TL-395

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TEST REPORT
IEC 62116
Test procedure of islanding prevention measures for utility-interconnected photovoltaic inverters

Report Number. .....:	230301065GZU-002
Date of issue .....:	04 April 2023
Total number of pages.....	21 Pages
Name of Testing Laboratory preparing the Report.....:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Applicant's name.....:	INVT Solar Technology (Shenzhen) Co., Ltd.
Address .....:	6th Floor, Block A, INVT Guangming Technology Building, Kejie Fourth Road, Shutianpu Community, Matian Guangming District, 518000 Shenzhen, PEOPLE'S REPUBLIC OF CHINA.
Test specification:	
Standard .....:	IEC 62116:2014
Test procedure .....:	Type approval
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC62116B
Test Report Form(s) Originator.....:	TÜV SÜD Product Service GmbH
Master TRF .....:	Dated 2017-11-03

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

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description :	Grid-tied Solar inverter
Trade Mark ..... :	invt
Manufacturer ..... :	Same as applicant
Model/Type reference :	iMars XG3KTL-1M, iMars XG3KTL-2M, iMars XG3.68KTL, iMars XG4KTL, iMars XG4.2KTL, iMars XG4.6KTL, iMars XG5KTL, iMars XG6KTL, iMars XG7KTL, iMars XG7KTL1, iMars XG8KTL, iMars XG8KTL1, iMars XG10KTL, iMars XG10KTL1

Ratings ..... :

Model	iMars XG3KTL-1M	iMars XG3KTL-2M	iMars XG3.68KTL	iMars XG4KTL
Max. Input voltage	600Vdc			
MPPT voltage range	80 – 580Vdc			
Max. input current	20A	2*20A		
Isc PV	26A	2*26A		
Rated output power	3000W	3000W	3680W	4000W
Max. Output power	3300VA	3300VA	3680VA	4400VA
Nominal output voltage	230Vac			
Max. output current	15A	15A	16A	20A
Nominal output frequency	50/60 Hz			
Power factor range	0.8Leading ~ 0.8Lagging			
Safety level	Class I			
Ingress protection	IP66			
Operation ambient temperature	-30℃ - +60℃			
Software version	VA1.0			
Model	iMars XG4.2KTL	iMars XG4.6KTL	iMars XG5KTL	iMars XG6KTL
Max. Input voltage	600Vdc			
MPPT voltage range	80 – 580Vdc			

	Max. input current	2*20A			
	Isc PV	2*26A			
	Rated output power	4200W	4600W	5000W	6000W
	Max. Output power	4620VA	5000VA	5500VA	6600VA
	Nominal output voltage	230Vac			
	Max. output current	21A	23A	25A	30A
	Nominal output frequency	50/60 Hz			
	Power factor range	0.8Leading ~ 0.8Lagging			
	Safety level	Class I			
	Ingress protection	IP66			
	Operation ambient temperature	-30℃ - +60℃			
	Software version	VA1.0			
	Model	iMars XG7KTL	iMars XG7KTL1	iMars XG8KTL	iMars XG8KTL1
	Max. Input voltage	600Vdc			
	MPPT voltage range	80 – 580Vdc			
	Max. input current	2*20A	28A/14A	2*20A	28A/14A
	Isc PV	2*26A	36.4A/18.2A	2*26A	36.4A/18.2A
	Rated output power	7000W	7000W	8000W	8000W
	Max. Output power	7700VA	7700VA	8800VA	8800VA
	Nominal output voltage	230Vac			
	Max. output current	35A	35A	40A	40A
	Nominal output frequency	50/60 Hz			

Power factor range	0.8Leading ~ 0.8Lagging	
Safety level	Class I	
Ingress protection	IP66	
Operation ambient temperature	-30℃ - +60℃	
Software version	VA1.0	
Model	iMars XG10KTL	iMars XG10KTL1
Max. Input voltage	600Vdc	
MPPT voltage range	80 – 580Vdc	
Max. input current	2*20A	28A/14A
Isc PV	2*26A	36.4A/18.2A
Rated output power	10000W	10000W
Max. Output power	10000VA	10000VA
Nominal output voltage	230Vac	
Max. output current	45.5A	45.5A
Nominal output frequency	50/60 Hz	
Power factor range	0.8Leading ~ 0.8Lagging	
Safety level	Class I	
Ingress protection	IP66	
Operation ambient temperature	-30℃ - +60℃	
Software version	VA1.0	

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**Testing Laboratory:**	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	
Testing location/ address ..... :		Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China	
Tested by (name, function, signature) ..... :		Gaison Li engineer	Gaison Li
Approved by (name, function, signature) .. :		Jason Fu Supervisor	Jason Fu
☐	**Testing procedure: CTF Stage 1:**	N/A	
Testing location/ address ..... :		N/A	
Tested by (name, function, signature) ..... :		N/A	
Approved by (name, function, signature) .. :		N/A	
☐	**Testing procedure: CTF Stage 2:**	N/A	
Testing location/ address ..... :		N/A	
Tested by (name + signature)..... :		N/A	
Witnessed by (name, function, signature) . :		N/A	
Approved by (name, function, signature) .. :		N/A	
☐	**Testing procedure: CTF Stage 3:**	N/A	
☐	**Testing procedure: CTF Stage 4:**	N/A	
Testing location/ address ..... :		N/A	
Tested by (name, function, signature) ..... :		N/A	
Witnessed by (name, function, signature) . :		N/A	
Approved by (name, function, signature) .. :		N/A	
Supervised by (name, function, signature) :		N/A	

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

N/A

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
All applicable tests	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China

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

N/A

☒ **The product fulfils the requirements of IEC 62116:2014**

Copy of marking plate:

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

invt	Grid-tied Solar Inverter
iMars XG3KTL-1M	
DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	20A
Isc PV	26A
AC Output	
Nominal Voltage	230V
Max. Current	15A
Rated Power	3000W
Max. Output Power	3300VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.

invt	Grid-tied Solar Inverter
iMars XG3KTL-2M	
DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	20A/20A
Isc PV	26A/26A
AC Output	
Nominal Voltage	230V
Max. Current	15A
Rated Power	3000W
Max. Output Power	3300VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

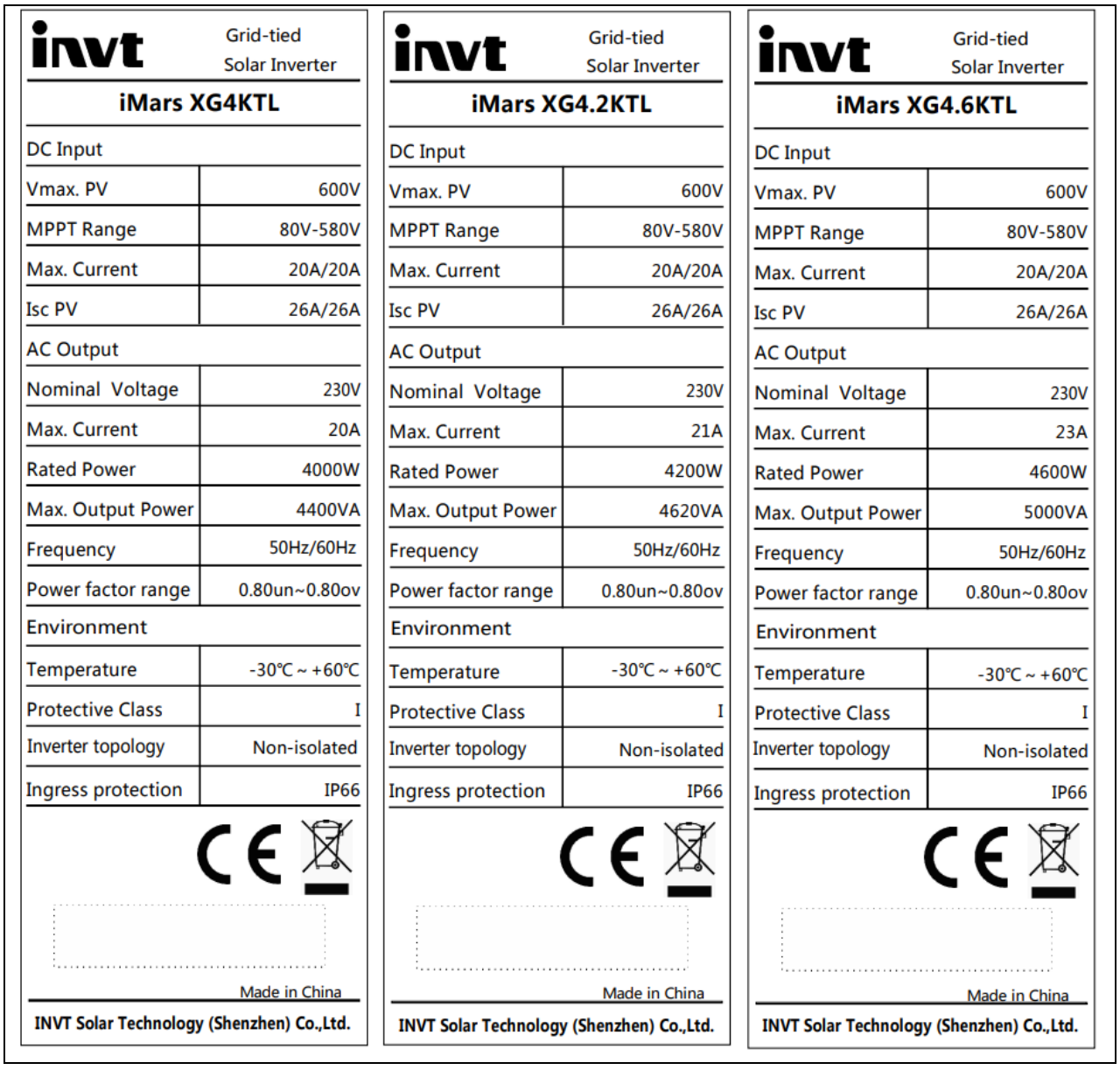
Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.

invt	Grid-tied Solar Inverter
iMars XG3.68KTL	
DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	20A/20A
Isc PV	26A/26A
AC Output	
Nominal Voltage	230V
Max. Current	16A
Rated Power	3680W
Max. Output Power	3680VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.



invt Grid-tied Solar Inverter

iMars XG4KTL

DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	20A/20A
Isc PV	26A/26A
AC Output	
Nominal Voltage	230V
Max. Current	20A
Rated Power	4000W
Max. Output Power	4400VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.

invt Grid-tied Solar Inverter

iMars XG4.2KTL

DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	20A/20A
Isc PV	26A/26A
AC Output	
Nominal Voltage	230V
Max. Current	21A
Rated Power	4200W
Max. Output Power	4620VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.

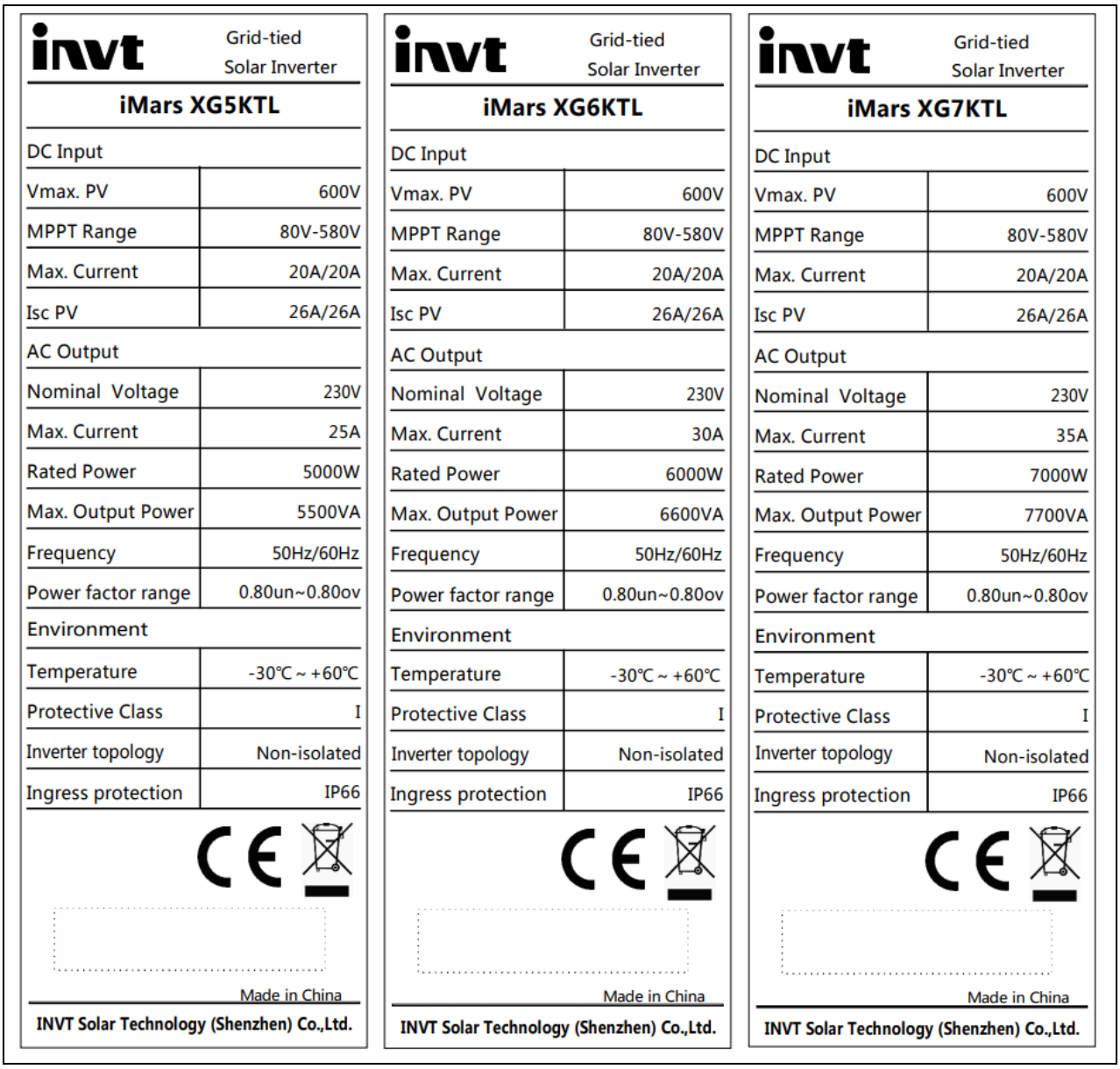
invt Grid-tied Solar Inverter

iMars XG4.6KTL

DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	20A/20A
Isc PV	26A/26A
AC Output	
Nominal Voltage	230V
Max. Current	23A
Rated Power	4600W
Max. Output Power	5000VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.



invt	Grid-tied Solar Inverter
iMars XG5KTL	
DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	20A/20A
Isc PV	26A/26A
AC Output	
Nominal Voltage	230V
Max. Current	25A
Rated Power	5000W
Max. Output Power	5500VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.

invt	Grid-tied Solar Inverter
iMars XG6KTL	
DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	20A/20A
Isc PV	26A/26A
AC Output	
Nominal Voltage	230V
Max. Current	30A
Rated Power	6000W
Max. Output Power	6600VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

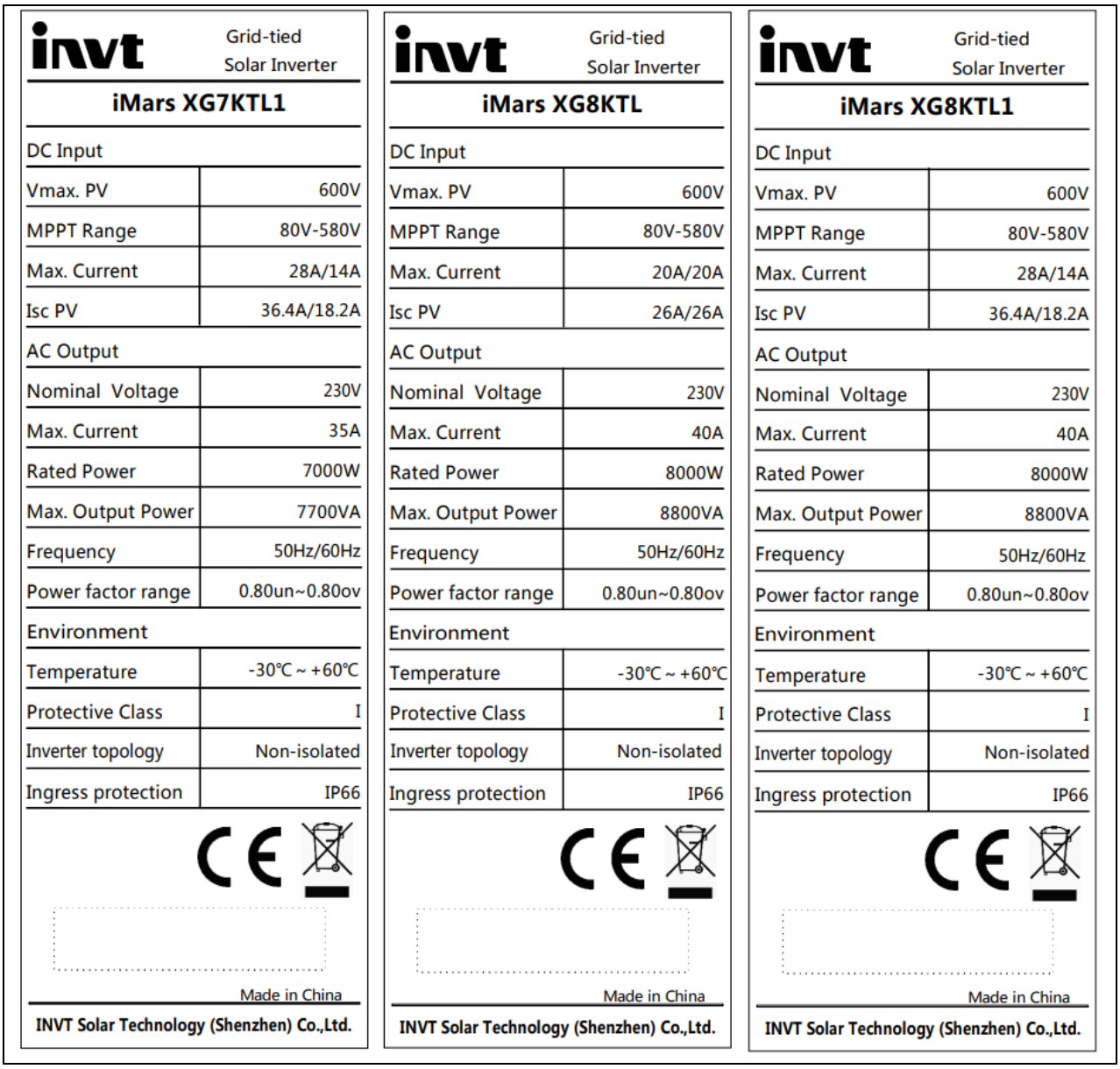
Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.

invt	Grid-tied Solar Inverter
iMars XG7KTL	
DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	20A/20A
Isc PV	26A/26A
AC Output	
Nominal Voltage	230V
Max. Current	35A
Rated Power	7000W
Max. Output Power	7700VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.



invt Grid-tied Solar Inverter

iMars XG7KTL1

DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	28A/14A
Isc PV	36.4A/18.2A
AC Output	
Nominal Voltage	230V
Max. Current	35A
Rated Power	7000W
Max. Output Power	7700VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.

invt Grid-tied Solar Inverter

iMars XG8KTL

DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	20A/20A
Isc PV	26A/26A
AC Output	
Nominal Voltage	230V
Max. Current	40A
Rated Power	8000W
Max. Output Power	8800VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.

invt Grid-tied Solar Inverter

iMars XG8KTL1

DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	28A/14A
Isc PV	36.4A/18.2A
AC Output	
Nominal Voltage	230V
Max. Current	40A
Rated Power	8000W
Max. Output Power	8800VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.

invt	Grid-tied Solar Inverter
iMars XG10KTL	
DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	20A/20A
Isc PV	26A/26A
AC Output	
Nominal Voltage	230V
Max. Current	45.5A
Rated Power	10000W
Max. Output Power	10000VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.

invt	Grid-tied Solar Inverter
iMars XG10KTL1	
DC Input	
Vmax. PV	600V
MPPT Range	80V-580V
Max. Current	28 /14 Ad.c.
Isc PV	36.4/18.2Ad.c
AC Output	
Nominal Voltage	230V
Max. Current	45.5A
Rated Power	10000W
Max. Output Power	10000VA
Frequency	50Hz/60Hz
Power factor range	0.80un~0.80ov
Environment	
Temperature	-30℃ ~ +60℃
Protective Class	I
Inverter topology	Non-isolated
Ingress protection	IP66

Made in China

INVT Solar Technology (Shenzhen) Co.,Ltd.

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.

Test item particulars.....:	
Classification of installation and use.....:	Fixed and outdoor used
Supply Connection.....:	Permanent connection
.....:	
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	06 Mar 2023
Date (s) of performance of tests.....:	21 Mar 2023 – 23 Mar 2023

General remarks:
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.** Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty. This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. The test report only allows to be revised only within the report defined retention period unless standard or regulation was withdrawn or invalid. **This report shall be used together with the report 230301065GZU-001.**

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) ..... :	Shenzhen INVT Electric Co., Ltd. (Baoan Factory) 4th to 1st floors of Emerson Industrial Park, No. 3, Fengtang Avenue, Tangwei Community, Fuhai Street, Baoan District, Shenzhen, CHINA.

General product information:

The inverter is a Grid-tied solar inverter, which converts the PV voltage into AC voltage, and feed into Grid.

The machine includes input and output EMI filtering and consists of Master CPU and Slave CPU.

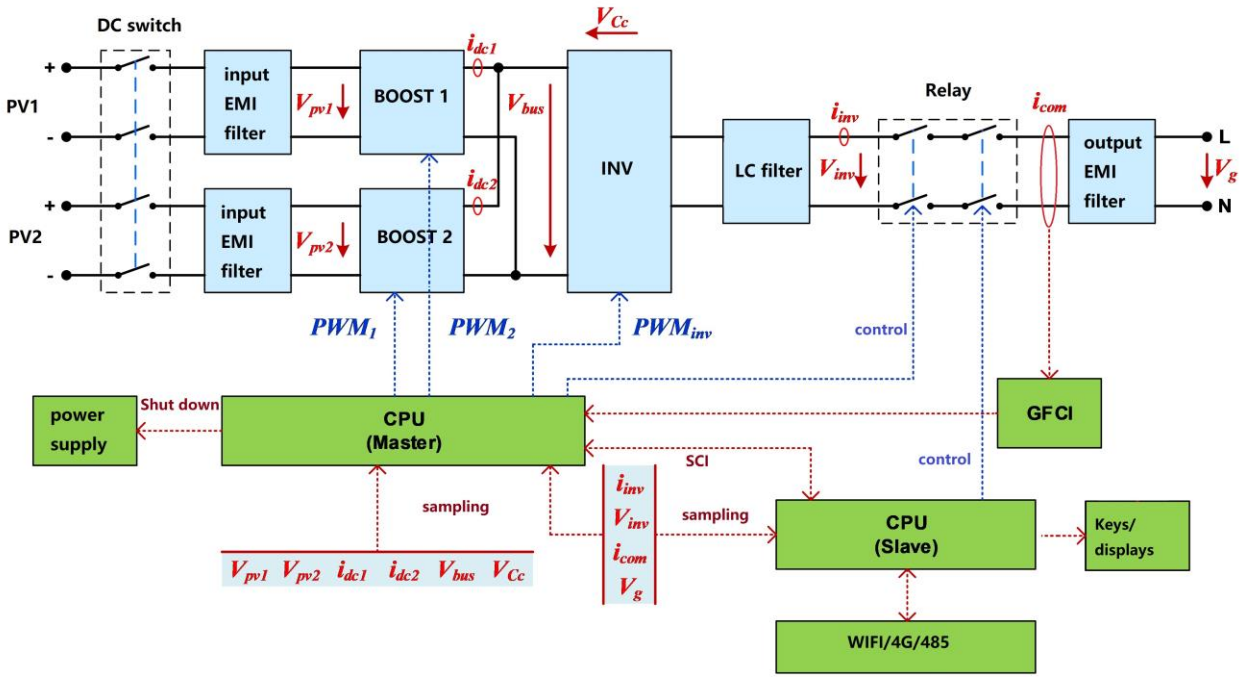
The Master CPU mainly monitors BUS voltage, the voltage, current, on the PV side, control the voltage boost of AC side, communicate with Slave CPU and participates in the inverter control.

Slave CPU can monitor output voltage, output current, for human-computer interaction communication and display, including RS485 communication, LED/LCD display.

There is an internal communication circuit between the two CPU to coordinate with each other to complete the software function of the whole machine.

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

The topology diagram as following:



Model differences:

All models are identical, except the max. input current, PV Isc and some parameter of the software architecture in order to control the max output power.

The product was tested on:

The Hardware version: 11006-00377

The Software version: VA1.0

Other than special notes, typical model iMars XG10KTL used as representative for testing in this report.

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict
4	**Testing circuit**		
	The testing circuit shown in Figure 1 is employed.		P
	Similar circuits are used for three-phase output.		P
	Parameters to be measured are shown in Table 1 and Figure 1. Parameters to be recorded in the test report are discussed in Clause 7.		P
5	**Testing equipment**		
5.1	**Measuring instruments**		**P**
	The waveform measurement/capture device is able to record the waveform from the beginning of the islanding test until the EUT ceases to energize the island.	Waveform caught from the switch open and the EUT cease to energize	P
	For multi-phase EUT, all phases are monitored.		P
	A waveform monitor designed to detect and calculate the run-on time may be used.		P
	For multi-phase EUT, the test and measurement equipment is recorded each phase current and each phase-to-neutral or phase-to-phase voltage, as appropriate, to determine fundamental frequency active and reactive power flow over the duration of the test.		P
	A sampling rate of 10 kHz or higher is recommended. The minimum measurement accuracy is 1 % or less of rated EUT nominal output voltage and 1 % or less of rated EUT output current		P
	Current, active power, and reactive power measurements through switch S1 used to determine the circuit balance conditions report the fundamental (50 Hz or 60 Hz) component.		P
5.2	**DC power source**		
5.2.1	**General**		**P**
	A PV array or PV array simulator (preferred) may be used. If the EUT can operate in utility-interconnected mode from a storage battery, a DC power source may be used in lieu of a battery as long as the DC power source is not the limiting device as far as the maximum EUT input current is concerned.	Topcon PV simulator used	P
	The DC power source provides voltage and current necessary to meet the testing requirements described in Clause 6.		P
5.2.2	**PV array simulator**		**P**

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict
	The tests are conducted at the input voltage defined in Table 2 below, and the current is limited to 1,5 times the rated photovoltaic input current, except when specified otherwise by the test requirements.	Topcon PV simulator used	P
	A PV array simulator is recommended, however, any type of power source may be used if it does not influence the test results.		P
5.2.3	**Current and voltage limited DC power supply with series resistance**		N/A
	A DC power source used as the EUT input source is capable of EUT maximum input power (so as to achieve EUT maximum output power) at minimum and maximum EUT input operating voltage.		N/A
	The power source provides adjustable current and voltage limit, set to provide the desired short circuit current and open circuit voltage when combined with the series and shunt resistance described below.		N/A
	A series resistance (and, optionally, a shunt resistance) is selected to provide a fill factor within the range: Output power: Sufficient to provide maximum EUT output power and other levels specified by test conditions of table 5. Response speed: The response time of a simulator to a step in output voltage, due to a 5% load change, results in a settling of the output current to within 10% of its final value in less than 1ms. Stability: Excluding the variations caused by the EUT MPPT, simulator output power remains stable within 2 % of specified power level over the duration of the test: from the point where load balance is achieved until the island condition is cleared or the allowable run-on time is exceeded. Power factor: 0.25 to 0.8		N/A
5.2.4	**PV array**		N/A
	A PV array used as the EUT input source is capable of EUT maximum input power at minimum and maximum EUT input operating voltage.		N/A

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict

	Testing is limited to times when the irradiance varies by no more than 2 % over the duration of the test as measured by a silicon-type pyranometer or reference device. It may be necessary to adjust the array configuration to achieve the input voltage and power levels prescribed in 6.1.		N/A
5.3	**AC power source**		
	The utility grid or other AC power source may be used as long as it meets the conditions specified in Table 4. **Table 4 – AC power source requirements** Items: Voltage — Conditions: Nominal ±2,0 % Items: Voltage THD — Conditions: < 2,5 % Items: Frequency — Conditions: Nominal ±0,1 Hz Items: Phase angle distance [1] — Conditions: 120 ° ± 1,5 ° [1] Three-phase case only		P
5.4	**AC loads**		
	On the AC side of the EUT, variable resistance, capacitance, and inductance are connected in parallel as loads between the EUT and the AC power source. Other sources of load, such as electronic loads, may be used if it can be shown that the source does not cause results that are different than would be obtained with passive resistors, inductors, and capacitors.		P
	All AC loads are rated for and adjustable to all test conditions. The equations for Qf are based upon an ideal parallel RLC circuit. For this reason, non-inductive resistors, low loss (high Qf) inductors, and capacitors with low effective series resistance and effective series inductance are utilized in the test circuit. Iron core inductors, if used, are not exceed a current THD of 2 % when operated at nominal voltage. Load components are conservatively rated for the voltage and power levels expected. Resistor power ratings are chosen so as to minimize thermally-induced drift in esistance values during the course of the test.		P

IEC 62116			
Clause	Requirement + Test	Result - Remark	Verdict
	Active and reactive power is calculated (using the measurements provided in Table 1) in each of the R, L and C legs of the load so that these parasitic parameters (and parasitics introduced by variacs or autotransformers) are properly accounted for when calculating Qf.		P
6	**Test for single or multi-phase inverter**		
6.1	**Test procedure**	**(see appended table)**	**P**
	The test uses an RLC load, resonant at the EUT nominal frequency (50 Hz or 60 Hz) and matched to the EUT output power.		P
	For multi-phase EUT, the load is balanced across all phases and the switch S1 as in Figure 1 opens all phases		P
	This test is performed with the EUT conditions as in Table 5, where power and voltage values are given as a percent of EUT full output rating.		P
	a)..Determine EUT test output power		P
	b) .Adjusting the DC input source		P
	c) .Turn off the EUT and open S1		P
	d) .Adjust the RLC circuit to have Qf = 1.0 ±0.05		P
	e)..Connect the RLC load configured in step d) to the EUT by closing S2		P
	f) ..Open the utility-disconnect switch S1 to initiate the test, Run-on time is recorded.		P
	g) .For test condition A, adjust the real load and only one of the reactive load components to each of the load imbalance conditions shown in the shaded portion of table 6. If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.		P
	h) For test condition B and C, adjust the only one reactive load components by approximately 1,0% per test, within a total range of 95% to 105% of the operating point. If run-on times are still increasing at the 95% or 105% points, additional 1% increments have to be taken until run-on times begin decreasing.		P
6.2	**Pass/fail criteria**		

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	An EUT is considered to comply with the requirements for islanding protection when each case of recorded run-on time is less than 2 s or meets the requirements of local codes.		P
7	**Documentation**		
	At a minimum, the following information is recorded and maintained in the test report.		P
	a) Specifications of EUT. Table 8 provides an example of the type of information that is provided.		P
	b) Measurement results. Table 9 provides an example of the type of information that is provided. Actual measured values is to be recorded.		P
	c) Block diagram of test circuit.		P
	d) Specifications of the test and measurement equipment. Table 10 provides an example of the type of information that is provided.		P
	e) Any test configuration or procedure details such as methods of achieving specified load and EUT output conditions.		P
	f) Any additional information required by the testing laboratory's accreditation.		P
	g) Specify the evaluation criterion from clause 6.2 that was utilized to determine if the product passed or failed the test.		P
Annex A	Islanding as it applies to PV systems(Informative)		--
A.1	General		--
A.2	Impact of distortion on islanding		--
Annex B	Test for independent islanding detection device (relay)(Informative)		--
B.1	Introduction		--
B.2	Testing circuit		--
B.3	Testing equipment		--
B.4	Testing procedure		--
B.5	Documentation		--

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Clause	Requirement + Test	Result - Remark	Verdict

5.3	TABLE: tested condition and run-on time								P
Model: Tested on model iMars XG10KTL									
No.	**P_{EUT} (% of EUT rating)**	**Reactive load (% of normal)**	**P_{AC}**	**Q_{AC}**	**Run-on time(ms)**	**P_{EUT} (KW)**	**Actual Q_f (Var)**	**V_{DC} （V）**	**Which load is selected to be adjusted (R or L)**
Test condition A									
1	100	100	0	0	521	10	1.00	400	/
2	100	100	-5	-5	334	10	1.03	400	/
3	100	100	-5	0	313	10	1.05	400	/
4	100	100	-5	+5	265	10	1.07	400	/
5	100	100	0	-5	314	10	0.98	400	/
6	100	100	0	+5	291	10	1.03	400	/
7	100	100	+5	-5	303	10	0.94	400	/
8	100	100	+5	0	328	10	0.97	400	/
9	100	100	+5	+5	401	10	0.99	400	/
Test condition B									
10	66	66	0	0	310	6.6	1.00	300	/
11	66	66	0	-5	214	6.6	0.98	300	L
12	66	66	0	-4	223	6.6	0.99	300	L
13	66	66	0	-3	213	6.6	0.99	300	L
14	66	66	0	-2	217	6.6	1.00	300	L
15	66	66	0	-1	206	6.6	1.00	300	L
16	66	66	0	1	227	6.6	1.01	300	L
17	66	66	0	2	202	6.6	1.02	300	L
18	66	66	0	3	264	6.6	1.02	300	L
19	66	66	0	4	260	6.6	1.03	300	L
20	66	66	0	5	232	6.6	1.02	300	L
Test condition C									
21	33	33	0	0	218	3.3	1.00	160	/
22	33	33	0	-5	152	3.3	0.98	160	L
23	33	33	0	-4	140	3.3	0.99	160	L
24	33	33	0	-3	148	3.3	0.99	160	L
25	33	33	0	-2	178	3.3	0.99	160	L
26	33	33	0	-1	154	3.3	0.99	160	L
27	33	33	0	1	204	3.3	1.01	160	L
28	33	33	0	2	137	3.3	1.02	160	L
29	33	33	0	3	126	3.3	1.02	160	L
30	33	33	0	4	208	3.3	1.02	160	L
31	33	33	0	5	174	3.3	1.03	160	L

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:
For test condition A:
If any of the recorded run-on times are longer than the one recorded for the rated balance condition, then the non-shaded parameter combinations also require testing.
For test condition B and C:
If run-on times are still increasing at the 95 % or 105 % points, additional 1 % increments is taken until run-on times begin decreasing.

--- End of test report---