Test Report

REPORT NUMBER: 4789766768.2.1-S2

PROJECT NUMBER: 4789766768

Select the applicable test locations:

☒**LOCATION 1:**

UL India Private Limited,
Laboratory building, Kalyani Platina Campus, Sy.no.129/4, EPIP Zone, Phase II, Whitefield,
Bangalore – 560 066
P:91-80-41384400

☐**LOCATION 2:**

UL India Private Limited,
Oak building, Kalyani Platina Campus, Sy.No.129/4,
EPIP Zone, Phase II, Whitefield,
Bangalore, Karnataka – 560 066

☐**LOCATION 3:**

UL India Private Limited, 30/A, I Stage, Vishveshwarya Industrial Estate, Doddanekkundi Industrial Area, Bangalore - 560048

☐**Other:**

(#Refer Page no. for Test lab location)

TEST DISCIPLINE: ELECTRONICS
PRODUCT GROUP: OTHERS

General details

Customer / Applicant	Pune, Maharashtra, 411026, India		
Manufacturer	Pune, Maharashtra, 411026, India		
Program	**Others**		
Item Under Test	20 kW Hybrid PV Inverter		
Model	SH-TX-20KW-240-415		
Number of Samples	ONE(1 No)		
UL Sample Identification	Inverter- 3552335		
Manufacturer Serial Number (if any)	2012129		
Condition of IUT on receipt	Good		
Date of Receipt	23 December 2020		
Applicable Standard	IEC 61000-3-12:2011 (Second Edition)		
Date of Testing (Start date)	27 January 2021	**End Date**	27 January 2021
UL general^ ambient condition	**Temperature in °C**		23 ±5°C
	Relative humidity in %		<70 %
Date of Issue	15 March 2021		
Test In-charge	Manjunath kumbar		

Fill in the rows with information or add hyphen (-)

Aarman Dalavi	Aarman Dalavi Digitally signed by Aarman Dalavi Date: 2021.03.15 15:10:33 +05'30'	Vishnu Kumar	Vishnu Kumar Digitally signed by Vishnu Kumar Date: 2021.03.15 15:35:56 +05'30'
Engineer		Project Engineer	
Reviewed by		**Authorized signatory**	

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CIN: U74200KA1997PTC023189

Test item description..... :	Hybrid PV Inverter 20kW (Lead model), other series models: 15kW and 10kW
Trade Mark ..... :	
Manufacturer..... :	
Model/Type reference..... :	Lead model: SH-TX-20KW-240-415 Series model: SH-TX-15KW-240-415, SH-TX-10KW-240-415
Ratings ..... :	Refer the rating labels below

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
Harmonics current measurement (Clause 4,5, 7.2) **All tests performed on the Lead model 20kW and as per MNRE series guidelines the series models will be automatically covered under this testing considering the maximum rated unit is tested** **Sample no: 3552335, Serial no: 2012129**	**UL INDIA PVT LTD,** **Laboratory building, Kalyani platina campus,** **Sy.no.129/4, EPIP zone, phase II, Whitefield,** **Bangalore – 560 066**

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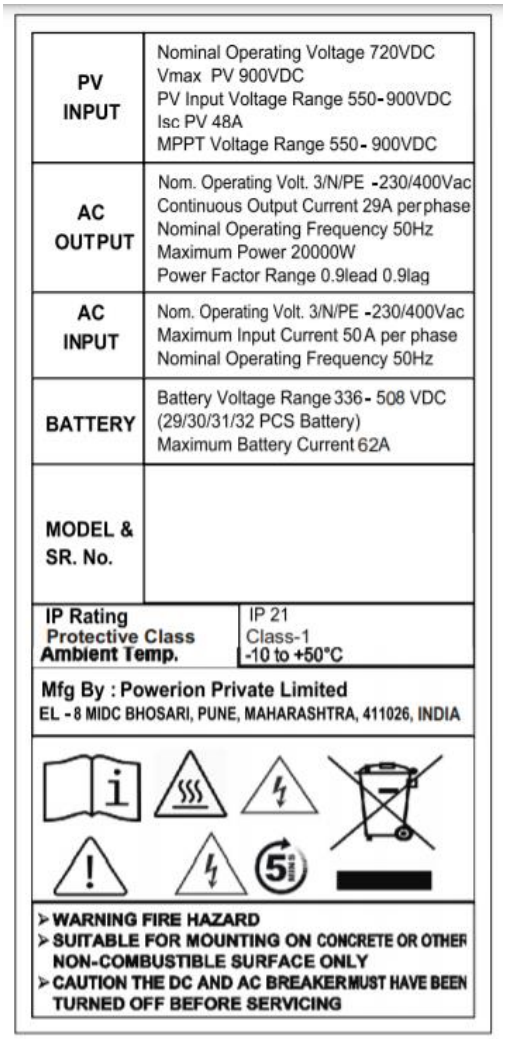
1. Testing Program Details

1.1. Equipment Marking Plate

Lead model: Hybrid 20kW PV Inverter

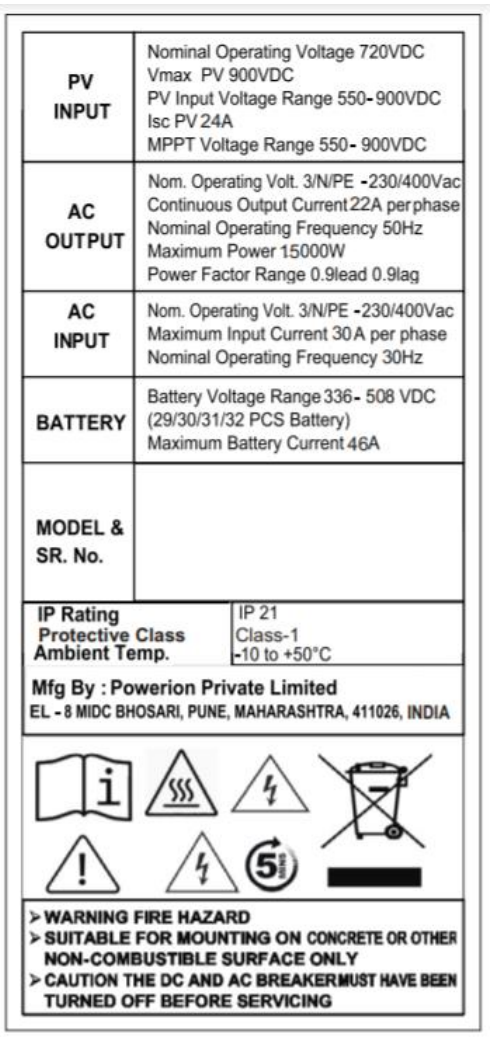


PV INPUT	Nominal Operating Voltage 720VDC Vmax PV 900VDC PV Input Voltage Range 550- 900VDC Isc PV 48A MPPT Voltage Range 550- 900VDC
AC OUTPUT	Nom. Operating Volt. 3/N/PE -230/400Vac Continuous Output Current 29A per phase Nominal Operating Frequency 50Hz Maximum Power 20000W Power Factor Range 0.9lead 0.9lag
AC INPUT	Nom. Operating Volt. 3/N/PE -230/400Vac Maximum Input Current 50A per phase Nominal Operating Frequency 50Hz
BATTERY	Battery Voltage Range 336- 508 VDC (29/30/31/32 PCS Battery) Maximum Battery Current 62A
MODEL & SR. No.	
IP Rating Protective Class Ambient Temp.	IP 21 Class-1 -10 to +50°C

Mfg By : Powerion Private Limited
EL - 8 MIDC BHOSARI, PUNE, MAHARASHTRA, 411026, INDIA

- WARNING FIRE HAZARD
- SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY
- CAUTION THE DC AND AC BREAKER MUST HAVE BEEN TURNED OFF BEFORE SERVICING

Series model: Hybrid 15kW PV Inverter



PV INPUT	Nominal Operating Voltage 720VDC Vmax PV 900VDC PV Input Voltage Range 550- 900VDC Isc PV 24A MPPT Voltage Range 550- 900VDC
AC OUTPUT	Nom. Operating Volt. 3/N/PE -230/400Vac Continuous Output Current 22A per phase Nominal Operating Frequency 50Hz Maximum Power 15000W Power Factor Range 0.9lead 0.9lag
AC INPUT	Nom. Operating Volt. 3/N/PE -230/400Vac Maximum Input Current 30A per phase Nominal Operating Frequency 30Hz
BATTERY	Battery Voltage Range 336- 508 VDC (29/30/31/32 PCS Battery) Maximum Battery Current 46A
MODEL & SR. No.	
IP Rating Protective Class Ambient Temp.	IP 21 Class-1 -10 to +50°C

Mfg By : Powerion Private Limited
EL - 8 MIDC BHOSARI, PUNE, MAHARASHTRA, 411026, INDIA

- WARNING FIRE HAZARD
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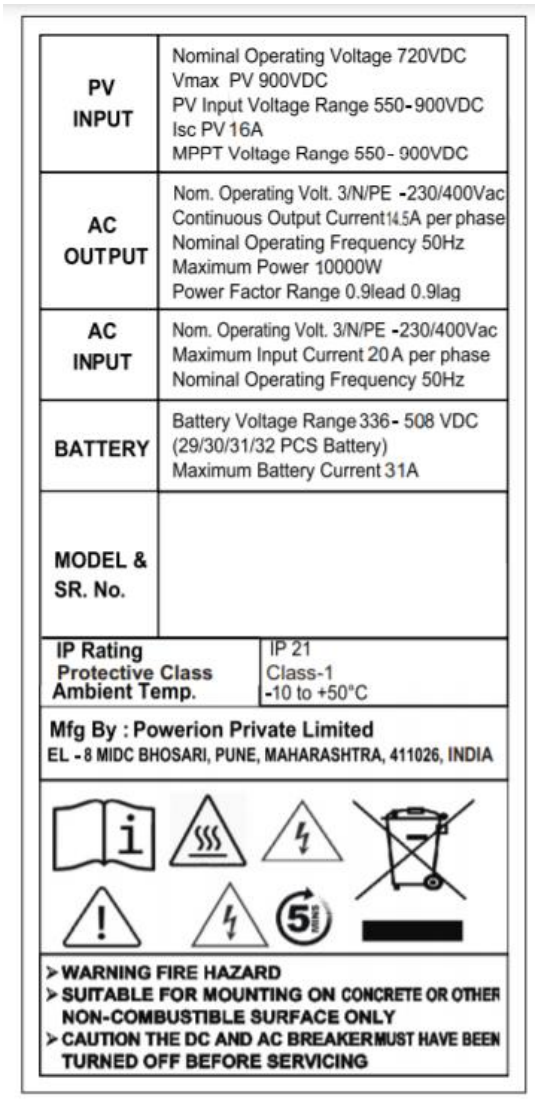
Hybrid 10kW PV Inverter



PV INPUT	Nominal Operating Voltage 720VDC Vmax PV 900VDC PV Input Voltage Range 550-900VDC Isc PV 16A MPPT Voltage Range 550 - 900VDC
AC OUTPUT	Nom. Operating Volt. 3/N/PE -230/400Vac Continuous Output Current 14.5A per phase Nominal Operating Frequency 50Hz Maximum Power 10000W Power Factor Range 0.9lead 0.9lag
AC INPUT	Nom. Operating Volt. 3/N/PE -230/400Vac Maximum Input Current 20A per phase Nominal Operating Frequency 50Hz
BATTERY	Battery Voltage Range 336 - 508 VDC (29/30/31/32 PCS Battery) Maximum Battery Current 31A
MODEL & SR. No.	
IP Rating **Protective Class** **Ambient Temp.**	IP 21 Class-1 -10 to +50°C

Mfg By : Powerion Private Limited
EL - 8 MIDC BHOSARI, PUNE, MAHARASHTRA, 411026, INDIA

- **WARNING FIRE HAZARD**
- **SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY**
- **CAUTION THE DC AND AC BREAKER MUST HAVE BEEN TURNED OFF BEFORE SERVICING**

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1.2. Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Solar Hybrid Inverter	-	SH-TX-20KW-240-415	-
AE	-	-	-	-
SIM	-	-	-	-
-	-	-	-	-
-	-	-	-	-

Note:

*** Use stands for**

EUT **- Equipment Under Test,**
AE **- Auxiliary/Associated Equipment, or**
SIM **- Simulator (Not Subjected to Test)**

1.3. EUT Operation Modes:

Mode #	Description
1	PV Input to Grid output mode
2	PV input to AC output mode
-	-
-	-
-	-
-	-

1.4. Result Summary

IEC 61000-3-12:2011			
Phenomenon	Port	Operation mode	Verdict
Harmonic current emissions	AC Mains	Mode 1	Pass
Harmonic current emissions	AC Mains	Mode 2	Pass

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2 Test Conditions and Results

2.1 Classification of equipment

Control principle used in the sample:	NA			
Professional equipment:	☒ Yes		☐ No	
Limits:	☐ Table 2	☒ Table 3	☐ Table 4	☐ Table 5
Reference current I_{ref}:	☒ Measured average value ☐ Specified by the manufacturer			29.05A

2.2 Description of the test location

Test location: NA

2.3. Photo documentation of the test set-up

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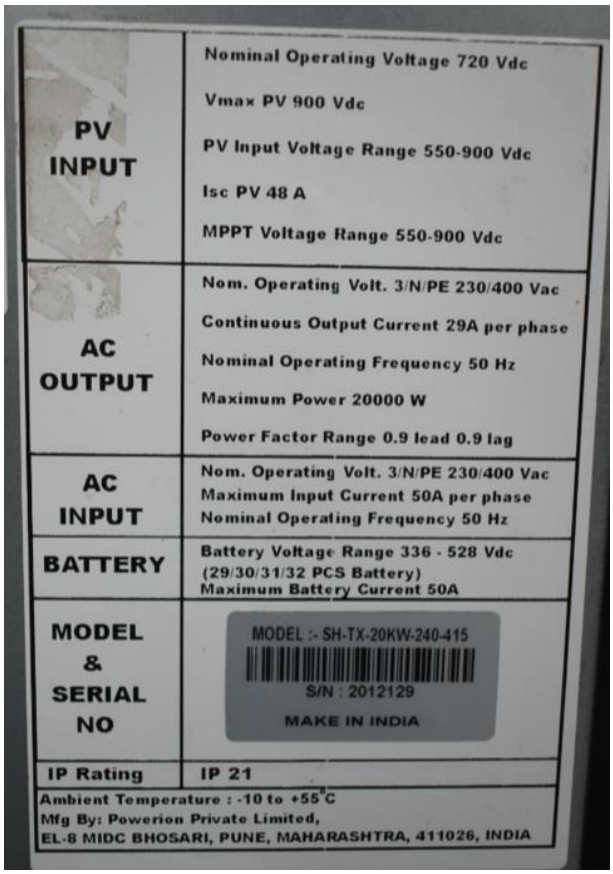
Rating Label



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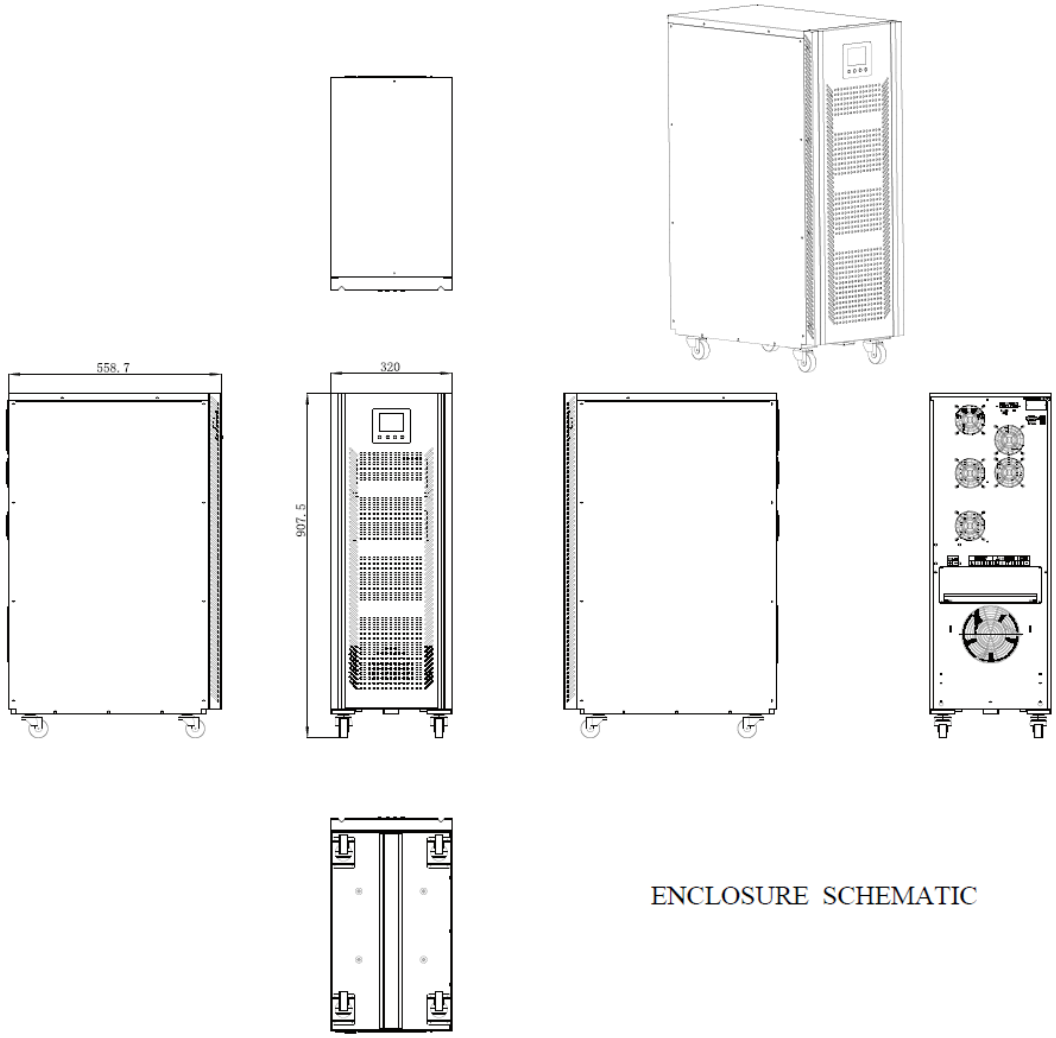
Enclosure Schematic



ENCLOSURE SCHEMATIC

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2.4 Test protocol

Parameters required prior to the test	Laboratory ambient temperature:		23 ±5°C
	Relative humidity:		<70%
	Air pressure:		NA
Operation Mode:	Operation Mode #1		
Verdict:	☒ P	☐ F	

Parameters required prior to the test	Laboratory ambient temperature:		23 ±5°C
	Relative humidity:		<70%
	Air pressure:		NA
Operation Mode:	Operation Mode #2		
Verdict:	☒ P	☐ F	

2.5 Modification during the test

NA

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2.6 Test results

Operation mode #1 (PV to Grid mode)

Order	Current Phase1 I1	Current Phase2 I2	Current Phase3 I3	Limits
	Ih/Iref in %	Ih/Iref in %	Ih/Iref in %	%
2	1.04%	0.89%	0.91%	8
3	0.45%	2.75%	1.25%	-
4	0.60%	0.61%	0.47%	4
5	2.43%	3.11%	2.58%	10.7
6	0.51%	0.59%	0.26%	2.67
7	5.63%	6.75%	5.96%	7.2
8	0.81%	0.34%	0.43%	2
9	5.35%	6.15%	5.91%	-
10	0.68%	0.33%	0.35%	1.6
11	2.91%	3.06%	3.09%	3.1
12	0.29%	0.17%	0.15%	1.33
13	0.98%	1.03%	1.07%	2
14	0.11%	0.08%	0.08%	-
15	0.40%	0.41%	0.40%	-
16	0.08%	0.05%	0.06%	-
17	0.30%	0.40%	0.35%	-
18	0.15%	0.08%	0.08%	-
19	0.31%	0.48%	0.42%	-
20	0.19%	0.07%	0.10%	-
21	0.22%	0.42%	0.38%	-
22	0.20%	0.07%	0.10%	-
23	0.34%	0.50%	0.47%	-
24	0.17%	0.07%	0.08%	-
25	0.44%	0.54%	0.56%	-
26	0.22%	0.14%	0.10%	-
27	0.30%	0.44%	0.44%	-
28	0.19%	0.12%	0.12%	-

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29	0.55%	0.66%	0.74%	-
30	0.30%	0.27%	0.21%	-
31	0.40%	0.71%	0.65%	-
32	0.16%	0.16%	0.13%	-
33	0.09%	0.14%	0.11%	-
34	0.08%	0.08%	0.07%	-
35	0.07%	0.12%	0.12%	-
36	0.06%	0.07%	0.05%	-
37	0.03%	0.04%	0.03%	-
38	0.03%	0.04%	0.03%	-
39	0.02%	0.03%	0.02%	-
40	0.03%	0.03%	0.02%	-
THC/Iref (%)	9.0%	10.7%	9.9%	13%
PWHC/Iref (%)	6.3%	8.1%	7.9%	22%

Operation mode # 2

Order	Current Phase1 I1	Current Phase2 I2	Current Phase3 I3	Limits
	Ih/Iref in %	Ih/Iref in %	Ih/Iref in %	%
2	0.31%	0.21%	0.14%	8
3	0.85%	0.80%	0.77%	-
4	0.28%	0.23%	0.14%	4
5	0.67%	0.53%	0.58%	10.7
6	0.26%	0.20%	0.15%	2.67
7	0.44%	0.45%	0.51%	7.2
8	0.22%	0.19%	0.09%	2
9	0.31%	0.32%	0.36%	-
10	0.19%	0.16%	0.06%	1.6
11	0.26%	0.26%	0.32%	3.1
12	0.19%	0.14%	0.07%	1.33
13	0.18%	0.24%	0.29%	2
14	0.20%	0.18%	0.07%	-

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15	0.15%	0.22%	0.25%	-
16	0.21%	0.20%	0.10%	-
17	0.12%	0.17%	0.24%	-
18	0.19%	0.17%	0.09%	-
19	0.09%	0.17%	0.21%	-
20	0.17%	0.16%	0.07%	-
21	0.07%	0.15%	0.17%	-
22	0.14%	0.15%	0.08%	-
23	0.05%	0.09%	0.14%	-
24	0.10%	0.12%	0.08%	-
25	0.04%	0.08%	0.09%	-
26	0.07%	0.08%	0.05%	-
27	0.03%	0.06%	0.06%	-
28	0.05%	0.07%	0.04%	-
29	0.03%	0.04%	0.06%	-
30	0.04%	0.05%	0.03%	-
31	0.03%	0.04%	0.04%	-
32	0.03%	0.04%	0.03%	-
33	0.03%	0.04%	0.04%	-
34	0.03%	0.04%	0.04%	-
35	0.03%	0.04%	0.04%	-
36	0.03%	0.03%	0.04%	-
37	0.02%	0.03%	0.03%	-
38	0.02%	0.03%	0.03%	-
39	0.02%	0.03%	0.03%	-
40	0.01%	0.03%	0.02%	-
THC/Iref (%)	1.5%	1.4%	1.4%	13%
PWHC/Iref (%)	2.2%	2.6%	2.4%	22%

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2.7 Product documentation

Equipment complying with the harmonic current emission limits corresponding to R_{sce} = 33	☒ Yes	☐ No
Calculation of the minimum value of R_{sce}:		☒ N/A
Declaration of the value of S_{sc} corresponding to the previous minimum value of R_{sce}:	kVA	☒ N/A

Statement in the instruction manual for equipment complying with the harmonic current emission limits corresponding to R_{sce} = 33

"Equipment complying with IEC 61000-3-12"

~~Statement in the instruction manual for equipment not complying with the harmonic current emission limits corresponding to R_{sce} = 33~~

~~*"This equipment complies with IEC 61000-3-12 provided that the short-circuit power Ssc is greater than or equal to xx at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power Ssc greater than or equal to xx."*~~

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2.8 List of test equipment

Inst. ID No.	Instrument Type	Function/Range	Last Cal. Date	Next Cal. Date
85358	Power Meter	65A AC/DC, 1000 V AC/DC	6-Jun-2020	5-Jun-2021
160918	Power Meter	65A AC/DC, 1000 V AC/DC	3-Jun-2020	2-Jun-2021
127222	Power Meter	65A AC/DC, 1000 V AC/DC	3-Jun-2020	2-Jun-2021
65675	Temperature & Humidity Recorder	16 -40Deg C,30-90 %RH	12-Jan-2021	12-Jan-2022
127224	Resistive Load	50kW	Support Equipment	
85704	DC Source	1000V, 100A	Support Equipment	
127226	Grid simulator	300V,42A	Support Equipment	

******End of Report******

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