




TEST REPORT France_UTE_C_15_712: 2008 Low Voltage Electrical Installations Practical Guide Photovoltaic installations	
Report reference No.	140327083GZU-016
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Testing location	Same as above
Address	Same as above
Applicant's Name	Shenzhen SOFARSOLAR Co., Ltd.
Address	3A-1, Huake Building, East Technology Park, Qiaoxiang Road, Nanshan District, Shenzhen, China
Test specification	
Standard	France_UTE_C_15_712: 05 Feb, 2008
Test procedure	Type test
Non-standard test method	N/A
Test Report Form No.	
France_UTE_C_15_712a	
TRF originator	Intertek
Master TRF	dated 2014-06
Test item description	
Grid-connected PV inverter	
Trademark	
Manufacturer	Same as Applicant
Factory	Dongguan dingqiang Machinery & Electric Co., Ltd. No. 8, Fulong road, Qingxi town, Dongguan city, Guangdong, China
Model and/or type reference	Sofar 20000TL-Sx, Sofar 17000TL-Sx, Sofar 15000TL-Sx, Sofar 10000TL-Sx (x=0-6)

Rating(s)..... : Maximum d.c. input voltage: 1000 V
Input voltage rang: 250-960 V
Max. input current: 2x24 A (for Sofar 20000TL-Sx); 2x21 A (for Sofar 17000TL-Sx, Sofar 15000TL-Sx); 2x15 A (for Sofar 10000TL-Sx)
Max. PV Isc: 2x30 A (for Sofar 20000TL-Sx); 2x27 A (for Sofar 17000TL-Sx, Sofar 15000TL-Sx); 2x20 A (for Sofar 10000TL-Sx)
Nominal output voltage: 3/N/PE230V/400V
Max. output current: 3x29 A (for Sofar 20000TL-Sx); 3x25 A (for Sofar 17000TL-Sx); 3x22 A (for Sofar 15000TL-Sx); 3x15 A (for Sofar 10000TL-Sx)
Nominal frequency: 50 Hz
Max. output power: 20000 W (for Sofar 20000TL-Sx); 17000 W (for Sofar 17000TL-Sx); 15000 W (for Sofar 15000TL-Sx); 10000 W (for Sofar 10000TL-Sx)
Ingress protection: IP65
Operating temperature range: -25~60°C

Summary of testing:

The sample(s) tested complied with the default type test requirement of France_UTE_C_15_712: 05 Feb, 2008

Copy of marking plate

Solar Inverter	Sofar 10000TL-S3
Max. DC Input Voltage	1000V
Operating MPPT voltage range	250-960V
Max. Input Current	2*15A
Max. PV Isc	2*20A
Nominal Grid Voltage	3/N/PE,230/400V
Max. Output Current	3*15A
Nominal Grid Frequency	50Hz
Max. Output Power	10000W
Power factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25-+60°C
Protective Class	Class I
Manufacturer: shenzhen SOFARSOLAR Co.,Ltd	
Made in China	
VDE-AR-N4105,RD1699,VDE0126-1-1,G83/2,UTE C15-712-1, C10/11,EN50438	

Solar Inverter	Sofar 15000TL-S3
Max. DC Input Voltage	1000V
Operating MPPT voltage range	250-960V
Max. Input Current	2*21A
Max. PV Isc	2*27A
Nominal Grid Voltage	3/N/PE,230/400V
Max. Output Current	3*22A
Nominal Grid Frequency	50Hz
Max. Output Power	15000W
Power factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25-+60°C
Protective Class	Class I
Manufacturer: shenzhen SOFARSOLAR Co.,Ltd	
Made in China	
VDE-AR-N4105,RD1699,VDE0126-1-1,G59/3,UTE C15-712-1, C10/11,IEC62116, IEC61727	

Solar Inverter	Sofar 17000TL-S3
Max. DC Input Voltage	1000V
Operating MPPT voltage range	250-960V
Max. Input Current	2*21A
Max. PV Isc	2*27A
Nominal Grid Voltage	3/N/PE,230/400V
Max. Output Current	3*25A
Nominal Grid Frequency	50Hz
Max. Output Power	17000W
Power factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25-+60°C
Protective Class	Class I
Manufacturer: shenzhen SOFARSOLAR Co.,Ltd	
Made in China	
VDE-AR-N4105,RD1699,VDE0126-1-1,G59/3,UTE C15-712-1, C10/11,IEC62116, IEC61727	

Solar Inverter	Sofar 20000TL-S3
Max. DC Input Voltage	1000V
Operating MPPT voltage range	250-960V
Max. Input Current	2*24A
Max. PV Isc	2*30A
Nominal Grid Voltage	3/N/PE,230/400V
Max. Output Current	3*29A
Nominal Grid Frequency	50Hz
Max. Output Power	20000W
Power factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25-+60°C
Protective Class	Class I
Manufacturer: shenzhen SOFARSOLAR Co.,Ltd	
Made in China	
VDE-AR-N4105,RD1699,VDE0126-1-1,G59/3,UTE C15-712-1, C10/11,IEC62116, IEC61727	



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 front surface of enclosure and visible after installation.

Test case verdicts

Test case does not apply to the test object :: N/A
 Test item does meet the requirement: P(ass)
 Test item does not meet the requirement ...: F(ail)

Testing

Date of receipt of test item: 3 Sep 2010
 Date(s) of performance of test: 3 Sep 2010 to 13 Sep 2010

General remarks

The test results presented in this report relate only to the object tested.
 This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
 "(See Enclosure #)" refers to additional information appended to the report.
 "(See appended table)" refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

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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 would be valid when used together with report No. 140327081GZU-002, dated 22 May 2014

General product information:

1. Product covered by this report is non-isolated grid-connected PV inverter for connection with low voltage grid in terms of VDE 0126
2. The inverters intended to operate at ambient temperature -25°C - +60°C and 250-960 Vdc input, which will be specified in the user manual, The inverters will output full power when operated at 45°C. If operated at higher than 45°C temperature, the output power derating.
3. The firmware version used for testing is V1.00

For all models, if the DC input voltage is higher than 850 Vdc the output power will be derating.
 For model Sofar 20000TL-Sx, if the DC input voltage is lower than 430 Vdc, the output power will be derating.
 For model Sofar 17000TL-Sx, if the DC input voltage is lower than 420 Vdc, the output power will be derating.
 For model Sofar 15000TL-Sx, if the DC input voltage is lower than 370 Vdc, the output power will be derating.
 For model Sofar 10000TL-Sx, if the DC input voltage is lower than 350 Vdc, the output power will be derating.

For all models, if the AC output voltage is lower than 230 Vac the output current will be limited to not higher than rated output current.

Model difference:

All the models have identical mechanical and electrical construction except some components and some parameter of the software architecture in order to control the max output power. And refer to the following table for detail.

Model	DC Cable Gland	PV connector	DC inside connector	Fuse PCB+ String detection	DC surge arrester	DC switch	AC switch	AC surge arrester

				board				
Sofar 20000TL-S0 Sofar 17000TL-S0 Sofar 15000TL-S0 Sofar 10000TL-S0	√		√					
Sofar 20000TL-S1 Sofar 17000TL-S1 Sofar 15000TL-S1 Sofar 10000TL-S1	√		√			√		
Sofar 20000TL-S2 Sofar 17000TL-S2 Sofar 15000TL-S2 Sofar 10000TL-S2		√	√			√		
Sofar 20000TL-S3 Sofar 17000TL-S3 Sofar 15000TL-S3 Sofar 10000TL-S3		√		√		√		
Sofar 20000TL-S4 Sofar 17000TL-S4 Sofar 15000TL-S4 Sofar 10000TL-S4		√		√	√	√		
Sofar 20000TL-S5 Sofar 17000TL-S5 Sofar 15000TL-S5 Sofar 10000TL-S5		√		√	√	√		√
Sofar 20000TL-S6 Sofar 17000TL-S6 Sofar 15000TL-S6 Sofar 10000TL-S6		√		√	√	√	√	√
√ denote incorporating this component								

Model Sofar 17000TL-Sx similar to Sofar 20000TL-Sx except amount of the DC-link capacitors, different of input and output sampling resistors and different inductance of Boost, invert inductor.

Model Sofar 15000TL-Sx similar to Sofar 17000TL-Sx except amount of the DC-link capacitors, different inductance of Boost, invert inductor and less PV input circuits (including PV terminal, fuse and sampling circuits of fuse).

Model Sofar 10000TL-Sx similiae to Sofar 15000TL-Sx except amount of the DC-link capacitors and boost diode, different of input and output sampling resistors and different inductance of Boost, invert inductor.

Model Sofar 20000TL-Sx and Sofar 17000TL-Sx have two external fans.

Model Sofar 15000TL-Sx has one external fan and model Sofar 10000TL-Sx has not.

Unless other special notes, only model Sofar 20000TL-S6 for testing.

Software setting as following:

Different country can be set on switch SWT3 on communication board, digit "0" represents OFF, digit "1" represents ON

SWITCH 5	SWITCH 4	SWITCH 3	SWITCH 2	SWITCH 1	Country
0	1	0	1	1	France

UTE C15-712-1			
Cl.	Requirement - Test	Result	Verdict
5	Description of PV installations	Refer to installation manual for details	P
6	Earthing of the installation		P
6.1	Diagrams showing bonding of alternating current part with earth The earthing system has been produced in accordance with the requirements of NF C 15-100		P
6.2	Earthing of one polarity in the d.c. part In a PV installation, the protection devices against indirect contact are independent of the principle of the earthing systems. The direct current part is created in accordance with the rules for class II or equivalent isolation.		P
6.3	Earthing of conductive masses and elements		P
6.3.1	Direct current part To minimise the effects of induced overvoltages, the metal structures of the modules and the metal support structures (including the metal cable runs) must be connected to equipotential bonding, which in turn is connected to the earth.		P
6.3.2	Alternating current part All chassis on the a.c. side must be connected to the earth via a protective conductor that meets the requirements of paragraph 411.3.1.2 and section 5-54 of N F C 15-100. If a transformer is installed outside the inverter (low voltage/low voltage or high voltage/low voltage transformer), equipotential bonding is required between these items of equipment.		P
6.3.3	Inverter The inverter body must be connected to the equipotential bonding via a conductor with a minimum cross-section of 6mm ² Cu or equivalent and to the protective conductor of the a.c. part.		P
7	Protection against electric shock		P
7.1	General points The PV equipment of the direct current part must be treated as being under voltage, even if it is disconnected from the alternating current part.		P
7.2	Protection against direct contact		P

UTE C15-712-1			
Cl.	Requirement - Test	Result	Verdict
7.2.1	<p>General case</p> <p>Electrical equipment must be fitted with a form of protection either by insulation of the live parts or through a casing</p>		P
7.2.2	<p>Particular case of safety extra-low voltage and protective extra-low voltage</p> <p>If the nominal voltage of the safety extra-low voltage circuit is less than or equal to 25 V rms a.c. or 60 V d.c. without ripple, protection against direct contact through insulation of the live parts or a casing is not necessary.</p>		P
7.3	<p>Protection against indirect contact</p>		P
7.3.1	<p>General points</p> <p>The regulations for protection against indirect contact are set out in section 4-41 of NF C 15-100.</p> <p>The circuits covered by 411.3.3 of standard NF C15-100 and, in particular, circuits in residential buildings must be protected with a differential device with a sensitivity of 30 mA or less.</p>	RCD equipped	P
7.3.2	<p>Direct current part</p> <p>For the direct current part (PV modules, junction boxes, chain cables, group cables, marshalling boxes or cabinets, etc.), protection against indirect contact must be ensured</p>		P
7.3.2.1	<p>Protection with safety extra-low voltage or protective extra-low voltage</p> <p>The requirements of article 414 of standard NF C15-100 must be applied. The voltage U_{ocMAX} must not exceed 120 V.</p>	Communication port was protected by reinforced insulation	P
7.3.2.2	<p>Protection with double or reinforced insulation</p> <p>The requirements of article 412 of standard NF C15-100 must be applied.</p>		P
7.3.3	<p>Alternating current part</p> <p>Protection against indirect contact is ensured through double or reinforced insulation or by an automatic cut-out of the supply, according to one of the following measures:</p> <ul style="list-style-type: none"> ● In a TT system: cut-out on the first fault; ● In a TN system: cut-out on the first fault; ● In an IT system: cut-out on the second fault. 	TN system	P

UTE C15-712-1			
Cl.	Requirement - Test	Result	Verdict
8	Overcurrent protection	Refer to installation manual for details	P
8.1	Direct current part		P
8.1.1	General points See figure 6 of this standard		P
8.1.2	Protection of PV modules In an installation with several PV module chains in parallel, the modules must be protected against the effect of reverse currents that may be generated in the chains in the event of a fault.		N/A
8.1.3	Protection of PV chain cables The sizing of the PV chain cables takes into account the choice of protection device for the PV modules adopted in 8.1.2.		N/A
8.1.4	Protection of PV group cables In an installation with several PV groups in parallel, the cables for the groups must be protected against the effect of reverse currents caused by a short circuit in a group.		N/A
8.1.5	Protection of main PV cable The main cable of a PV generator must be dimensioned with a permissible current I_s greater than or equal to $1.25 I_{sc} STC_{gen}$.		N/A
8.1.6	Characteristics of overcurrent protection devices The overcurrent protection devices must be either fuses compliant with standard NF EN 60269-1 or circuit-breakers compliant with standard NF EN 60947-2. These devices must be implemented for both polarities, regardless of the configuration of the installation.		P
8.2	Alternating current part		P
8.2.1	General points In the case of an installation connected to the network via a branch line with limited power, the minimum cross-section of the conductors connected to the terminals downstream of the general isolating and protection device is $10 \text{ mm}^2 \text{ Cu}$.	Stated in manual	P

UTE C15-712-1			
Cl.	Requirement - Test	Result	Verdict
8.2.2	<p>Overload protection</p> <p>Alternating current circuits are protected against surges in accordance with the requirements of article 433 of standard NF C 15-100.</p>		P
8.2.3	<p>Short-circuit protection</p> <p>In the case of a short circuit in an inverter or its line, the inverter is regarded as the load and the public network as the source.</p>		P
9	<p>Tripping device</p> <p>This protection device is designed to disconnect generators in the event of:</p> <ul style="list-style-type: none"> ● a fault on the public distribution network; ● a failure in the supply from the public distribution network; ● fluctuations in the voltage or frequency greater than those specified by the distributor. 		P
10	<p>Prevention of degradation of photovoltaic installations</p> <p>In order to prevent the degradation of PV installations due to specific external influences and the presence of direct current, and despite the implementation of measures such as the installation of double insulation and monoconductor cables, additional measures must be implemented for the direct current part.</p>	Should be evaluated in the end installation	N/A
11	<p>Voltage drop</p>	Should be noted in the end installation	N/A
11.1	<p>General points</p> <p>The objective of technical and commercial optimisations is to minimise voltage drops.</p>		N/A
11.2	<p>Direct current installation</p> <p>The authorised maximum drop in voltage in the direct current part of the installation is between 3% and $I_{mpp} STC$ (STC: standard test conditions).</p>		N/A

UTE C15-712-1			
Cl.	Requirement - Test	Result	Verdict
11.3	<p>Alternating current installation</p> <p>For PV installations connected directly to the LV public distribution network, the maximum authorised drop in voltage between the a.c. terminals of the inverter and the point of delivery (NF C 14-100) is 3% at the nominal power of the inverter(s). It is recommended to limit this drop in voltage to 1 % in order to be able to limit energy losses on the one hand and momentary disconnection of the inverter on the other, maintaining a margin between the average operating voltage of the inverter and the setting of its protection at maximum voltage.</p>		N/A
12	<p>Disconnectors and circuit-breakers</p>	Should be noted in the end installation	N/A
12.1	<p>General points</p> <p>When choosing and installing circuit-breakers and disconnectors between the PV installation and the public distribution network, the network must be regarded as the source and the PV installation as the load.</p>		N/A
12.2	<p>Disconnectors</p> <p>To facilitate maintenance of the PV inverters, disconnection mechanisms must be installed close to the inverter, on both direct current and alternating current sides.</p>		N/A
12.3	<p>Emergency circuit-breakers</p>		N/A
12.3.1	<p>General points</p> <p>To allow maintenance work on junction boxes fitted with protection devices, a circuit-breaker must be installed inside or immediately downstream of these protection devices</p>		N/A
12.3.2	<p>Direct current part</p>		N/A
12.3.2.1	<p>General measures</p> <p>The emergency disconnection can be ensured by manual control of the circuit-breaker or via a remote control action.</p>		N/A
12.3.2.2	<p>Measures specific to residential buildings</p> <p>In conformity with the regulations set down in article 771.463 of standard NF C 15-100, the emergency circuit-breakers must be tripped by a direct manual action.</p>		N/A
12.3.3	<p>Alternating current part</p>		N/A

UTE C15-712-1			
Cl.	Requirement - Test	Result	Verdict
12.3.3.1	<p>General measures</p> <p>The emergency disconnection can be ensured by manual control of the circuit-breaker or via a remote control action.</p>		N/A
12.3.3.2	<p>Measures specific to residential buildings</p> <p>If the route between the inverter and the network passes through the residential part, the emergency circuit-breaker of the PV installation must be installed in the residential service duct of the building, if there is one, in accordance with articles 771.463 and 771.558 of standard NF C15-100.</p>		N/A
12.3.3.3	<p>Cut-out for intervention by emergency services</p> <p>If a cut-out is required to allow the intervention of the emergency services, this must be triggered by one of the following events</p>		N/A
13	<p>Protection from surges emanating from the atmosphere or caused by operations¹</p>		N/A
13.1	<p>General points</p> <p>The information contained in this chapter refers to overvoltage protection for photovoltaic installations connected to the network and complements standard NF C 15-100 and guide UTE C 61-740-52.</p>		N/A
13.1.1	<p>Types of protection</p>		N/A
13.1.1.1	<p>Protection through equipotential bonding</p> <p>As described in section 6.3, an equipotential bonding conductor must connect all the metal structures of the modules and the metal structures of the supports of the PV installation (including the metal cable runs) whether or not lightning conductors are present. This conductor must be connected to the earth.</p>		N/A
13.1.1.2	<p>Protection by lightning arresters</p> <p>The installation conditions are described in 13.2</p>		N/A
13.2	<p>Installation conditions for lightning arresters</p>		N/A
13.2.1	<p>Installation conditions for lightning arresterson a.c. side</p> <p>Based on guide UTE C 61-740-52, protection by a lightning arrester is obligatory if there is a lightning conductor or if the lightning density (Ng) is greater than 2.5.</p>		N/A
13.2.2	<p>Installation conditions for lightning arresters on d.c. side</p>		N/A

UTE C15-712-1			
Cl.	Requirement - Test	Result	Verdict
13.2.2.1	<p>Installation without lightning conductor</p> <p>The length L is the accumulated distance between the inverter(s) and the furthest points of the photovoltaic modules comprising the chain, as a sum of the lengths of the routes in accordance with the principles shown in Figure 7.</p>		N/A
13.2.2.2	<p>Installation with lightning conductor</p> <p>The installation of type 2 lightning conductor(s) is obligatory on the d.c. side.</p>		N/A
13.3	<p>Overvoltage protection for installations without lightning conductor</p>		N/A
13.3.1	<p>Choice and installation of lightning arresters on a.c. side</p> <p>If a lightning arrester is prescribed for the a.c. part of a PV installation connected to the public low-voltage distribution network, it is always installed in the panel nearest to the installation origin of the installation. If this lightning arrester is located more than 10 metres away from the inverter, a second lightning arrester must be installed near the latter.</p>		N/A
13.3.2	<p>Choice and installation of lightning arresters on d.c. side</p> <p>If a lightning arrester is prescribed for the d.c. part of a PV installation, it is always installed in the panel nearest to the inverter. If one of the chains is located more than 10 metres away from the inverter, the installation of a second lightning arrester near the chains is recommended.</p>		N/A
13.3.3	<p>Choice of I_n</p> <p>The lightning arresters are type 2 with a minimum value for the nominal discharge current I_n of 5 kA. A higher nominal discharge current than the required value will prolong the service life of the lightning arrester.</p>		N/A
13.3.4	<p>Choice of I_{max}</p> <p>This parameter is used to coordinate the energy of the lightning arresters: please refer to information from the manufacturer.</p>		N/A
13.3.5	<p>Choice of U_p</p> <p>The value of U_p must be less than 80% of the surge withstand voltage of the equipment to be protected.</p>		N/A

UTE C15-712-1			
Cl.	Requirement - Test	Result	Verdict
13.3.6	<p>Choice of Ucpv</p> <p>The value of the maximum permissible voltage from the lightning arrester UCPV must be selected according to the maximum open-circuit voltage of the PV generator corresponding to the voltage UocSTC specified by the manufacturers of the PV modules. The voltage UCPV must be greater than or equal to the maximum voltage UocMAX of the photovoltaic generator. Whatever the protection methods of the lightning arrester, it must also withstand the maximum voltage UocMAX between these live terminals (+ and - terminals) and the earth.</p>		N/A
13.3.7	<p>Choice of Iscpv and protection device associated with the lightning arrester</p> <p>The lightning arrester must be fitted with an external disconnection device, if specified by the manufacturer; this assembly must be sized to function regardless of the current produced by the PV modules.</p>		N/A
13.4	<p>Additional regulations for surge protection for installations with a lightning conductor</p> <p>The regulations are set out in guide UTE C 61-740-52.</p>		N/A
14	Choice and installation of equipment		N/A

UTE C15-712-1			
Cl.	Requirement - Test	Result	Verdict
14.1	<p>General points</p> <p>The rated operating voltage of all the equipment of the d.c. part must be equal to or greater than the voltage UOCMAX. In the case of buildings with multiple occupation (for tertiary or residential use) with photovoltaic production in communal parts, the lines coming from the PV modules must be routed round the outside of private areas to the junction boxes for the chain/group located in the communal areas or in the buildings or the electrical service site dedicated to this purpose.</p> <p>The equipment installed outside must have a minimum degree of protection of IP44. The degree of protection against mechanical impacts must be at least IK07 in compliance with standard NF EN 62262 (C 20-015).</p> <p>It must be possible to carry out work on the removable equipment, devices and connections in the utmost safety.</p> <p>If a transformer is installed, the inverters and any general low-voltage panel must be installed close to the transformer in the same room or in adjoining rooms.</p> <p>The location of equipment (junction box(es), inverter(s), cabinets with protection devices and meter cabinets etc.) must comply with article 513.1 of standard NF C 15-100. Special regulations for residential buildings are given in article 771. The equipment, including the ducts etc., must be arranged so that they can be operated, inspected and serviced easily and their connections can be accessed.</p>		N/A
14.2	Ducts etc.		N/A
14.2.1	<p>Choice for the d.c. part</p> <p>The ducts are sized in accordance with the regulations in standard NF C 15-100 on the basis of cables with reticulated polyethylene insulation.</p>		N/A
14.2.2	<p>Installation</p> <p>The connections and the cables must be installed in a manner that will prevent any deterioration due to external influences. See the requirements set out in guide UTE C 15-520.</p>		N/A
14.3	<p>PV modules</p> <p>The PV modules must comply with the standards in series NF EN 61730.</p>		N/A

UTE C15-712-1			
Cl.	Requirement - Test	Result	Verdict
14.4	<p>Inverters</p> <p>The level of the current for the inverter must be based on Imp_{STC}</p>		N/A
14.5	<p>Equipment</p> <p>All equipment installed in the d.c. part must be adapted for operation in direct current and be selected and installed in accordance with the manufacturer's instructions.</p> <p>Equipment installed in the d.c. part must be of the industrial type, in other words compliant with the NF EN 60947 series of standards.</p> <ul style="list-style-type: none"> ● The characteristics of switches, switch-disconnectors and fuse-combination units must conform to the operating category DC21 B. ● The characteristics of disconnectors must conform to the operating category DC20. ● The characteristics of contactors must conform to the operating category DC1. 		N/A
14.6	<p>Equipment assemblies</p> <p>The direct current and alternating parts of the installation can be accommodated in the same panel if there is a physical separation of these two parts.</p> <p>For the d.c. part, it is imperative to protect all the connections or disconnection devices against accidental or unauthorised opening when live in accordance with 536.2.3 of standard NF C 15-100. To this end, a notice "Do not operate when live" must be placed inside the boxes or cabinets near these disconnection devices.</p> <p>Furthermore, in premises accessible to persons other than those with the requisite authorisation or qualification (BA4 or BA5):</p> <ul style="list-style-type: none"> ● The design or installation must be such that it is only possible to disassemble the connection devices with the aid of a tool; ● Equipment that does not have an under load circuit-breaking feature must require the either the use of a key or tool or the direct operation of a device with an under load circuit-breaking feature. 		N/A

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Cl.	Requirement - Test	Result	Verdict
14.7	<p>Connectors</p> <p>In the d.c. part, the connectors used must comply with the standard NF EN 50521. To guarantee the quality of the connection and limit the risks of an electric arc that could spark a fire, each pair of male and female connectors to be assembled, must be of the same type and the same brand.</p>		N/A
14.8	<p>Lighting arresters</p>		N/A
14.8.1	<p>Choice of lightning arresters</p> <p>The lightning arresters installed in the a.c. part of the PV installation must comply with standard NF EN 61643-11.</p> <p>The lightning arresters installed in the d.c. part of the PV installation must meet the requirements of guide UTE C 61-740-51.</p>		N/A
14.8.2	<p>Installation of lightning arresters</p> <p>Alternating current and direct current lightning arresters are installed in accordance with the regulations set out in guide UTE C 61-740-52.</p>		N/A
15	<p>Markings</p>		P
15.1	<p>Identification of components</p> <p>The main components comprising the photovoltaic installations must be identified and marked with clearly visible labels fixed permanently in accordance with the installation plans and diagrams:</p>		P
15.2	<p>Labelling</p> <p>For safety reasons and to alert the different people carrying out work in and around the building (staff tasked with maintenance work, inspectors, public distribution network operators, emergency services, etc.), it is imperative that the presence of a photovoltaic installation on a building is indicated.</p>		P
15.2.1	<p>Labelling on the a.c. part</p>		P
15.2.2	<p>Labelling on the d.c. part</p> <p>All the junction boxes (PV generator and PV groups) and d.c. ducts must carry a visible and permanent marking indicating that live parts within these boxes may remain under voltage even after the inverter has been disconnected on the direct current side.</p>		P

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Cl.	Requirement - Test	Result	Verdict
15.3.2	<p>Labelling on the inverter</p> <p>All inverters must bear a marking indicating that before any work is carried out, the two sources of voltage must be isolated.</p>		P
16	<p>Technical file</p> <p>The technical file must include the following items drawn up in French:</p> <ul style="list-style-type: none"> ● A circuit diagram of the photovoltaic system; ● The list of installed equipment mentioning the characteristics and references to the replacement parts (fuses, lightning arrester cartridges etc.); ● An installation diagram for the various photovoltaic components and modules as well as the corresponding connections (ducts); ● A description of the procedure for working on the photovoltaic system and safety instructions. 		P
17	<p>Maintenance of photovoltaic installations</p>		N/A
17.1	<p>General points</p> <p>The minimal technical maintenance work must be provided for during the life cycle of a photovoltaic installation to maintain or restore the installation to a state in which it can fulfil the function for which it was designed.</p>		N/A
17.2	<p>Levels and frequency of maintenance</p> <p>A distinction is made between the following three levels of maintenance comprising:</p> <ul style="list-style-type: none"> ● Conditional maintenance based on monitoring of the key parameters of the installation; ● Precautionary maintenance carried out according to the prognoses extrapolated from the analysis and evaluation of the key parameters concerning the degradation of the asset (e.g. corrosion); ● Systematic maintenance carried out at predetermined intervals and without a prior check of the state of the product or its constituent components. 		N/A

UTE C15-712-1			
Cl.	Requirement - Test	Result	Verdict
17.3	<p>Technical areas covered during maintenance</p> <p>A distinction is made between operations relating to the safety of persons and property, and actions relating to functional reliability.</p>		N/A
Annex A	<p>Agreements between the administrator of the public distribution network and the user/produce</p>		N/A
A1	<p>Provisions for limiting effects adversely affecting supply quality</p> <p>The study of the connection by the administrator of the public distribution network requires the communication of the characteristic data for the project, the generators and the provisions for connection to the network. The administrator of the public distribution network may disclose data sheets summarising the minimum list of data required to study the request.</p>		N/A
A2	<p>Choice of tripping device and approval</p> <p>The installation or modification of a tripping device must be subject to an agreement with the administrator of the public distribution network. This process must take account of the situation and the features at the point of delivery and must therefore, where necessary, be coordinated with the connection study for the site.</p>		N/A
A3	<p>Start-up by the administrator of the public distribution network</p> <p>For installations with a power of less than 250 WA, this step is subject to prior submission of proof of conformity stamped by CONSUEL (Comite National pour la Securite des Usagers de l'Electricite, the National Committee for the Safety of Users of Electricity).</p>		N/A
Annex B	<p>Cables for photovoltaic installations - values for permissible currents (informative)</p>		-
	<p>Specific cables for photovoltaic installations have been refined in order to meet the needs of these installations. The tables below, taken from document UTE C 32-502, give the values for the permissible currents for cables compliant with this guide.</p>		N/A
Annex C	<p>Keraunic levels in France and in the overseas departments (informative)</p>		-

Appendix A: photos



Overall view of the unit



Bottom view of the unit

Appendix A: photos

PV connector (Sofar 20000TL-Sx and Sofar 17000TL-Sx has 3x2 pairs)
(Sofar 15000TL-Sx and Sofar 10000TL-Sx has 2x2 pairs)



Terminals view of the unit (for models "-S2" to "-S6")



Terminals view of the unit (without AC switch)

Appendix A: photos



Terminals view of the unit for model Sofar 10000TL-Sx



Terminals view of the unit (for models "-S0" to "-S1")

Appendix A: photos

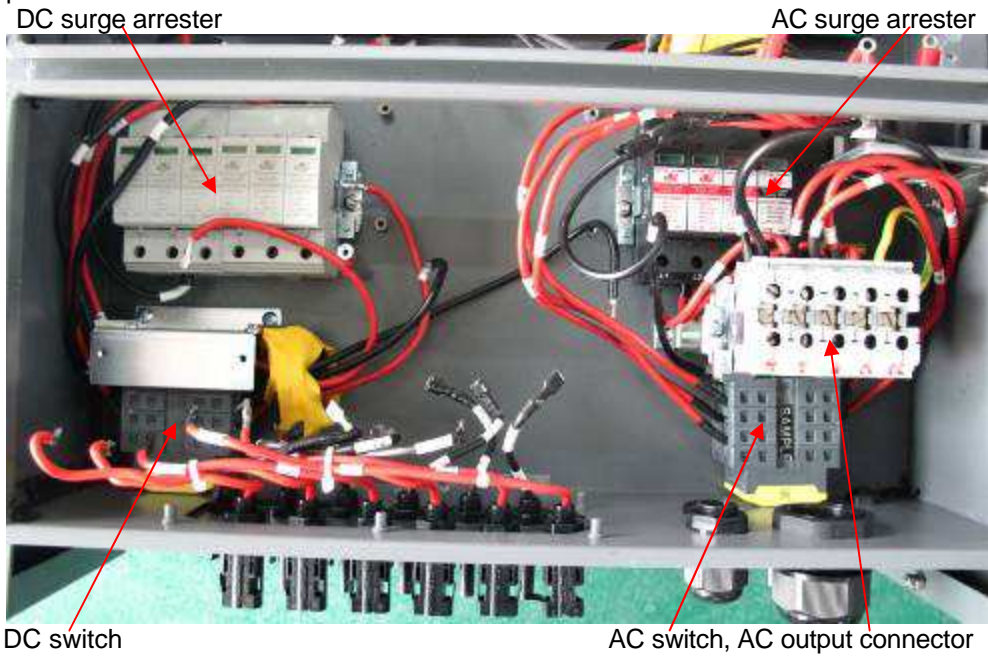


Internal view of the unit

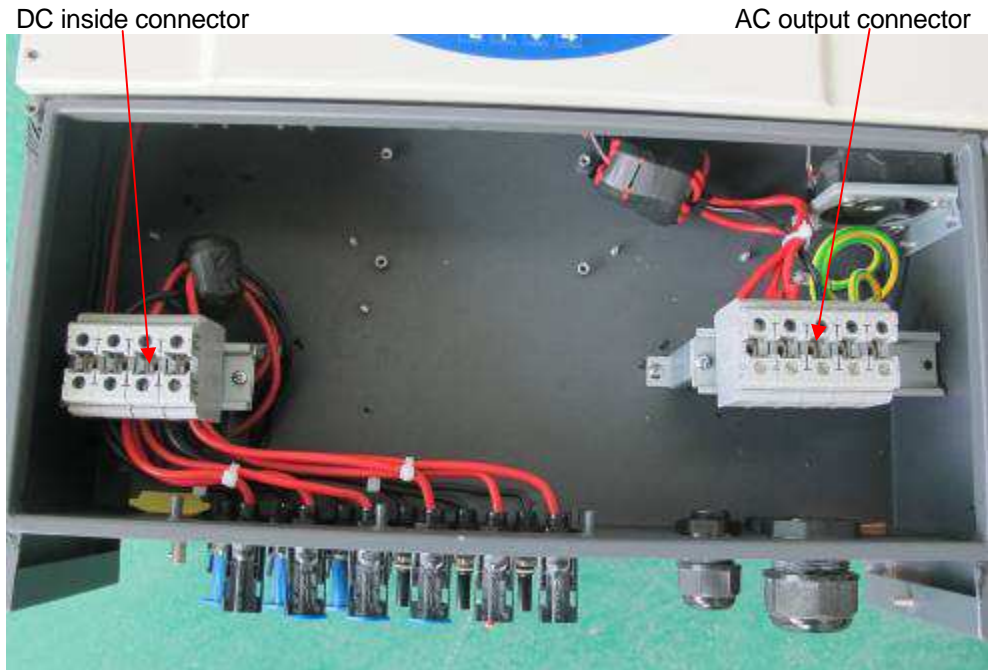


Internal view of the unit

Appendix A: photos



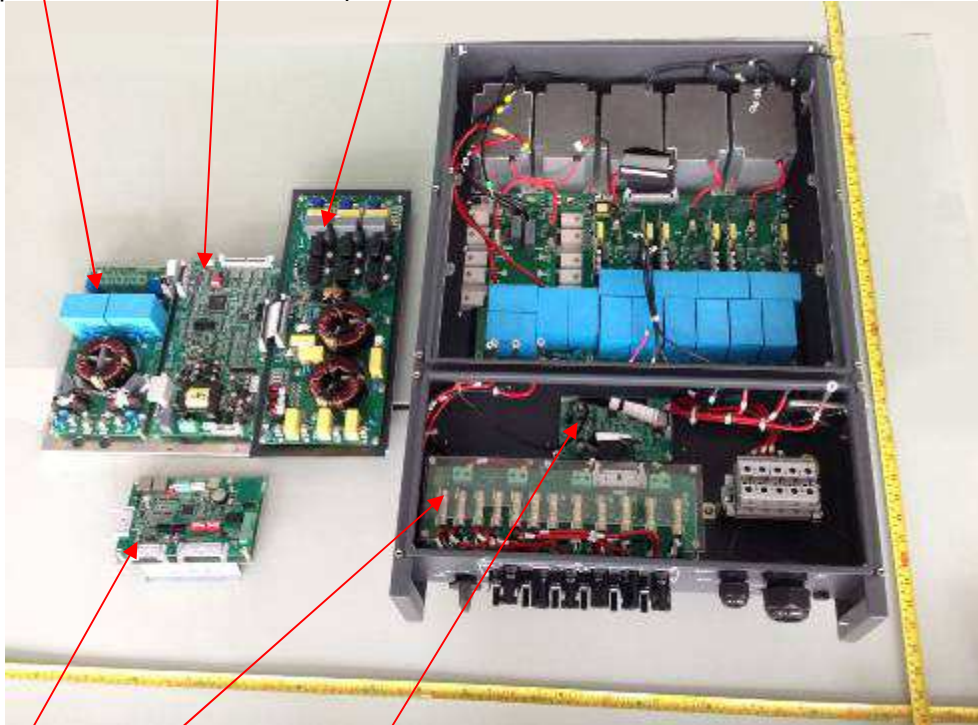
Internal view of the unit



Internal view of the unit

Appendix A: Photos

Input board, Control board, Output board



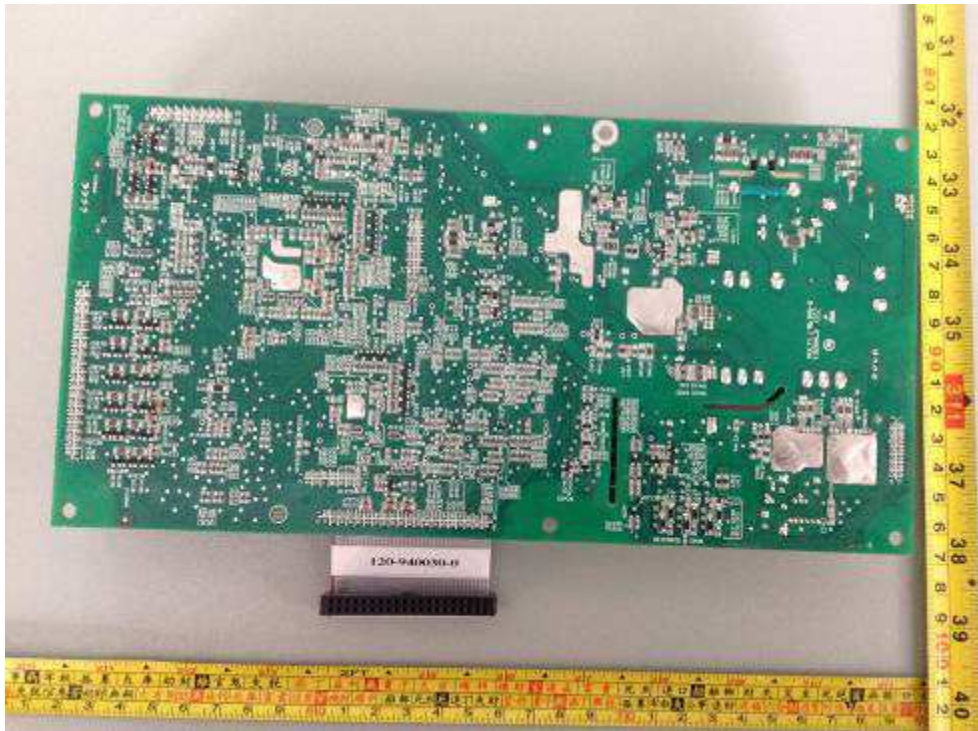
COM board, Fuse board, String detection board

Internal view of the unit



Front view of the control board

Appendix A: Photos



Bottom view of the control board

(End of report)