,No.1008 Guangqiao Avenue,
Yulv Community,Yutang Streets,Guangming District,SHENZHEN.PRC.**EENOVANCE**Rechargeable Lithium ion Battery Cabinet
Model: E-MATE 30-61-A

Battery Parameters	100Ah,61.44kWh,480V~700.8V DC	PV Parameters	30kW,150Vdc~850Vdc
Bat.Max.Charge/Discharge Current	50A/50A	Bat.Max.Charge/Discharge Power	30kW/30kW
Grid Parameters	30kW/400VAC/3P+N+PE	Back-up Parameters	30kW/400VAC/3P+N+PE
Rated AC Current	45.6A	Antiseptic rank	C4
Rated AC Frequency	50Hz/60Hz	Protection class	Class I
Series Number	SQEC006110E1018001	IP Level	IP55

Shenzhen EEnovance Energy Technology co.,LTD

Room 401,Building 2,Yufengda Industrial Park,No.1008 Guangqiao Avenue,
Yulv Community,Yutang Streets,Guangming District,SHENZHEN.PRC.

**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. Labels of other models are as the same with **E-MATE 50-61-A**, **E-MATE 40-61-A**, **E-MATE 37.5-61-A**, **E-MATE 30-61-A** and **E-MATE 29.9-61-A**'s except the parameters of rating.
4. As declared by the applicant, the importer (and manufacturer, if it is different)'s name, registered trade name or registered trademark and the postal address will be marked on the products before being place on the market. The contact details shall be in a language easily understood by end-users and market surveillance authorities.

Test item particulars	Rechargeable Lithium ion Battery Cabinet		
Equipment mobility	☐ movable ☒ fixed	☐ hand-held ☐ transportable	☐ stationary ☐ for building-in
Connection to the mains	☐ pluggable equipment ☒ permanent connection		☐ direct plug-in ☐ for building-in
Environmental category	☒ outdoor	☐ indoor unconditional	☐ indoor conditional
Over voltage category Mains	☐ OVC I	☐ OVC II	☒ OVC III ☐ OVC IV
Over voltage category PV	☐ OVC I	☒ OVC II	☐ OVC III ☐ OVC IV
Mains supply tolerance (%)	-90 / +110 %		
Tested for power systems	TN systems		
IT testing, phase-phase voltage (V)	N/A		
Class of equipment	☒ Class I ☐ Class II ☐ Class III ☐ Not classified		
Mass of equipment (kg)	1080 kg Max.		
Pollution degree	Outside PD3; Inside PD2		
IP protection class	IP55		
Possible test case verdicts:			
- test case does not apply to the test object: N/A			
- test object does meet the requirement.....: P (Pass)			
- test object was not evaluated for the requirement: N/E			
- test object does not meet the requirement: F (Fail)			
Testing			
Date of receipt of test item: 2025-01-28			
Date (s) of performance of tests: 2025-03-03 to 2025-05-06			

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
 "(See appended table)" refers to a table appended to the report.

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Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IEC62109-1:

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) Dongguan EEnovance Energy Technology Co., Ltd.
 Room 501, Building1, Songhu Zhigu Science and Technology Industrial Park, No.11, Liaobu Yanhe Road, Liaobu Town, Dongguan City, Guangdong Province. PRC.

General product information:

The solar-storage and off-grid energy storage system consists of two parts: a hybrid inverter and a lithium battery system (also called a battery cabinet). It is a small and medium-power PV energy storage system developed for areas without or with little electricity, achieving the functional characteristics of efficient power generation, reliable power supply, and intelligent operation and maintenance. This system provides a systematic solution that supports solar PV access, energy storage battery access, load access, and grid access. The system mainly consists of battery cabinet, hybrid inverter, HV switch box, etc.

Equipment Under Testing:

- **E-MATE 50-61-A**
- **E-MATE 29.9-61-A**
- **E-MATE 30-61-A**
- **E-MATE 37.5-61-A**
- **E-MATE 40-61-A**

Variant models:

- E-MATE 50-5.12-A, E-MATE 50-10.24-A, E-MATE 50-15.36-A, E-MATE 50-20.48-A, E-MATE 50-25.60-A, E-MATE 50-30.72-A, E-MATE 50-35.84-A, E-MATE 50-40.96-A, E-MATE 50-46.08-A, E-MATE 50-51.20-A, E-MATE 50-56.32-A,
- E-MATE 29.9-5.12-A, E-MATE 29.9-10.24-A, E-MATE 29.9-15.36-A, E-MATE 29.9-20.48-A, E-MATE 29.9-25.60-A, E-MATE 29.9-30.72-A, E-MATE 29.9-35.84-A, E-MATE 29.9-40.96-A, E-MATE 29.9-46.08-A, E-MATE 29.9-51.20-A, E-MATE 29.9-56.32-A,
- E-MATE 30-5.12-A, E-MATE 30-10.24-A, E-MATE 30-15.36-A, E-MATE 30-20.48-A, E-MATE 30-25.60-A, E-MATE 30-30.72-A, E-MATE 30-35.84-A, E-MATE 30-40.96-A, E-MATE 30-46.08-A, E-MATE 30-51.20-A, E-MATE 30-56.32-A,
- E-MATE 37.5-5.12-A, E-MATE 37.5-10.24-A, E-MATE 37.5-15.36-A, E-MATE 37.5-20.48-A, E-MATE 37.5-25.60-A, E-MATE 37.5-30.72-A, E-MATE 37.5-35.84-A, E-MATE 37.5-40.96-A, E-MATE 37.5-46.08-A, E-MATE 37.5-51.20-A, E-MATE 37.5-56.32-A,
- E-MATE 40-5.12-A, E-MATE 40-10.24-A, E-MATE 40-15.36-A, E-MATE 40-20.48-A, E-MATE 40-25.60-A, E-MATE 40-30.72-A, E-MATE 40-35.84-A, E-MATE 40-40.96-A, E-MATE 40-46.08-A, E-MATE 40-51.20-A, E-MATE 40-56.32-A

The variant models have been included in this test report without tests because the following features don't change regarding to the tested model:

- Same connection system and hardware topology.
- Same control algorithm.
- Same Firmware Version.

Information within this section has been provided by the client.

The models of E-MATE 50-61-A, E-MATE 50-5.12-A, E-MATE 50-10.24-A, E-MATE 50-15.36-A, E-MATE 50-20.48-A, E-MATE 50-25.60-A, E-MATE 50-30.72-A, E-MATE 50-35.84-A, E-MATE 50-40.96-A, E-MATE 50-46.08-A, E-MATE 50-51.20-A, E-MATE 50-56.32-A, E-MATE 29.9-61-A, E-MATE 29.9-5.12-A, E-MATE 29.9-10.24-A, E-MATE 29.9-15.36-A, E-MATE 29.9-20.48-A, E-MATE 29.9-25.60-A, E-MATE 29.9-30.72-A, E-MATE 29.9-35.84-A, E-MATE 29.9-40.96-A, E-MATE 29.9-46.08-A, E-MATE 29.9-51.20-A, E-MATE 29.9-56.32-A, E-MATE 30-61-A, E-MATE 30-5.12-A, E-MATE 30-10.24-A, E-MATE 30-15.36-A, E-MATE 30-20.48-A, E-MATE 30-25.60-A, E-MATE 30-30.72-A, E-MATE 30-35.84-A, E-MATE 30-40.96-A, E-MATE 30-46.08-A, E-MATE 30-51.20-A, E-MATE 30-56.32-A, E-MATE 37.5-61-A, E-MATE 37.5-5.12-A, E-MATE 37.5-10.24-A, E-MATE 37.5-15.36-A, E-MATE 37.5-20.48-A, E-MATE 37.5-25.60-A, E-MATE 37.5-30.72-A, E-MATE 37.5-35.84-A, E-MATE 37.5-40.96-A, E-MATE 37.5-46.08-A, E-MATE 37.5-51.20-A, E-MATE 37.5-56.32-A, E-MATE 40-61-A, E-MATE 40-5.12-A, E-MATE 40-10.24-A, E-MATE 40-15.36-A, E-MATE 40-20.48-A, E-MATE 40-25.60-A, E-MATE 40-30.72-A, E-MATE 40-35.84-A, E-MATE 40-40.96-A, E-MATE 40-46.08-A, E-MATE 40-51.20-A and E-MATE 40-56.32-A are identical on topological schematic circuit diagram and control solution codes except for input/output rating.

The results obtained apply only to the particular sample tested that is the subject of the present test report. The most unfavorable result values of the verifications and tests performed are contained herein.

Following table shows the full ratings of all the models referenced in this report, marked in **bold letters** the ones subjected to testing:

Product Model	E-MATE 50-61-A	E-MATE 50-5.12-A	E-MATE 50-10.24-A	E-MATE 50-15.36-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	12	1	2	3
Battery system rated capacity	61.44kWh	5.12kWh	10.24 kWh	15.36kWh
Battery system rated voltage	614.4Vd.c.	51.2Vd.c.	102.4Vd.c.	153.6Vd.c.
Battery system rated current	80 A			
Battery system voltage range	480V - 700.8 Vd.c	40V - 58.4Vd.c	80V - 116.8 Vd.c	120V - 175.2 Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	4*40A			
DC maximum power	96 kW			
MPPT quantity	4			
AC Side Parameters				
Rated output power	50 kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	76 A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	1080kg	596kg	640kg	684kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 50-20.48-A	E-MATE 50-25.60-A	E-MATE 50-30.72-A	E-MATE 50-35.84-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	4	5	6	7
Battery system rated capacity	20.48kWh	25.60kWh	30.72kWh	35.84kWh
Battery system rated voltage	204.8Vd.c.	256.0Vd.c.	307.2Vd.c.	358.4Vd.c.
Battery system rated current	80 A			
Battery system voltage range	160V - 233.6Vd.c	200V - 292.0Vd.c	240V - 350.4Vd.c	280V - 408.8Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	4*40A			
DC maximum power	96 kW			
MPPT quantity	4			
AC Side Parameters				
Rated output power	50 kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	76 A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	728kg	772kg	816kg	860kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 50-40.96-A	E-MATE 50-46.08-A	E-MATE 50-51.20-A	E-MATE 50-56.32-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	8	9	10	11
Battery system rated capacity	40.96kWh	46.08kWh	51.20kWh	56.32kWh
Battery system rated voltage	409.6Vd.c.	460.8Vd.c.	512.0Vd.c.	563.2Vd.c.
Battery system rated current	80 A			
Battery system voltage range	320V - 467.2Vd.c	360V - 525.6Vd.c	400V - 584.0Vd.c	440V - 642.4Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	4*40A			
DC maximum power	96 kW			
MPPT quantity	4			
AC Side Parameters				
Rated output power	50 kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	76 A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	904kg	948kg	992kg	1036kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 29.9-61-A	E-MATE 29.9-5.12-A	E-MATE 29.9-10.24-A	E-MATE 29.9-15.36-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	12	1	2	3
Battery system rated capacity	61.44kWh	5.12kWh	10.24 kWh	15.36kWh
Battery system rated voltage	614.4Vd.c.	51.2Vd.c.	102.4Vd.c.	153.6Vd.c.
Battery system rated current	50 A			
Battery system voltage range	480V - 700.8 Vd.c	40V - 58.4Vd.c	80V - 116.8Vd.c	120V - 175.2 Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	3*40A			
DC maximum power	59.8 kW			
MPPT quantity	3			
AC Side Parameters				
Rated output power	29.9 kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	45.4 A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	1080kg	596kg	640kg	684kg
Operating temperature	-30°C~~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 29.9-20.48-A	E-MATE 29.9-25.60-A	E-MATE 29.9-30.72-A	E-MATE 29.9-35.84-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	4	5	6	7
Battery system rated capacity	20.48kWh	25.60kWh	30.72kWh	35.84kWh
Battery system rated voltage	204.8Vd.c.	256.0Vd.c.	307.2Vd.c.	358.4Vd.c.
Battery system rated current	50 A			
Battery system voltage range	160V - 233.6Vd.c	200V - 292.0Vd.c	240V - 350.4Vd.c	280V - 408.8Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	3*40A			
DC maximum power	59.8 kW			
MPPT quantity	3			
AC Side Parameters				
Rated output power	29.9 kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	45.4 A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	728kg	772kg	816kg	860kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 29.9-40.96-A	E-MATE 29.9-46.08-A	E-MATE 29.9-51.20-A	E-MATE 29.9-56.32-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	8	9	10	11
Battery system rated capacity	40.96kWh	46.08kWh	51.20kWh	56.32kWh
Battery system rated voltage	409.6Vd.c.	460.8Vd.c.	512.0Vd.c.	563.2Vd.c.
Battery system rated current	50 A			
Battery system voltage range	320V - 467.2Vd.c	360V - 525.6Vd.c	400V - 584.0Vd.c	440V - 642.4Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	3*40A			
DC maximum power	59.8 kW			
MPPT quantity	3			
AC Side Parameters				
Rated output power	29.9 kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	45.4 A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	904kg	948kg	992kg	1036kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 30-61-A	E-MATE 30-5.12-A	E-MATE 30-10.24-A	E-MATE 30-15.36-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	12	1	2	3
Battery system rated capacity	61.44kWh	5.12kWh	10.24 kWh	15.36kWh
Battery system rated voltage	614.4Vd.c.	51.2Vd.c.	102.4Vd.c.	153.6Vd.c.
Battery system rated current	50 A			
Battery system voltage range	480V - 700.8 Vd.c	40V - 58.4Vd.c	80V - 116.8Vd.c	120V - 175.2 Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	3*40A			
DC maximum power	60 kW			
MPPT quantity	3			
AC Side Parameters				
Rated output power	30 kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	45.6 A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	1080kg	596kg	640kg	684kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 30-20.48-A	E-MATE 30-25.60-A	E-MATE 30-30.72-A	E-MATE 30-35.84-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	4	5	6	7
Battery system rated capacity	20.48kWh	25.60kWh	30.72kWh	35.84kWh
Battery system rated voltage	204.8Vd.c.	256.0Vd.c.	307.2Vd.c.	358.4Vd.c.
Battery system rated current	50 A			
Battery system voltage range	160V - 233.6Vd.c	200V - 292.0Vd.c	240V - 350.4Vd.c	280V - 408.8Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	3*40A			
DC maximum power	60 kW			
MPPT quantity	3			
AC Side Parameters				
Rated output power	30 kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	45.6 A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	728kg	772kg	816kg	860kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 30-40.96-A	E-MATE 30-46.08-A	E-MATE 30-51.20-A	E-MATE 30-56.32-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	8	9	10	11
Battery system rated capacity	40.96kWh	46.08kWh	51.20kWh	56.32kWh
Battery system rated voltage	409.6Vd.c.	460.8Vd.c.	512.0Vd.c.	563.2Vd.c.
Battery system rated current	50 A			
Battery system voltage range	320V - 467.2Vd.c	360V - 525.6Vd.c	400V - 584.0Vd.c	440V - 642.4Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	3*40A			
DC maximum power	60 kW			
MPPT quantity	3			
AC Side Parameters				
Rated output power	30 kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	45.6 A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	904kg	948kg	992kg	1036kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 37.5-61-A	E-MATE 37.5-5.12-A	E-MATE 37.5-10.24-A	E-MATE 37.5-15.36-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	12	1	2	3
Battery system rated capacity	61.44kWh	5.12kWh	10.24 kWh	15.36kWh
Battery system rated voltage	614.4Vd.c.	51.2Vd.c.	102.4Vd.c.	153.6Vd.c.
Battery system rated current	62 A			
Battery system voltage range	480V - 700.8 Vd.c	40V - 58.4Vd.c	80V - 116.8Vd.c	120V - 175.2 Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	4*40A			
DC maximum power	75 kW			
MPPT quantity	4			
AC Side Parameters				
Rated output power	37.5kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	57A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	1080kg	596kg	640kg	684kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 37.5-20.48-A	E-MATE 37.5-25.60-A	E-MATE 37.5-30.72-A	E-MATE 37.5-35.84-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	4	5	6	7
Battery system rated capacity	20.48kWh	25.60kWh	30.72kWh	35.84kWh
Battery system rated voltage	204.8Vd.c.	256.0Vd.c.	307.2Vd.c.	358.4Vd.c.
Battery system rated current	62 A			
Battery system voltage range	160V - 233.6Vd.c	200V - 292.0Vd.c	240V - 350.4Vd.c	280V - 408.8Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	4*40A			
DC maximum power	75 kW			
MPPT quantity	4			
AC Side Parameters				
Rated output power	37.5kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	57A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	728kg	772kg	816kg	860kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 37.5-40.96-A	E-MATE 37.5-46.08-A	E-MATE 37.5-51.20-A	E-MATE 37.5-56.32-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	8	9	10	11
Battery system rated capacity	40.96kWh	46.08kWh	51.20kWh	56.32kWh
Battery system rated voltage	409.6Vd.c.	460.8Vd.c.	512.0Vd.c.	563.2Vd.c.
Battery system rated current	62 A			
Battery system voltage range	320V - 467.2Vd.c	360V - 525.6Vd.c	400V - 584.0Vd.c	440V - 642.4Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	4*40A			
DC maximum power	75 kW			
MPPT quantity	4			
AC Side Parameters				
Rated output power	37.5kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	57A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	904kg	948kg	992kg	1036kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 40-61-A	E-MATE 40-5.12-A	E-MATE 40-10.24-A	E-MATE 40-15.36-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	12	1	2	3
Battery system rated capacity	61.44kWh	5.12kWh	10.24 kWh	15.36kWh
Battery system rated voltage	614.4Vd.c.	51.2Vd.c.	102.4Vd.c.	153.6Vd.c.
Battery system rated current	66A			
Battery system voltage range	480V - 700.8 Vd.c	40V - 58.4Vd.c	80V - 116.8Vd.c	120V - 175.2 Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	4*40A			
DC maximum power	80 kW			
MPPT quantity	4			
AC Side Parameters				
Rated output power	40kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	60.8A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	1080kg	596kg	640kg	684kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 40-20.48-A	E-MATE 40-25.60-A	E-MATE 40-30.72-A	E-MATE 40-35.84-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	4	5	6	7
Battery system rated capacity	20.48kWh	25.60kWh	30.72kWh	35.84kWh
Battery system rated voltage	204.8Vd.c.	256.0Vd.c.	307.2Vd.c.	358.4Vd.c.
Battery system rated current	66 A			
Battery system voltage range	160V - 233.6Vd.c	200V - 292.0Vd.c	240V - 350.4Vd.c	280V - 408.8Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	4*40A			
DC maximum power	80 kW			
MPPT quantity	4			
AC Side Parameters				
Rated output power	40kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	60.8A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	728kg	772kg	816kg	860kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

Product Model	E-MATE 40-40.96-A	E-MATE 40-46.08-A	E-MATE 40-51.20-A	E-MATE 40-56.32-A
System Parameters				
Battery module	5.12 kWh, 51.2 Vd.c.			
Number of packs	8	9	10	11
Battery system rated capacity	40.96kWh	46.08kWh	51.20kWh	56.32kWh
Battery system rated voltage	409.6Vd.c.	460.8Vd.c.	512.0Vd.c.	563.2Vd.c.
Battery system rated current	66 A			
Battery system voltage range	320V - 467.2Vd.c	360V - 525.6Vd.c	400V - 584.0Vd.c	440V - 642.4Vd.c
PV Side Parameter				
PV side voltage range	150 V - 850 Vd.c. (full power above 500 Vd.c.)			
DC maximum current	4*40A			
DC maximum power	80 kW			
MPPT quantity	4			
AC Side Parameters				
Rated output power	40kW			
Rated grid voltage	3L / N / PE, 230 / 400Va.c.			
Maximum output current	60.8A			
Allowable grid voltage range	230 V - 400 Va.c.			
Rated grid frequency	50Hz / 60Hz			
Power factor	-1~1			
System Parameter				
Dimension (W×D×H)	740×1040×2330 mm			
Weight	904kg	948kg	992kg	1036kg
Operating temperature	-30°C~+55°C			
Relative humidity	0~95% (No condensation)			
Maximum working altitude	3000 m (> 2000 m Derating)			
Ingress protection rating	IP55			
Heat dissipation method	Forced air cooling			

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Clause	Requirement – Test	Result – Remark	Verdict

4	GENERAL TESTING REQUIREMENTS		P
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	Ambient environmental condition compliance.	P
4.2.2.2	State of equipment	Test carried on a complete EUT.	P
4.2.2.3	Position of equipment	The equipment was installed in accordance with the manufacturer's instructions.	P
4.2.2.4	Accessories	Accessories and operator-interchangeable parts available from, or recommended by the manufacturer according to the installation manual required.	P
4.2.2.5	Covers and removable parts	No covers or parts, which can be removed without using a TOOL.	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	The least favorable loading conditions was considered. Until steady condition was established.	P
4.2.2.9	Earthing terminals	Connection to the earth	P
4.2.2.10	Controls	Any position was set.	P

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Clause	Requirement – Test	Result – Remark	Verdict
4.2.2.11	Available short circuit current	Considered.	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
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 below.	P
4.4.4.1	Component fault tests	(see appended table 4.4)	P
4.4.4.2	Equipment or parts for short-term or intermittent operation	Continuous operation equipment.	N/A
4.4.4.3	Motors		P
4.4.4.4	Transformer short circuit tests		N/A
4.4.4.5	Output short circuit	(see appended table 4.4)	P
4.4.4.6	Backfeed current test for equipment with more than one source of supply	Considered	P
4.4.4.7	Output overload	(see appended table 4.4)	P
4.4.4.8	Cooling system failure		P
4.4.4.9	Heating devices	No heating devices used.	N/A
4.4.4.10	Safety interlock systems	No safety interlock device used.	N/A
4.4.4.11	Reverse d.c. connections	(see appended table 4.4)	P
4.4.4.12	Voltage selector mismatch	No voltage selector used.	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
4.4.4.13	Mis-wiring with incorrect phase sequence or polarity		P
4.4.4.14	Printed wiring board short-circuit test		N/A
4.5	Humidity preconditioning	(see appended table 7.5)	P
4.5.1	General		P
4.5.2	Conditions	Humidity: 93%RH Temperature: 40°C Duration: 48hrs	P
4.6	Backfeed voltage protection	Hazardous voltage and energy was not present on the terminals, with the DC mains supply source de-energized or disconnected. In addition the symbol 13 of Table C.1 was marked for servicing functions	P
4.6.1	Backfeed tests under normal conditions	Relay or Contactor is available at AC output side to prevent back-feed current from AC to DC side.	P
4.6.2	Backfeed tests under single-fault conditions	Relay or contactor is available at AC output side and with auto disconnected device at DC input side to prevent backfeed current from AC to DC side, even if under single-fault conditions.	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
5	MARKING AND DOCUMENTATION		P
5.1	Marking		P
5.1.1	General		P
	Equipment shall bear markings as specified in 5.1 and 5.2	The marking label is on the outer surface of the enclosure.	P
	Graphic symbols may be used and shall be in accordance with Annex C or IEC 60417 as applicable.	All used graphic symbols are in accordance with Annex C.	P

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Clause	Requirement – Test	Result – Remark	Verdict
	Graphic symbols shall be explained in the documentation provided with the PCE.	The explanations are provided in the user manual.	P
5.1.2	Durability of markings	The labels were subjected to the permanence of marking	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	After this test there was no damage to the labels. The marking on the labels did not fade. There was no curling or lifting of the label's edges.	P
5.1.3	Identification		P
	The equipment shall, as a minimum, be permanently marked with:	See below.	P
	a) the name or trade mark of the manufacturer or supplier	See copy of marking plate.	P
	b) model number, name or other means to identify the equipment	See above.	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.	See above.	P
5.1.4	Equipment ratings		P
	Unless otherwise specified in another part of IEC 62109, the following ratings, as applicable shall be marked on the equipment:	See below	P
	– input voltage, type of voltage (a.c. or d.c.), frequency, and max. continuous current for each input	See model list.	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	See above.	P
	– the ingress protection (IP) rating as in 6.3 below	See clause 6.3	P
5.1.5	Fuse identification		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		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	necessary, the type shall also be indicated		
	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.	Relevant symbol, indicator or information are available.	P
	Push-buttons and actuators of emergency stop devices, and indicator lamps used only to indicate a warning of danger or the need for urgent action shall be coloured red.	No such device.	N/A
	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.		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	The “+” and “-” marking provided adjacent to the PV input connectors.	P
	– a pictorial representation illustrating the proper polarity where the correct polarity can be unambiguously determined from the representation	No pictorial representation illustration used.	N/A
5.1.6.1	Protective Conductor Terminals		P
	The means of connection for the protective earthing conductor shall be marked with:		P
	– symbol 7 of Annex C; or	Symbol 7 of Table C.1 marked adjacent to the PE terminal.	P
	– the letters “PE”; or	See above.	N/A
	– the colour coding green-yellow.		P
5.1.7	Switches and circuit-breakers		P

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Clause	Requirement – Test	Result – Remark	Verdict
	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.	The letter “ON” and “OFF” is clearly marked.	P
5.1.8	Class II Equipment	Class I Equipment.	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.	See above.	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	See above.	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 compartment, there shall be a marking, visible beside the terminal before connection, of either:	Not used.	N/A
	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,	No such symbols.	N/A

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	shall have a depth or raised height of at least 0,5 mm.		
	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		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		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.	External inverter considered	P
5.2.2.3	Coolant		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:	Not used.	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.	Marked with Symbol 21 of Table C.1 and the time to discharge capacitors to safe voltage and energy levels accompany the symbol.	P
5.2.2.5	Motor guarding		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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	No such hazard.	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.	Marked with symbol 13 of Annex C and explain in user manual.	P
	The symbol shall be located on the outside of the unit or shall be prominently visible behind any cover giving access to hazardous parts.	See above.	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:	All related informations provided in the user's maunal.	P
	a) explanations of equipment makings, including symbols used		P
	b) location and function of terminals and controls		P

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Clause	Requirement – Test	Result – Remark	Verdict
	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		P
	– WET LOCATIONS classification for the intended external environment as per 6.1		P
	– POLLUTION DEGREE classification for the intended external environment as per 6.2		P
	– INGRESS PROTECTION rating as per 6.3		P
	– Ambient temperature and relative humidity ratings		P
	– MAXIMUM altitude rating		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;		P
	d) a warning that when the photovoltaic array is exposed to light, it supplies a d.c. voltage to the PCE		P
5.3.1.1	Language		P
	Instructions related to safety shall be in a language that is acceptable in the country where the equipment is to be installed.	Instruction related to safety is in English.	P
5.3.1.2	Format		P
	In general, the documentation must be provided in printed form and is to be delivered with the equipment.	The printed form is available and is delivered with the PCE.	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.	See above.	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	All below related informations provided in the user's manual.	P

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Clause	Requirement – Test	Result – Remark	Verdict
	installation or commissioning of the equipment. The information provided shall include:		
	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;	No hazardous sound level.	P
	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;		P
	i) tightening torque to be applied to wiring terminals;		P
	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;	No backfeed current available.	P
	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;	RCMU built in PCE.	P
	m) instructions for protective earthing, including the information required by 7.3.6.3.7 if a second protective earthing conductor is to be		P

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Clause	Requirement – Test	Result – Remark	Verdict
	installed:		
	n) where required by 7.3.8, the installation instructions shall include the following or equivalent wording:		P
	“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.”		P
	o) for PCE intended to charge batteries, the battery nominal voltage rating, size, and type		P
	p) PV array configuration information, such as ratings, whether the array is to be grounded or floating, any external protection devices needed, etc.		P
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:	All related information provided in the user's manual.	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
	– 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:	All related information provided in the service manual.	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

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Clause	Requirement – Test	Result – Remark	Verdict
	– Instructions for accessing operator access areas, if any are present, including a warning not to enter other areas of the equipment;		P
	– Part numbers and instructions for obtaining any required operator replaceable parts;		P
	– Instructions for safe cleaning (if recommended)		P
	– 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		P
	Where required by 14.8.5, the documentation shall include the applicable items from the following list of instructions regarding maintenance of batteries:		P
	– Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions		P
	– When replacing batteries, replace with the same type and number of batteries or battery packs		P
	– General instructions regarding removal and installation of batteries		P
	– CAUTION: Do not dispose of batteries in a fire. The batteries may explode.		P
	– CAUTION: Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.		P
	– CAUTION: A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:		P
	a) Remove watches, rings, or other metal objects.		P
	b) Use tools with insulated handles.		P
	c) Wear rubber gloves and boots.		P
	d) Do not lay tools or metal parts on top of batteries		P

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Clause	Requirement – Test	Result – Remark	Verdict
	e) Disconnect charging source prior to connecting or disconnecting battery terminals		P
	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).		P
6	ENVIRONMENTAL REQUIREMENTS AND CONDITIONS		P
	The manufacturer shall rate the PCE for the following environmental conditions:		P
	– ENVIRONMENTAL CATEGORY, as in 6.1 below		P
	– Suitability for WET LOCATIONS or not		P
	– POLLUTION DEGREE rating in 6.2 below		P
	– INGRESS PROTECTION (IP) rating, as in 6.3 below		P
	– Ultraviolet (UV) exposure rating, as in 6.4 below		P
	– Ambient temperature and relative humidity ratings, as in 6.5 below		P
6.1	Environmental categories and minimum environmental conditions		P
6.1.1	Outdoor	For outdoor use.	P
6.1.2	Indoor, unconditioned	See above.	N/A
6.1.3	Indoor, conditioned	See above.	N/A
6.2	Pollution degree	PD 2 (inside), PD 3 (outside)	P
6.3	Ingress Protection	IP55	P
6.4	UV exposure	The shelter is considered necessary for outdoor use. Anti-UV approved AC and DC connectors provided.	P
6.5	Temperature and humidity	Specified by manufacturer.	P
7	PROTECTION AGAINST ELECTRIC SHOCK AND ENERGY HAZARDS		P
7.1	General	The proper construction of PCE is available for protection against shock and energy hazards during	P

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Clause	Requirement – Test	Result – Remark	Verdict
		installation, operation and maintenance under normal and single fault conditions.	
7.2	Fault conditions	See subclause 4.4.	P
7.3	Protection against electric shock		P
7.3.1	General	Each circuit under evaluation is compliance.	P
7.3.2	Decisive voltage classification		P
7.3.2.1	Use of decisive voltage class (DVC)	See below	P
7.3.2.2	Limits of DVC (according table 6)	See subclause 7.3.2.1.	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)	For circuits evaluation information of PCE, refer to brief description of general product information on previous pages.	P
7.3.2.5	Connection to PELV and SELV circuits	DVC-A is classified for communication circuits.	P
7.3.2.6	Working voltage and DVC	See subclause 7.3.2.4.	P
7.3.2.6.1	General	See above.	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	For protective separation evaluation information of PCE, refer to brief description of general product information on previous pages.	P
	Protective separation shall be achieved by:		P
	double or reinforced insulation, or		P
	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		P
	protective impedance comprising limitation of current per 7.3.5.3 and of discharged energy		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	per 7.3.5.4, or		
	▪ limitation of voltage according to 7.3.5.4.		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	Protection against electric shock by means of earthed metal enclosure. Any access to touch live parts is impossible.	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).	See subclause 7.3.2.4.	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.		N/A
7.3.4.2	Protection by means of enclosures and barriers	Protection against electric shock by means of earthed metal enclosure.	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.		P
7.3.4.2.1	General		P
	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).		P
	Polymeric materials used to meet these requirements shall also meet the requirements of 13.6		N/A
7.3.4.2.2	Access probe criteria	Considered.	P

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	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	Considered.	P
	b) decisive voltage classification B, (DVC B) - the probe must not touch bare live parts	No DVC-B in the PCE	N/A
	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,	Considered.	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	Live parts are enclosed by the earthed metal enclosure and no openings.	P
	b) Tests with the test finger (Figure D.1) and test pin (Figure D.2) of OE, 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.	It is not possible to touch the hazardous live parts by the test finger and test pin.	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 equipment, is tested with access to the equipment limited according to the method of mounting detailed in the installation instructions.	Not intended for built-in or rack mounting.	N/A
	c) Openings preventing the entry of the jointed test finger (Figure E-1 of OE) during test b)	No openings.	N/A

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	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.		
	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.	No openings.	N/A
7.3.4.2.4	Service access areas	It is not allowed to remove the cover during installation and maintenance when PCE is energized.	P
7.3.4.3	Protection by means of insulation of live parts	See subclause 7.3.2, 7.3.3 and 7.3.4.1.	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		P
7.3.5.1	General	See below.	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:		P
	– is of decisive voltage class A and complies with 7.3.5.2, or	Only DCV-A classified circuit can be touched directly, see also 7.3.5.2.	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		P

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	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.		
	Conformity is checked by visual inspection and trial insertion.		P
7.3.5.2	Protection using decisive voltage class A	Comm. port is considered as DVC-A which can be accessible and separated from DVC-C by double or reinforced insulation.	P
7.3.5.3	Protection by means of protective impedance	This method not considered.	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 normal and single fault conditions. Refer to figure 8.		N/A
7.3.5.4	Protection by means of limited voltages	This method not considered.	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

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	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)	The PCE is defined as protective class I.	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 earthing metal enclosure is complied with Protective class I.	P
	That part of a PCE meets the requirements of 7.3.6.4 is defined as protective class II.	The circuit of communication is complied with Protective class II for accessible communication ports.	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.		P
7.3.6.2	Insulation between live parts and accessible conductive parts	See subclaus 7.3.2.3, 7.3.7.4 and 7.3.7.5.	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 7.3.7.5	The clearances specified in 7.3.7.4 and creepage specified in 7.3.7.5 are complied.	P
7.3.6.3	Protective class I – Protective bonding and earthing		P

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Clause	Requirement – Test	Result – Remark	Verdict
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:	Suitable protective bonding provided.	P
	a) accessible conductive parts that are protected by one of the measures in 7.3.5.2 to 7.3.5.4, or	DVC-A classified circuit is considered.	P
	b) accessible conductive parts are separated from live parts of DVC-B or -C using double or reinforced insulation.	Communication circuits are separated from live parts used double or reinforced insulation.	P
7.3.6.3.2	Requirements for protective bonding	The cross-section of the protective bonding conductor is the same as that for the external protective earthing conductor.	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;	The connection of external protective earthing conductor is direct metal contact via a terminal with screw.	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;	Protective earthing terminal used.	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.		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.		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		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	has been investigated as suitable for protective bonding purposes.		
7.3.6.3.3	Rating of protective bonding	See below.	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 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.	Suitable protective bonding used.	P
	Protective bonding shall meet following requirements:	See below.	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 Ω 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.	Sub table 7.3.6.3.3	N/A
	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.		P
	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		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	provided overcurrent device.		
	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 but the measurement of the voltage drop is made only from the main protective earthing terminal to the accessible part required to be earthed.		P
	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		N/A
	The test current, duration of the test and acceptance criteria are as follows:		N/A
	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 Ω .		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.		N/A
	c) During and after the test, there shall be no melting, loosening, or other damage that would impair the effectiveness of the		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	protective bonding means.		
	The test current is derived from an a.c or d.c supply source, the output of which is not earthed.		N/A
	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 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.		N/A
7.3.6.3.4	Protective bonding impedance (routine test)		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:	The alternative of sub clause 7.3.6.3.5 was considered.	N/A
	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:		N/A
	the test duration may be reduced to no less than 2 s		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.	The external protective earthing conductor crosssectional is designed as half of phase conductors with same material. Related statement specified in manual.	P
	If the external protective earthing conductor is routed through a plug and socket or similar		P

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Clause	Requirement – Test	Result – Remark	Verdict
	means of disconnection, it shall not be possible to disconnect it unless power is simultaneously removed from the part to be protected.		
	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
	2,5 mm² if mechanical protection is provided;		N/A
	4 mm² if mechanical protection is not provided.	Related statement specified in user manual.	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.		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
	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. 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. A separate means of connection shall be provided for each external protective earthing conductor. 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.	The external protective earthing terminal block consist of other live conducts as AC connector for connecting PCE to the mains. Corrosion-resistant is considered for connection and bonding points. Separated earthing terminal be provided for protective earthing conductor was specified in user manual.	P
	The means of connection for the protective earthing conductor shall be permanently marked with:		P
	symbol 7 of Annex C; or	With the symbol 7 of Table C.1.	P
	the colour coding green-yellow	The color coding of Green – yellow recommended.	P

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Clause	Requirement – Test	Result – Remark	Verdict
	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)	N/A
	For all other PCE, one or more of the following measure shall be applied, unless the touch current 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.	See appended table 7.5.4. In addition, the caution symbol 15 of Table C.1 provided on PCE and in manual.	P
	a) Permanently connected wiring, and:		N/A
	a cross-section of the protective earthing conductor of at least 10 mm² Cu or 16 mm² Al; or		N/A
	automatic disconnection of the supply in case of discontinuity of the protective earthing conductor; or		N/A
	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		N/A
	b) Connection with an industrial connector according to IEC 60309 and a minimum protective earthing conductor cross-section of 2,5 mm ² 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		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	current requirements apply to the maximum number of the PCEs to be connected in parallel, unless one of the measures in 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	PCE is designed for protective class I.	N/A
	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:		N/A
	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 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;		N/A
	metal-encased equipment of protective class II may have provision on its enclosure for the connection of an equipotential bonding conductor;		N/A
	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;		N/A
	equipment employing protective class II shall be marked according to 5.1.8.		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

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Clause	Requirement – Test	Result – Remark	Verdict
	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
	pollution degree	(see appended table 7.3.7.1.1)	P
	overvoltage category	(see appended table 7.3.7.1.2)	P
	supply earthing system	(see appended table 7.3.7.1.3)	P
	insulation voltage	(see appended table 7.3.7.1.4)	P
	location of insulation		P
	type of insulation		P
	Compliance of insulation, creepage distances, and clearance distances, shall be verified by measurement or visual inspection, and the tests of 7.5.		P
7.3.7.1.3	Supply earthing systems	For TN system.	P
	Three basic types of earthing system are described in IEC 60364-1. They are:		P
	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.		P
	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;		N/A
	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.		N/A
7.3.7.1.4	Insulation voltages	PV supply circuits: 4000V (VMAX PV: 850Vd.c.) AC mains circuits: 4000V	P

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Clause	Requirement – Test	Result – Remark	Verdict
		(Rated: 230Va.c.) Other circuits: 4000V (Rated: 230Va.c.)	
	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	Considered.	P
7.3.7.2.2	Circuits connected directly to the mains	Clearances and solid insulation required according to the impulse voltage, temporary overvoltage, or working voltage, whichever gives the most severe requirement.	P
7.3.7.2.3	Circuits other than mains circuits	Clearances and solid insulation required according to the impulse voltage and recurring peak voltage.	P
7.3.7.2.4	Insulation between circuits	Clearances and solid insulation according to the higher impulse voltages. Creepages according to the higher r.m.s. working voltage.	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	The max. insulation / impulse voltage: 4000V.	P
7.3.7.4.2	Electric field homogeneity	Not considered.	N/A
7.3.7.4.3	Clearance to conductive enclosures	Refer to subclause 7.3.7.4.1 and 13.7.	P
7.3.7.5	Creepage distances	(see appended table 7.3.7)	P
7.3.7.5.1	General		P
7.3.7.5.2	Voltage		P
7.3.7.5.3	Materials	Insulating material group IIIb 175 > CTI ≥ 100 assumed.	P
7.3.7.6	Coating	Not used.	N/A
7.3.7.7	PWB spacings for functional insulating	Comply with 7.3.7.4 and 7.3.7.5.	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
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	Passed the impulse withstand voltage and a.c. or d.c. voltage tests. See appended table 7.5.1, 7.5.2 & 7.5.3. Note: No double or reinforced solid insulation used. No voltage stress on the insulation is greater than 1 kV/mm.	P
7.3.7.8.2.2	Functional insulation	Not used.	N/A
7.3.7.8.3	Thin sheet or tape material	See below.	P
7.3.7.8.3.1	General		P
7.3.7.8.3.2	Material thickness not less than 0,2 mm		P
7.3.7.8.3.3	Material thickness less than 0,2 mm		P
7.3.7.8.3.4	Compliance	See subclause 7.3.7.8.3.2.	P
7.3.7.8.4	Printed wiring boards		P
7.3.7.8.4.1	General	Insulation between conductor layers in double-sided singlelayer PWBs meet the requirements of 7.3.7.8.1. Basic, supplementary, double and reinforced insulation meet the appropriate requirements of 7.3.7.8.2.1 or 7.3.7.8.2.2. Functional insulation in PWBs meet the requirements of 7.3.7.8.2.3.	P
7.3.7.8.4.2	Use of coating materials	No coating material used.	N/A
7.3.7.8.5	Wound components	No such wound components.	N/A
7.3.7.8.6	Potting materials	No potting materials used.	N/A
7.3.7.9	Insulation requirements above 30 kHz	Considered.	P
7.3.8	Residual Current-operated protective (RCD) or monitoring (RCM) device compatibility	Built-in RCM unit within the PCE.	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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.	Under normal and single-fault conditions, the resulting d.c. component of the current in the protective earthing conductor does not exceed the d.c. current withstand requirements in IEC 60755 and IEC 62020 for RCD and RCM of type B.	N/A
7.3.9	Capacitor discharge	(see appended table 7.3.9)	P
7.3.9.1	Operator access area		N/A
	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.		N/A
7.3.9.2	Service access areas		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.	The warning symbol 21 of Table C.1 and an indication of the discharge time is placed in a clearly visible position on the protective barrier to avoid unconsciousness contact.	P
7.4	Protection against energy hazards		P
7.4.1	Determination of hazardous energy level	There is no risk of energy hazard in operator access areas, protection of electrical shock by means of earthed metal enclosure.	P
	A hazardous energy level is considered to exist if		P
	a) The voltage is 2 V or more, and power available after 60 s exceeds 240 VA.		P
	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: $E = 0,5 CU^2$		P
7.4.2	Operator Access Areas		P
	Equipment shall be so designed that there is no risk of energy hazard in operator access areas from accessible circuits.	All hazardous energy parts were enclosed within the earthed metal enclosure.	P
7.4.3	Services Access Areas		P

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Clause	Requirement – Test	Result – Remark	Verdict
7.5	Electrical tests related to shock hazard	(see appended table 7.5)	P
7.5.1	Impulse voltage test (type test)	See appended table 7.5.1. During the test no puncture, flashover, or sparkover occurs.	P
7.5.2	Voltage test (dielectric strength test)	See below.	P
7.5.2.1	Purpose of test		P
7.5.2.2	Value and type of test voltage	(see appended table 7.5.2)	P
7.5.2.3	Humidity pre-conditioning	PCE is intended for WET LOCATIONS use.	P
7.5.2.4	Performing the voltage test	Refer to appended table 7.5.2.	P
7.5.2.5	Duration of the a.c. or d.c. voltage test	The full voltage is maintained for 60s.	P
7.5.2.6	Verification of the a.c. or d.c. voltage test	No electrical breakdown occurs during the test.	P
7.5.3	Partial discharge test	No double or reinforced solid insulation used. No voltage stress on the insulation is greater than 1 kV/mm.	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.	See above.	P
7.5.5	Equipment with multiple sources of supply		N/A
8	PROTECTION AGAINST MECHANICAL HAZARDS		P
8.1	General		P
	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.	Edges, projections, corners, openings, guards, handles and the like, that are accessible to the OPERATOR are smooth and rounded.	P
	Conformity is checked as specified in 8.2 to 8.6.		P

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Clause	Requirement – Test	Result – Remark	Verdict
8.2	Moving parts		N/A
	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.		N/A
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.	Barrier and the marking of symbol 15 of Table C.1 is provided for service persons.	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.		N/A
8.4	Provisions for lifting and carrying		N/A
	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.		N/A
	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.		N/A
8.5	Wall mounting		N/A
	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.		N/A
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 of a fault.	No such parts.	N/A
9	PROTECTION AGAINST FIRE HAZARDS		P
9.1	Resistance to fire		P
	This subclause specifies requirements intended to reduce the risk of ignition and the spread of flame,	Suitable and appropriate materials, components and	P

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Clause	Requirement – Test	Result – Remark	Verdict
	both within the equipment and to the outside, by the appropriate use of materials and components and by suitable construction.	construction are used to reduce the risk of ignition and the spread of flame.	
9.1.1	Reducing the risk of ignition and spread of flame		P
	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.		P
9.1.2	Conditions for a fire enclosure		P
	A FIRE ENCLOSURE is required for equipment or parts of equipment for which Method 2 is not fully applied and complied with.	A FIRE ENCLOSURE is required for equipment or parts of equipment.	P
9.1.2.1	Parts requiring a fire enclosure		P
	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:		P
	– components in PRIMARY CIRCUITS		P
	– components in SECONDARY CIRCUITS supplied by power sources which exceed the limits for a LIMITED POWER SOURCE as specified in 9.2;		P
	– 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;		P
	– 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;		P
	– components having unenclosed arcing parts, such as open switch and relay contacts and commutators, in a circuit at HAZARDOUS VOLTAGE or at a HAZARDOUS ENERGY LEVEL; and		P
	– insulated wiring, except as permitted in 9.1.2.2.		P

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Clause	Requirement – Test	Result – Remark	Verdict
9.1.2.2	Parts not requiring a fire enclosure	See above.	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.	Metal enclosure provided.	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.	Metal enclosure provided.	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.	Flammability CLASS HB or better used.	P
9.1.3.4	Materials for components and other parts inside fire enclosures	Flammability CLASS HB or better used.	P
9.1.3.5	Materials for air filter assemblies	No such materials.	N/A
9.1.4	Openings in fire enclosures		N/A
9.1.4.1	General	No openings in fire enclosures.	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	See above.	N/A
9.1.4.3	Openings in the bottom of a fire enclosure	See above.	N/A
	The bottom of a FIRE ENCLOSURE or individual barriers, shall provide protection against emission		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	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.		
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	PCE not for 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.	No overcurrent hazards was presented by short circuits and overloads tests. Refer to sub-clause 4.4.4.	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.		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 which it is used, the installation instructions shall specify that an upstream protective device, rated for the prospective short-circuit current of	Upstream protective device for backup protection is specified in the installation manual.	P

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Clause	Requirement – Test	Result – Remark	Verdict
	that port, shall be used to provide backup protection.		
10	PROTECTION AGAINST SONIC PRESSURE HAZARDS		P
10.1	General		P
	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.		P
10.2	Sonic pressure and Sound level		P
10.2.1	Hazardous Noise Levels	Sound pressure level is lower than 80dB.	P
11	PROTECTION AGAINST LIQUID HAZARDS		N/A
11.1	Liquid Containment, Pressure and Leakage	No liquid contained in this system, and energy storage battery used.	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
12	CHEMICAL HAZARDS		N/A
12.1	General	No chemical Hazards.	N/A
13	PHYSICAL REQUIREMENTS		P
13.1	Handles and manual controls		P
	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	It shall not be possible to fix them in wrong position if this might result in a hazard.	P

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Clause	Requirement – Test	Result – Remark	Verdict
	components, it shall not be possible to fix them in a wrong position if this might result in hazard.		
13.1.1	Adjustable controls	No such controls.	N/A
13.2	Securing of parts	Screws, nuts, washers, springs or similar parts are secured so as to withstand mechanical stresses occurring	P
13.3	Provisions for external connections		P
13.3.1	General	Appropriate provisions for external connections applied.	P
13.3.2	Connection to an a.c. Mains supply		P
13.3.2.1	General	Terminals provided for permanent connection to the PV supply.	P
	For safe and reliable connection to a MAINS supply, equipment shall be provided with one of the following:		P
	– terminals or leads or a non-detachable power supply cord for permanent connection to the supply; or		P
	– 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		N/A
	– 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	A set of terminals as specified in 13.3.3 for external connection of supply cords.	P
13.3.2.3	Appliance inlets		N/A
13.3.2.4	Power supply cord	Not provided, but technical requirements provided in user manual.	N/A
13.3.2.5	Cord anchorages and strain relief	No power supply cords provided.	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		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	are relieved from strain; and		
	– the outer covering of the cord is protected from abrasion.		N/A
13.3.2.6	Protection against mechanical damage	No power supply cords provided, however plastic inlet bushings provided ready for use.	N/A
13.3.3	Wiring terminals for connection of external conductors		P
13.3.3.1	Wiring terminals	Terminals for power supply cords connection by means of screws.	P
13.3.3.2	Screw terminals	Screws and nuts which clamp external supply conductors have a thread conforming to ISO 261 or ISO 262.	P
13.3.3.3	Wiring terminal sizes	The terminals meet the temperature rise test of 4.3 when connected using wire sizes as specified in the documentation or in Table 24.	P
13.3.3.4	Wiring terminal design	Lug terminals applied, and the cable lug clamped by nut.	P
13.3.3.5	Grouping of wiring terminals	Terminals located in proximity to each other.	P
13.3.3.6	Stranded wire	Lug terminals applied.	P
13.3.4	Supply wiring space	Lug terminals applied, and the cable lug is clamped by nut without the risk of damage to the conductors or their insulation.	P
13.3.5	Wire bending space for wires 10 mm ² and greater	Considered.	P
13.3.6	Disconnection from supply sources	Disconnect devices provided.	P
13.3.7	Connectors, plugs and sockets	The misconnection is unlikely for PV or DC connectors.	P
13.3.8	Direct plug-in equipment	Not direct plug-in use.	N/A
13.4	Internal wiring and connections		P
13.4.1	General	The insulation, conductors and routing of all wires of the equipment is suitable for the	P

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		electrical, mechanical, thermal and environmental conditions of use.	
13.4.2	Routing	Wires are routed away from sharp edges, screw threads, burrs, fins, moving parts, drawers, and similar parts, which could abrade the wire insulation.	P
13.4.3	Colour coding	The green/yellow color coding wire only used for protective earthing conductor.	P
13.4.4	Splices and connections	All splices and connections are mechanically adequate secure and provided electrical continuity. The likelihood of loose is impossible.	P
13.4.5	Interconnections between parts of the PCE	The communication cable only used for servicing, no any physical damage or mechanical damage likely.	P
13.5	Openings in enclosures	Not opening in metal enclosure.	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	See below.	P
13.6.1.1	Thermal index or capability	Appropriate electrical, mechanical, thermal and flammability degree polymeric materials provided.	P
13.6.2	Polymers serving as enclosures or barriers preventing access to hazards	Metal enclosure used.	N/A
13.6.2.1	Stress relief test	See above.	N/A
13.6.3	Polymers serving as solid insulation	See below.	P
13.6.3.1	Resistance to arcing		P
13.6.4	UV resistance	Metal enclosure provided.	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Polymeric parts of an OUTDOOR ENCLOSURE required for compliance with this standard shall be sufficiently resistance to degradation by ultra-violet (UV) radiation		N/A
13.7	Mechanical resistance to deflection, impact, or drop		P
13.7.1	General	See below.	P
13.7.2	250-N deflection test for metal enclosures	A steady force of 250 N applied for 5 s, after test no hazards occurred.	P
13.7.3	7-J impact test for polymeric enclosures	Impact test applied on the display screen cover.	P
13.7.4	Drop test	Not for hand - held, direct plug - in, or transportable equipment.	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		P
14	COMPONENTS		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		P

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Clause	Requirement – Test	Result – Remark	Verdict
	of the applicable IEC standard, provided that the component has been approved to the non-IEC standard by a recognized testing authority.		
	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 previously certified to the applicable component safety standard shall be subjected to the voltage test of 7.5.2 as routine test.		P
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	Approved overtemperature protective devices used and for which appropriate rating was selected for use and do not operate in normal use. For overtemperature protection test or evaluation see appended table 4.4.4.	P
14.4	Fuse holders	Fuse holders with fuses are not intended to be replaceable by an OPERATOR.	N/A
14.5	MAINS voltage selecting devices	No such 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.	PCB materials with a flammability classification of V-1 or better used.	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

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Clause	Requirement – Test	Result – Remark	Verdict
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.	No such components.	N/A
14.8	Batteries		P
	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.		P
14.8.1	Battery Enclosure Ventilation		N/A
14.8.1.1	Ventilation requirements		N/A
14.8.1.2	Ventilation testing		N/A
14.8.1.3	Ventilation instructions		N/A
14.8.2	Battery Mounting		P
	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.		P
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		P
	Reverse battery connection of the terminals shall		P

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Clause	Requirement – Test	Result – Remark	Verdict
	be prevented if reverse connection could result in a hazard within the meaning of this Standard		
14.8.5	Battery maintenance instructions		P
	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.		P
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	Single fault safe compliance. Failures evaluation and risk analysis were performed by means of fault simulation or single fault conditions. (refer to subclause of 4.4.4).	P

4.2.2.6/4.7 a)			TABLE: electrical data (in normal conditions) (Model: E-MATE 50-61-A)									P
PV input			Battery output			AC Grid output			AC load output			
U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	
Condition A: PV supply power to BAT												
600.6	85.8	51.6	644.1	77.8	50.1	--	--	--	--	--	--	--
723.1	71.3	51.6	654.6	76.4	50.0	--	--	--	--	--	--	--
839.3	61.3	51.5	661.9	75.4	49.9	--	--	--	--	--	--	--
Condition B: PV supply power to AC Grid												
604.0	85.3	51.5	--	--	--	230.4	71.0	49.0	--	--	--	--
727.8	70.8	51.5	--	--	--	230.4	71.0	49.0	--	--	--	--
847.0	61.0	51.6	--	--	--	230.4	71.2	49.2	--	--	--	--
Condition C: PV supply power to AC load												
606.2	84.9	51.4	--	--	--	--	--	--	228.4	72.1	49.4	--
724.2	72.2	52.3	--	--	--	--	--	--	228.3	72.3	49.5	--
846.2	60.9	51.5	--	--	--	--	--	--	228.4	72.3	49.5	--
Condition D: BAT to AC Grid												
--	--	--	616.6	75.4	46.5	207.4	71.6	44.6	--	--	--	--
--	--	--	614.3	83.6	51.3	230.5	71.1	49.1	--	--	--	--
--	--	--	614.5	83.5	51.3	252.8	65.3	49.5	--	--	--	--
Condition E: BAT to AC Load												
--	--	--	609.2	85.2	51.9	--	--	--	228.4	72.3	49.5	--
Condition F: AC Grid to BAT												
--	--	--	664.8	66.6	44.3	207.9	74.2	46.3	--	--	--	--
--	--	--	666.7	73.8	49.2	229.3	74.5	51.2	--	--	--	--
--	--	--	667.2	75.1	50.1	252.4	68.6	52.0	--	--	--	--
Supplementary information:												

4.2.2.6/4.7 b) TABLE: electrical data (in normal conditions) (Model: E-MATE 29.9-61-A)											
PV input			Battery output			AC Grid output			AC load output		
U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]
Condition A: PV supply power to BAT											
600.6	85.8	51.6	644.1	77.8	50.1	--	--	--	--	--	--
723.1	71.3	51.6	654.6	76.4	50.0	--	--	--	--	--	--
839.3	61.3	51.5	661.9	75.4	49.9	--	--	--	--	--	--
Condition B: PV supply power to AC Grid											
588.7	48.2	28.4	--	--	--	236.7	115.0	27.2	--	--	--
715.2	40.9	29.2	--	--	--	235.5	119.4	28.1	--	--	--
839.8	35.2	29.6	--	--	--	235.3	120.8	28.4	--	--	--
Condition C: PV supply power to AC load											
590.6	62.3	36.8	--	--	--	--	--	--	239.4	149.3	35.7
715.2	50.5	36.1	--	--	--	--	--	--	239.6	149.4	35.8
837.3	44.9	37.6	--	--	--	--	--	--	242.2	150.9	36.5
Condition D: BAT to AC Grid											
--	--	--	615.9	49.0	30.17	237.4	125.1	29.6	--	--	--
Condition E: BAT to AC Load											
--	--	--	624.4	50.0	31.22	--	--	--	236.5	126.9	30.00
Condition F: AC Grid to BAT											
--	--	--	638.7	45.0	28.7	239.5	125.2	29.6	--	--	--
Supplementary information:											

4.2.2.6/4.7 c)			TABLE: electrical data (in normal conditions) (Model: E-MATE 30-61-A)								
PV input			Battery output			AC Grid output			AC load output		
U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]
Condition A: PV supply power to BAT											
600.6	85.8	51.6	644.1	77.8	50.1	--	--	--	--	--	--
723.1	71.3	51.6	654.6	76.4	50.0	--	--	--	--	--	--
839.3	61.3	51.5	661.9	75.4	49.9	--	--	--	--	--	--
Condition B: PV supply power to AC Grid											
590.1	49.7	29.4	--	--	--	235.6	119.2	28.1	--	--	--
718.0	40.8	29.3	--	--	--	235.6	119.4	28.1	--	--	--
839.7	35.4	29.6	--	--	--	235.7	120.9	28.4	--	--	--
Condition C: PV supply power to AC load											
600.7	57.4	34.5	--	--	--	--	--	--	237.4	143.5	34.0
719.1	48.1	34.6	--	--	--	--	--	--	237.5	143.4	34.0
839.8	40.8	34.3	--	--	--	--	--	--	237.0	143.1	33.9
Condition D: BAT to AC Grid											
--	--	--	614.1	50.0	30.7	237.7	127.2	30.2	--	--	--
Condition E: BAT to AC Load											
--	--	--	622.3	51.0	31.74	--	--	--	236.7	127.8	30.2
Condition F: AC Grid to BAT											
--	--	--	641.5	46.0	29.51	239.7	127.4	30.5	--	--	--
Supplementary information:											

4.2.2.6/4.7 d)			TABLE: electrical data (in normal conditions) (Model: E-MATE 37.5-61-A)								
PV input			Battery output			AC Grid output			AC load output		
U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]
Condition A: PV supply power to BAT											
600.6	85.8	51.6	644.1	77.8	50.1	--	--	--	--	--	--
723.1	71.3	51.6	654.6	76.4	50.0	--	--	--	--	--	--
839.3	61.3	51.5	661.9	75.4	49.9	--	--	--	--	--	--
Condition B: PV supply power to AC Grid											
590.2	61.1	36.0	--	--	--	235.8	146.8	34.5	--	--	--
716.1	52.4	37.3	--	--	--	236.4	154.6	36.4	--	--	--
838.2	44.9	37.5	--	--	--	235.4	153.8	36.1	--	--	--
Condition C: PV supply power to AC load											
590.9	69.4	41.0	--	--	--	--	--	--	237.2	170.0	40.3
717.5	57.0	40.9	--	--	--	--	--	--	237.5	170.1	40.3
839.8	48.7	40.9	--	--	--	--	--	--	237.7	170.3	40.4
Condition D: BAT to AC Grid											
--	--	--	609.8	63.0	38.4	238.7	158.6	37.7	--	--	--
Condition E: BAT to AC Load											
--	--	--	619.5	63.0	39.0	--	--	--	236.4	159.3	37.6
Condition F: AC Grid to BAT											
--	--	--	646.9	56.0	36.2	239.8	157.5	37.6	--	--	--
Supplementary information:											

4.2.2.6/4.7 e)			TABLE: electrical data (in normal conditions) (Model: E-MATE 40-61-A)									
PV input			Battery output			AC Grid output			AC load output			
U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	U [V]	I [A]	P[kW]	
Condition A: PV supply power to BAT												
600.6	85.8	51.6	644.1	77.8	50.1	--	--	--	--	--	--	
723.1	71.3	51.6	654.6	76.4	50.0	--	--	--	--	--	--	
839.3	61.3	51.5	661.9	75.4	49.9	--	--	--	--	--	--	
Condition B: PV supply power to AC Grid												
590.6	65.0	38.2	--	--	--	235.9	155.9	36.7	--	--	--	
716.3	54.5	38.9	--	--	--	236.8	158.86	37.5	--	--	--	
839.8	47.0	39.4	--	--	--	237.0	162.9	38.5	--	--	--	
Condition C: PV supply power to AC load												
587.5	73.5	43.2	--	--	--	--	--	--	237.9	179.6	42.7	
715.0	60.1	43.0	--	--	--	--	--	--	236.9	178.8	42.3	
838.4	51.4	43.1	--	--	--	--	--	--	236.8	178.7	42.3	
Condition D: BAT to AC Grid												
--	--	--	607.0	67.0	40.67	239.7	167.3	40.0	--	--	--	
Condition E: BAT to AC Load												
--	--	--	618.0	68.0	42.0	--	--	--	236.1	170.0	40.1	
Condition F: AC Grid to BAT												
--	--	--	648.1	61.0	39.5	239.5	171.8	41.0	--	--	--	
Supplementary information:												

4.3 a)	TABLE: Heating Test				P
	test voltage (V)	See Supplementary information			—
	Ambient temperature t1 (°C)	See below			—
	Ambient temperature t2 (°C)	See below			—
temperature rise dT of part/at:		T (°C)			
Test Condition:		Test 1	Test 2	Test 3	Test 4
High voltage box					
DC+ copper bar insulation sleeve	55.4	55.7	58.8	57.6	90
DC+ contactor	62.8	63.8	62.9	64.0	95
DC+ fuse	55.8	56.6	60.2	58.9	90
DC Hall	56.7	57.8	59.4	58.8	/
Main circuit breaker	55.3	55.5	59.1	58.0	85
DC MCB switch	55.5	55.5	58.5	57.5	85
Control circuit fuse	55.3	55.6	58.4	57.9	90
DC-AC Switching Power Supply Shell	60.1	61.6	60.6	61.3	/
Anti reverse module	56.2	57.7	58.9	59.4	/
DC-DC Switching Power Supply Module	57.7	59.1	59.3	60.4	/
Pre charging contactor	56.0	57.2	59.2	58.6	85
Pre charge resistor	55.6	55.9	58.6	58.0	/
Control box casing	56.9	58.2	59.4	59.9	70
Relay K1	57.7	59.3	63.6	63.2	85
Transformer T5	63.7	65.1	66.6	66.9	110
Capacitor C5	64.8	66.2	66.6	67.4	105
Chip U16	61.9	63.3	64.0	64.6	125
Chip U21	62.0	63.4	63.8	64.6	125
Battery compartment					
High voltage box circuit breaker handle	55.6	55.1	58.1	57.2	85
High voltage box MCB switch	55.5	55.0	58.0	57.3	85
High voltage box button	55.2	55.8	58.3	57.5	85
High voltage box handle	55.1	55.4	58.1	57.1	85
High voltage box communication terminal	55.2	55.7	58.2	57.6	85
Positive terminal of high-voltage box	55.1	55.8	58.6	57.4	85
High voltage box casing	55.3	56.0	58.7	57.8	70
Water immersion sensor	55.2	55.5	58.6	57.2	/
PDU circuit breaker	55.5	56.2	59.1	57.9	85
Battery case	55.4	56.0	58.8	57.9	70
Battery handle	55.3	55.9	58.8	57.6	85
Positive terminal of battery	55.7	55.7	59.1	58.1	85
Fire extinguishing equipment	55.8	55.9	58.9	58.0	/
Detector	56.9	58.1	59.9	58.9	/
Explosion proof valve fan	55.9	56.5	59.8	58.2	/
Smoke detector	56.0	56.7	60.0	58.3	/
Battery compartment lighting	60.7	61.1	64.9	64.2	/
Temperature detector	56.3	57.4	57.6	58.7	/

Display	56.7	57.6	59.2	61.3	85
Door handle	61.7	56.8	59.4	58.4	70
Air conditioner casing	56.0	56.6	59.9	58.1	70
Emergency stop switch	56.1	56.6	58.8	58.0	85
Explosion proof valve	62.3	53.9	56.2	58.5	/
Front of the whole machine	59.6	59.8	61.9	62.3	70
Side of the whole machine	56.9	56.1	57.8	58.4	70
Inverter					
PCS front	63.8	64.9	65.2	66.1	70
PCS back	56.3	56.1	60.5	57.7	70
PV knob	60.7	60.6	62.2	62.3	85
Bluetooth terminal	63.1	62.8	64.3	64.9	85
PV terminal	63.4	62.2	64.9	64.3	85
The buttons below the PCS screen	69.6	69.7	70.8	72.1	95
Power Distribution Box					
Door handle	55.2	56.2	56.9	56.7	70
Front	55.6	56.8	57.4	57.9	70
LOAD circuit breaker	55.8	56.4	64.7	64.7	85
Load live wire	56.5	57.1	70.8	71.1	105
Battery adapter terminal	56.4	57.3	57.9	58.1	85
Battery positive wire	56.1	57.1	57.9	57.8	105
Power grid circuit breaker	57.9	58.5	57.5	57.4	85
Power grid live line	62.4	63.0	57.9	58.2	105
Hall sensor	57.7	58.4	58.0	58.3	/
Ambient	55.0	55.0	55.0	55.0	/
Test Condition:					
	Test 5	Test 6	Test 7	Test 8	--
High voltage box					
DC+ copper bar insulation sleeve	58.6	63.2	58.9	61.5	90
DC+ contactor	67.3	72.2	68.3	69.3	95
DC+ fuse	71.6	78.6	77.3	78.0	90
DC Hall	59.1	62.9	60.7	63.6	/
Main circuit breaker	59.0	63.3	60.4	61.5	85
DC MCB switch	55.8	59.0	55.3	61.2	85
Control circuit fuse	59.6	62.3	58.7	66.0	90
DC-AC Switching Power Supply Shell	69.4	72.1	68.1	62.1	/
Anti reverse module	60.9	63.8	60.0	68.2	/
DC-DC Switching Power Supply Module	59.6	62.6	58.5	68.7	/
Pre charging contactor	58.6	62.0	57.6	63.3	85
Pre charge resistor	56.2	59.2	55.3	61.5	/
Control box casing	59.9	63.0	59.0	64.5	70
Relay K1	59.2	62.3	59.1	63.0	85
Transformer T5	65.5	68.2	64.6	70.7	110
Capacitor C5	67.4	70.5	66.2	71.8	105
Chip U16	64.4	67.4	63.3	68.6	125
Chip U21	64.7	67.7	63.5	68.6	125
Battery compartment					
High voltage box circuit breaker handle	55.6	58.1	55.1	61.3	85
High voltage box MCB switch	55.6	58.0	55.1	60.9	85
High voltage box button	56.0	58.6	55.4	61.2	85

High voltage box handle	56.0	58.5	55.4	61.2	85
High voltage box communication terminal	56.1	58.7	55.3	61.1	85
Positive terminal of high-voltage box	56.7	59.8	56.2	61.5	85
High voltage box casing	56.3	59.1	55.7	61.5	70
Water immersion sensor	56.0	58.4	55.6	61.3	/
PDU circuit breaker	56.6	59.5	56.0	61.9	85
Battery case	55.6	58.1	55.0	62.1	70
Battery handle	55.8	58.4	55.3	62.1	85
Positive terminal of battery	58.2	61.7	58.4	61.9	85
Fire extinguishing equipment	55.2	57.7	55.5	61.8	/
Detector	56.3	58.7	56.6	62.7	/
Explosion proof valve fan	57.0	60.0	56.5	62.6	/
Smoke detector	57.2	60.3	56.7	62.7	/
Battery compartment lighting	63.0	63.2	58.7	62.8	/
Temperature detector	55.7	58.1	55.8	62.3	/
Display	56.6	59.4	58.3	63.3	85
Door handle	56.8	57.8	56.3	60.0	70
Air conditioner casing	56.0	58.4	55.6	62.5	70
Emergency stop switch	56.4	57.7	56.1	60.4	85
Explosion proof valve	56.3	55.8	57.4	58.3	/
Front of the whole machine	65.9	63.6	66.1	68.5	70
Side of the whole machine	56.4	57.3	58.8	60.4	70
Inverter					
PCS front	59.9	61.4	61.2	66.4	70
PCS back	56.2	57.2	58.8	61.2	70
PV knob	59.1	60.8	58.9	63.0	85
Bluetooth terminal	60.4	61.3	60.1	64.4	85
PV terminal	61.8	62.5	57.7	63.4	85
The buttons below the PCS screen	63.0	64.6	64.0	72.2	95
Power Distribution Box					
Door handle	55.9	55.1	56.5	57.2	70
Front	55.3	55.6	56.2	58.2	70
LOAD circuit breaker	55.1	56.1	56.2	63.9	85
Load live wire	55.5	56.8	56.4	70.5	105
Battery adapter terminal	57.2	58.4	58.4	60.6	85
Battery positive wire	59.9	61.6	61.8	63.8	105
Power grid circuit breaker	55.1	55.8	57.6	57.7	85
Power grid live line	55.5	56.2	61.6	58.3	105
Hall sensor	55.5	56.4	57.6	58.4	/
Ambient	55.0	55.0	55.0	55.0	/
Test Condition:					
	Test 9	--	--	--	--
High voltage box					
DC+ copper bar insulation sleeve	63.0	--	--	--	90
DC+ contactor	72.4	--	--	--	95
DC+ fuse	76.5	--	--	--	90
DC Hall	63.2	--	--	--	/
Main circuit breaker	63.3	--	--	--	85
DC MCB switch	59.2	--	--	--	85
Control circuit fuse	62.8	--	--	--	90
DC-AC Switching Power Supply	72.6	--	--	--	/

Shell					
Anti reverse module	64.0	--	--	--	/
DC-DC Switching Power Supply Module	63.0	--	--	--	/
Pre charging contactor	62.5	--	--	--	85
Pre charge resistor	59.4	--	--	--	/
Control box casing	63.5	--	--	--	70
Relay K1	63.1	--	--	--	85
Transformer T5	68.5	--	--	--	110
Capacitor C5	71.2	--	--	--	105
Chip U16	67.9	--	--	--	125
Chip U21	68.2	--	--	--	125
Battery compartment					
High voltage box circuit breaker handle	58.2	--	--	--	85
High voltage box MCB switch	58.0	--	--	--	85
High voltage box button	58.7	--	--	--	85
High voltage box handle	58.6	--	--	--	85
High voltage box communication terminal	58.9	--	--	--	85
Positive terminal of high-voltage box	60.0	--	--	--	85
High voltage box casing	59.3	--	--	--	70
Water immersion sensor	58.6	--	--	--	/
PDU circuit breaker	59.6	--	--	--	85
Battery case	59.0	--	--	--	70
Battery handle	59.1	--	--	--	85
Positive terminal of battery	60.3	--	--	--	85
Fire extinguishing equipment	58.5	--	--	--	/
Detector	59.3	--	--	--	/
Explosion proof valve fan	60.1	--	--	--	/
Smoke detector	60.3	--	--	--	/
Battery compartment lighting	64.3	--	--	--	/
Temperature detector	58.5	--	--	--	/
Display	59.1	--	--	--	85
Door handle	59.6	--	--	--	70
Air conditioner casing	59.7	--	--	--	70
Emergency stop switch	57.9	--	--	--	85
Explosion proof valve	64.9	--	--	--	/
Front of the whole machine	65.1	--	--	--	70
Side of the whole machine	59.0	--	--	--	70
Inverter					
PCS front	60.6	--	--	--	70
PCS back	57.5	--	--	--	70
PV knob	58.5	--	--	--	85
Bluetooth terminal	60.4	--	--	--	85
PV terminal	58.4	--	--	--	85
The buttons below the PCS screen	64.4	--	--	--	95
Power Distribution Box					
Door handle	55.8	--	--	--	70
Front	56.3	--	--	--	70
LOAD circuit breaker	56.9	--	--	--	85
Load live wire	57.3	--	--	--	105

Battery adapter terminal	58.9	--	--	--	85
Battery positive wire	61.5	--	--	--	105
Power grid circuit breaker	58.3	--	--	--	85
Power grid live line	62.8	--	--	--	105
Hall sensor	58.4	--	--	--	/
Ambient	55.0	--	--	--	/
Supplementary information:					
Test 1 PV supply power to AC Grid: PV 600Vdc, AC 230Vac, operated at 55°C at its maximum output power.					
Test 2 PV supply power to AC Grid: PV 850Vdc, AC 230Vac, operated at 55°C at its maximum output power.					
Test 3 PV supply power to AC Load: PV 600Vdc, AC 230Vac, operated at 55°C at its maximum output power.					
Test 4 PV supply power to AC Load: PV 850Vdc, AC 230Vac, operated at 55°C at its maximum output power.					
Test 5 PV supply power to BAT: PV 600Vdc, BAT Charge, operated at 55°C at its maximum output power.					
Test 6 PV supply power to BAT: PV 850Vdc, BAT Charge, operated at 55°C at its maximum output power.					
Test 7 BAT to AC Grid: BAT Discharge, AC 230Vac, operated at 55°C at its maximum output power.					
Test 8 BAT to AC Load: BAT Discharge, AC 230Vac, operated at 55°C at its maximum output power.					
Test 9 AC Grid to BAT: AC 230Vac, BAT Charge, operated at 55°C at its maximum output power.					
TABLE: Heating test, resistance method					N/A
Test voltage (V)			--	—	
Ambient, t₁ (°C)			--	—	
Ambient, t₂ (°C)			--	—	
Temperature rise of winding	R₁ (Ω)	R₂ (Ω)	ΔT (K)	Max. dT (K)	Insulation class
--	--	--	--	--	--

4.4		TABLE: fault condition tests						P
		ambient temperature (°C): 25°C					—	
No.	component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result	
1	AC output	Overload	Refer to above table	Steady condition	-	-	EUT protection, exit inverter status. No components damage. No hazard.	
2	DC+ to DC-	Reverse	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT can't start up. No output power feed into grid. No hazard	
3	Output L1 to N	SC	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT can't start up. No output power feed into grid. No hazard	
4	Output L2 to N	SC	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT can't start up. No output power feed into grid. No hazard	
5	Output L3 to N	SC	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT can't start up. No output power feed into grid. No hazard	
6	Output L1 to L2	Reverse	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT can't start up. No output power feed into grid. No hazard	
7	Output L1 to L3	Reverse	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT can't start up. No output power feed into grid. No hazard	
8	Output L2 to L3	Reverse	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT can't start up. No output power feed into grid. No hazard	
9	DC+ to DC -	SC	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT stop operation immediately after short-circuit. No backfeed current observed to PV side. No output power feed into grid. No components damage, no hazard.	
10	BAT+ to BAT -	SC	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT stop operation immediately after short-circuit. No backfeed current observed to PV side. No output power feed into grid. No components damage, no hazard.	

11	BAT+ to BAT -	Reverse	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT stop operation immediately after short-circuit. No backfeed current observed to PV side. No output power feed into grid. No components damage, no hazard.
12	Output	L1-Phase mis-wiring grid connection	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT can't start up. No output power feed into grid. No hazard
13	Output	L2-Phase mis-wiring grid connection	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT can't start up. No output power feed into grid. No hazard
14	Output	L3-Phase mis-wiring grid connection	PV: 850Vdc AC output: 400Vac	10min	-	-	EUT can't start up. No output power feed into grid. No hazard

Supplementary information:

Note 1: Pass the dielectric strength test of basic insulation test voltage for accessible DVC-A, reinforced or double Insulation and basic insulation in protective class I equipment.

Note 2: The equipment was placed on white tissue-paper covering a softwood surface and covering the equipment with cheesecloth during the fault testing, no emission of molten metal, burning insulation, or flaming or glowing particles from the fire enclosure, and there was no charring, glowing, or flaming of the cheesecloth.

Note 3: No other hazard (e.g. chemical, expulsion) observed after each test, SC=Short circuit, OC=Open circuit, OV=Over voltage, OL=Over load.

7.3.6.3.3	TABLE: protective equipotential bonding				N/A
Measured between:		Test current (A)	Voltage drop (V)	Resistance (mΩ)	result
--		--	--	--	--
supplementary information					

7.3.6.3.7	TABLE: touch current measurement			P
Measured between:		Measured (mA)	Limit (mA)	Comments/conditions
PE and enclosure		AC 2.14	AC 3.5 / DC 10	PE disconnected
PE and communication circuit		AC 1.12	AC 3.5 / DC 10	PE disconnected
Supplementary information:				

7.3.7	TABLE: clearance and creepage distance measurements						P
clearance cl and creepage distance dcr at / of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)	
High voltage box:							
BAT input positive to BAT input negative: BI	4000	850Vdc 230Vac	3.5	10.2	10.0	10.2	
BAT input positive to enclosure: BI	4000	850Vdc 230Vac	3.5	12.9	10.0	14.9	
BAT input negative to enclosure: BI	4000	850Vdc 230Vac	3.5	12.8	10.0	14.9	
BAT output positive to BAT output negative: BI	4000	850Vdc 230Vac	3.5	19.0	10.0	32.6	
BAT output positive to enclosure: BI	4000	850Vdc 230Vac	3.5	18.1	10.0	18.1	
BAT output negative to enclosure: BI	4000	850Vdc 230Vac	3.5	18.2	10.0	18.2	
Transformer T5 Primary to Secondary: BI	4000	850Vdc 230Vac	3.5	11.2	5.0	11.2	
Transformer T6 Primary to Secondary: BI	4000	850Vdc 230Vac	3.5	6.6	5.0	6.6	
Optocoupler U15 Primary to Secondary: BI	4000	850Vdc 230Vac	3.5	8.3	5.0	8.3	
Note(s): F=functional insulation, BI=basic insulation, S=supplementary insulation, R=reinforced insulation. When determine the clearance: For battery and PV circuits: Overvoltage category II applied. For AC GRID / load circuits (connected to AC mains): Overvoltage Category III applied Interpolation is used, operating altitude is 3000m max. For the internal of the PCB board, pollution II was considered. Requirement about creepage distances for the distance to the metal enclosure come from columns 7 and 8 of Table 14. Requirement about creepage distances for other parts come from column 3 of table 14. PCB with min. CTI 175 used.							

7.3.7	TABLE: distance through insulation measurement				
distance through insulation di at/of:	U r.m.s. (V)	test voltage (V)	required di (mm)	di (mm)	
Bobbin in transformer ¹⁾ (BI)	850Vdc/230Vac	2120	Certificated	Certificated	
Opto-coupler ¹⁾ (RI)	850Vdc/230Vac	4240	Certificated	Certificated	
Note(s): ¹⁾ Certificated components.					

7.5	TABLE: electric strength measurements, impulse voltage test and partial discharge test				P
test voltage applied between:	test voltage (V)	impulse withstand voltage (V)	partial discharge extinction voltage (V)	result	
PV to metal PE (BI)	2120DC	5250	--	Pass	
AC GRID to metal PE (BI)	2120DC	5250	--	Pass	
AC Load to metal PE (BI)	2120DC	5250	--	Pass	
PV to Control screen surface (RI)	4240DC	7250	--	Pass	
AC GRID to Control screen surface (BI)	4240DC	7250	--	Pass	
AC Load to Control screen surface (BI)	4240DC	7250	--	Pass	
Legend					
BI	Basic insulation	SI	Supplementary insulation		
DI	Double insulation	RI	Reinforced insulation		
FI	Functional insulation	O.V.C	Overvoltage category		

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 _{sc} (A)		VA	
			Meas.	Limit	Meas.	Limit
--	--	--	--	--	--	--
--	--	--	--	--	--	--
supplementary information:						

14	TABLE: list of critical components					P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity ¹⁾	
Metal enclosure	--	--	Min. thickness: 2.0mm	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance	
Converter Hybrid Inverter	Ginlong Technologies Co., Ltd.	1) S6-EH3P50K-H, 2) S6-EH3P40K-H, 3) S6-EH3P37.5K-H, 4) S6-EH3P30K-H, 5) S6-EH3P29.9K-H	1) S6-EH3P50K-H: AC output power: 50000W 2) S6-EH3P40K-H: AC output power: 40000W 3) S6-EH3P37.5K-H: AC output power: 37500W 4) S6-EH3P30K-H: AC output power: 30000W 5) S6-EH3P29.9K-H: AC output power: 29900W Battery voltage range: 150-800Vd.c. Max charging/discharging current: 2*70A Class I	IEC/EN 62109-1: 2010, IEC/EN 62109-2: 2011	TUV SUD report No.: 504092300 13241-02 Certificate No.: B 086470 0185 Rev. 02	
Rechargeable Li-ion Battery System	Shenzhen EEnovance Energy Technology CO.,LTD	E-MATE-BATT-1*1P16S-100-A, E-MATE-BATT-N*1P16S-100-A (N=2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17)	Battery Module: Rated Voltage: 51.2 V, Rated Capacity: 100 Ah; Battery System: Rated Voltage: n×51.2V (1≤n≤17), Rated Capacity: 100Ah	IEC 62619: 2022	SGS CB test report No.: SZES2411 00822801 CB Ref. Certif. No.: FI 63813	
Air-conditioning	Sanhe Tongfei Refrigeration Co.,Ltd.	ECA-20	2kW	EN IEC 60335-1:2023+A11: 2023	TUV Rheinland Certificate No.: AM 50580032 0001 Report No.:500805 81 004	
Temperature detector	Tianjin VSALL Intelligent Fire	VC6633	DC 9-28V, ≤50mA, red light	EN 54-5:2000+A1:2002	Certificate No.:1174b	

14	TABLE: list of critical components					P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity ¹⁾	
	Technology Co.,Ltd					
Smoke detector	Tianjin VSALL Intelligent Fire Technology Co.,Ltd	VC6623	DC 9-28V, ≤50mA, red light	EN 54-7:2000+A1:2002 +A2:2006	Certificate No.:1174a	
Aerosol extinguishing devi	Hubei Jiandun Fire Technology Co.,Ltd	QRR0.15G/S -PFK	150g	EN15004-1:2019 EN15276-1:2019 EN15276-2:2019	Certificate No.: ICR/VC/HU 240110 Report No.:HT23DR-1215333 HT23DR-1215334	
Breaker	Shanghai Liangxin Electrical Co., Ltd.	NDB1-63	AC220V 10A	EN60898-1:2003+A1+A11+A12+A13 EN60898-1:2006	Certificate No.:AN506 01856 0001 Report No.:500673 45 008	
Emergency stop	Zhejiang Chint Electrics Co., Ltd.	NP2	AC220V 4.5A	EN60947-5-1:2004+A1	Certificate No.:AN 50361757 0001 Report No.:150530 25 002	
Control screen	Zhiyuan Electronics Co., Ltd	ZPC-101Q55RTW -01	4-RE485、3-CAN、3-TCP、8DI8DO	IEC/EN 62109-1 IEC/EN 62109-2	Tested with appliance	
Reay	Zhejiang Chint Electrics Co., Ltd.	JZX-22F	Contact Loads:250V/3A Coil Voltage:24VDC	EN61810-1:2015	Certificate No.:LVD18-7670 Report No.:RZCE2 018-0461	
Fan	Delta Electronics , Inc.	PFB0824DHE(Y)	DC24V 0.93A	EN 62368-1:2014	Report No.:400127 06(5000878 -2611-0010)	
High voltage control box						
PCB	Ring PCB	RB02	V-0, 130°C	UL796	UL	

14	TABLE: list of critical components					P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity ¹⁾	
	technology Co., Limited		Min. thickness: 1.5mm	UL94	(E347858)	
Miniature circuit breaker	ProJoy Electric Co.,Ltd.	PEBS-S-80	16A/900VDC	EN 60947-2:2017+AI	TUV R 50604688 0001	
Fuse	Xi'an Sinofuse Electric Co Ltd	RS306-01	200A/1250VDC	UL 248-1	UL E353337	
Fuse	Xi'an Sinofuse Electric Co Ltd	FGB-A-3E10A	10A/690VAC	UL 248-1	UL-US-2423408-0	
Fuse base	Xi'an Sinofuse Electric Co Ltd	TSA1038-SZ	30A/800VAC	UL 4248-1	UL E493529	
Fuse	Xi'an Sinofuse Electric Co Ltd	RS308-PV	6A/1500VDC	UL 248-1	UL E493628	
DC-DC Converter	MORNSUN GUANGZHOU SCIENCE & TECHNOLOGY CO., LTD.	PV200-29B24R3	Input: 250-1500Vdc, 1.2A Max. Output: 24Vdc, 8333mA	EN 62109-1:2010	EC2023216	
AC-DC Converter	MORNSUN GUANGZHOU SCIENCE & TECHNOLOGY CO., LTD.	LM200-22B24R2-C	Input: 100-240Vac, 5A, 50/60Hz, 200-240Vac, 3A, 50/60Hz Output: 24Vdc	IEC 62368-1:2018	Ref. Certif. No.: DK-136861-UL Teat report No.: S01A22070 419S017	
High voltage connector	DEGSON TECHNOLOGY CO.,LTD	ESS-120A-25-B/S-OR-00 ESS-120A-25-B/S-BK-00	120A/1500V V0/-40℃～125℃	UL4128	UL-US-2217474-0	

14	TABLE: list of critical components					P
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity ¹⁾	
Low voltage connector	Shenzhen Xin Antai connection technology Co., Ltd	XAT-16-00851-02-01	5A/125VDC	EN IEC 61000-6-1:2019 EN IEC 61000-6-3:2021	SIT241121 560101E	
Insulating Tape	HEBEI YONGLE TAPE CO LTD	808	105°C/600VDC	UL510	UL E174965	
Lead wires (charge & discharge)	WUXI XINHONG YE WIRE & CABLE CO LTD	10269	3 AWG, VW-1, 105°C Vmax: 1000V	UL758	UL E248566	
¹⁾ an asterisk indicates a mark which assures the agreed level of surveillance						

List of test equipment used:

No,	Equipment	Internal No,	Type/ Characteristics	Last Calibration	Due Data
1	Oscilloscope	BZ-DGD-L064	MS04054B	2025/01/06	2026/01/05
2	Voltage probe	BZ-DGD-L241-1	VP5200A	2025/01/07	2026/01/06
3	Current probe	BZ-DGD-L026-1	CT6863-05	2025/01/07	2026/01/06
4	Current probe	BZ-DGD-L026-2	CT6863-05	2025/01/07	2026/01/06
5	Current probe	BZ-DGD-L026-3	CT6863-05	2025/01/07	2026/01/06
6	AC power supply	BZ-DGD-L204	WPLA-330200KVA	2024/09/10	2025/09/09
7	Two-way DC analog power supply	BZ-DGD-L002	WDGC-1000KW	2024/08/02	2025/08/01
8	Pull and push	BZ-DGD-L080	ZP-1000	2025/01/08	2026/01/07
9	Vernier Caliper	BZ-DGB-L043	(0-150) mm	2025/01/14	2026/01/13
10	Tape measure	BZ-DGB-L058	(0-5) m	2025/01/14	2026/01/13
11	Stopwatch	BZ-DGD-L217	PS-1003A	2025/01/16	2026/01/15
12	Heating Recoder	BZ-DGD-L331	34970A	2025/01/07	2026/01/06
13	IR tester	BZ-DGD-L334	CS9922ESI	2025/01/09	2026/01/08
14	Surge generator	BZ-DGE-L143-3	HIM 412	2025/01/07	2026/01/06
15	Noise meter	BZ-DGD-L029	TES-1357	2025/01/09	2026/01/08
16	Test finger	BZ-DGD-L081-2	/	2025/01/10	2026/01/09
17	Thermostat	BZ-DGB-L028	16m ³	2025/01/10	2026/01/09
18	Electronic Scale	BZ-DGB-L257	YH-T1	2024/08/02	2025/08/01
19	Temperature and humidity meter	BZ-DGD-L005	DT-322	2025/01/14	2026/01/13
20	Leakage Current Test Network	BZ-DGD-L091	/	2024/08/01	2025/07/31
21	Power Analyzer	BZ-DGD-L059	PA6000H	2024/08/08	2025/08/07
22	Ground Resistance Tester	BZ-DGD-L095	LK2678	2024/08/01	2025/07/31
23	Sand and dust chamber	BZ-KKX-L010	SC-500	2024/09/08	2025/09/07
24	Diving test device	BZ-KKX-L008	JL-122	2024/09/07	2025/09/06

-----End of report-----

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IEC 62109-1		

Attachment I

(Pictures of the EUT and Electrical Schemes)

1 PICTURES

Pictures of the unit



Front of the cabinet



Back of the cabinet

Pictures of the unit



Left of the cabinet



Right of the cabinet

Pictures of the unit



Open the front door



Internal view

Pictures of the unit



Front of Inverter



Battery pack

Pictures of the unit



Front of High voltage box

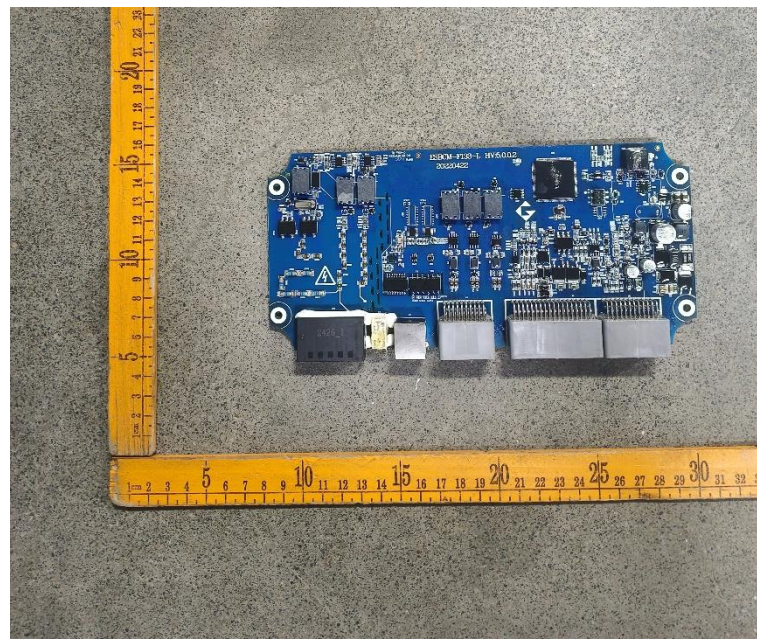


Back of High voltage box

Pictures of the unit

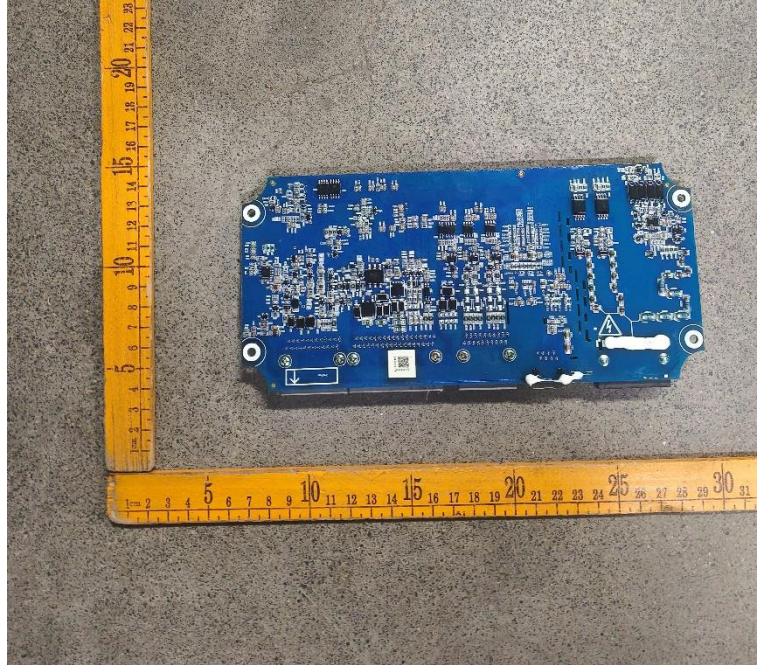


Internal of High voltage box



Front view of ESBCM board

Pictures of the unit



Back view of ESBCM board



Air conditioner

Pictures of the unit



Control screen



Air conditioner & pdu & lamp circuit breaker

Pictures of the unit



Temperature sensor



Smoke sensor

Pictures of the unit



Detector



Fire extinguishing equipment

Pictures of the unit



Relay



Fan

Pictures of the unit



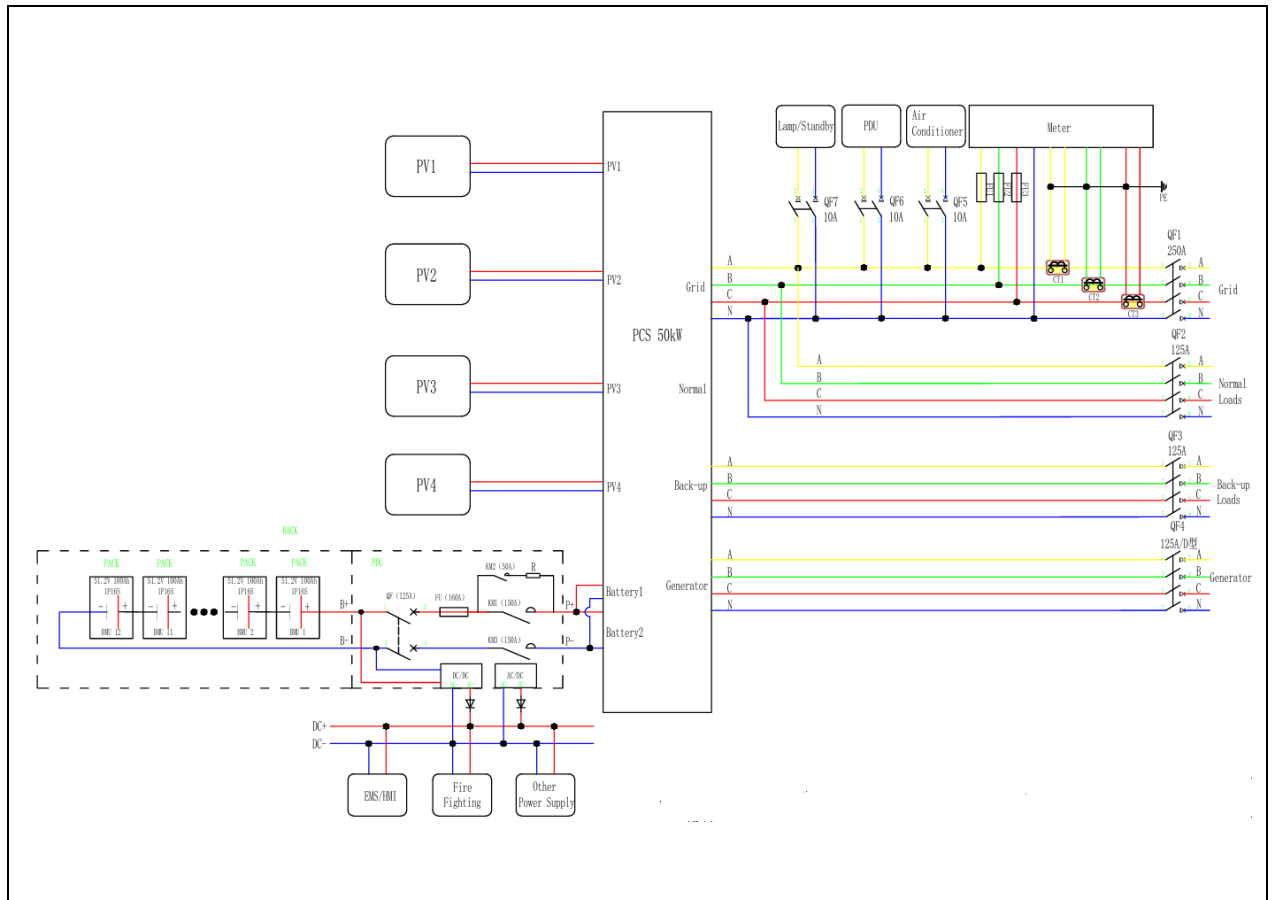
Emergency stop

Series Number

SQEC006110C418001

Serial Number

2 ELECTRICAL SCHEMES

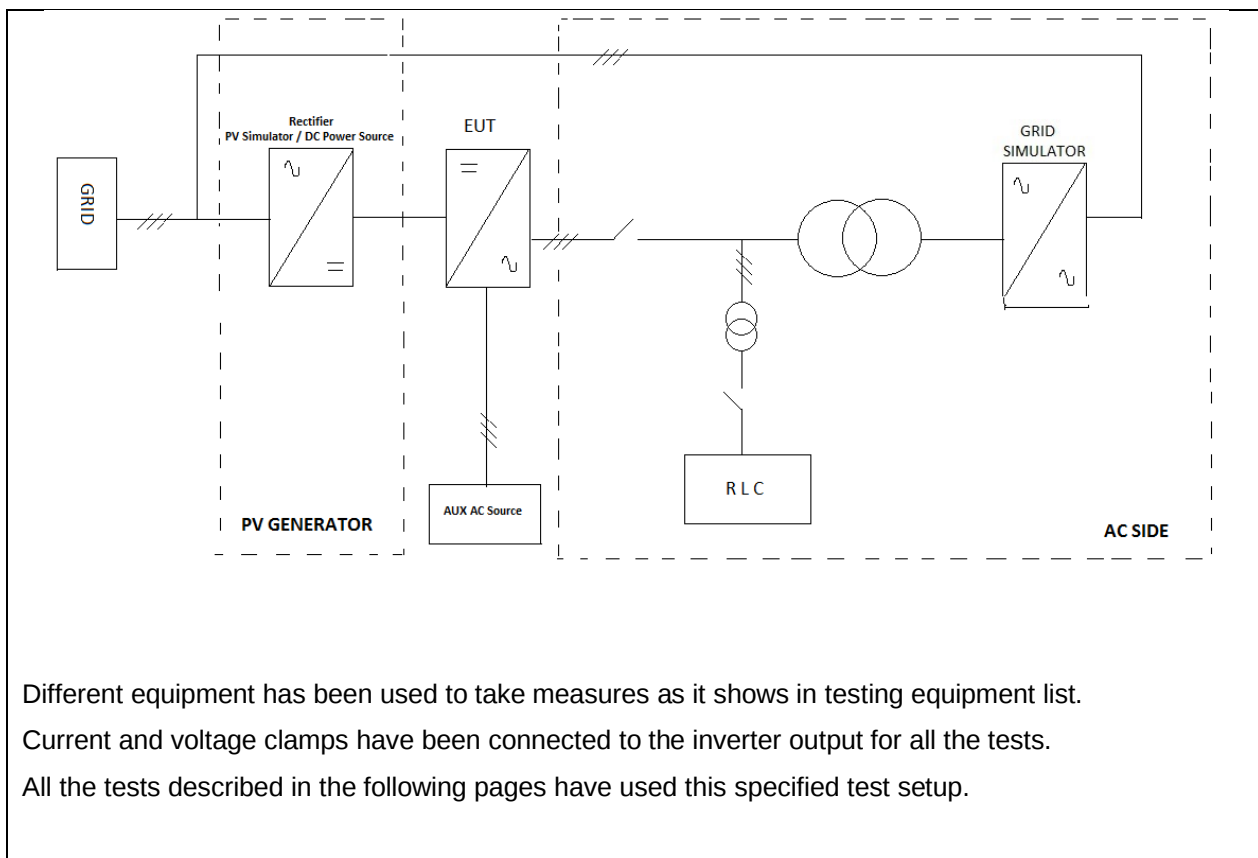


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Attachment II

(Testing information)

2.1 TESTING CIRCUIT



Different equipment has been used to take measures as it shows in testing equipment list.
 Current and voltage clamps have been connected to the inverter output for all the tests.
 All the tests described in the following pages have used this specified test setup.

2.2 MEASUREMENT UNCERTAINTY

Magnitude	Uncertainty
Voltage measurement uncertainty	±1.5 %
Current measurement uncertainty	±2.0 %
Frequency measurement uncertainty	±0.2 %
Time measurement uncertainty	±0.2 %
Power measurement uncertainty	±2.5 %
Phase Angle	±1°
Temperature	±3° C
Note1: Measurements uncertainties showed in this table are maximum allowable uncertainties. The measurement uncertainties associated with other parameters measured during the tests are in the laboratory at disposal of the solicitant.	