



**Type Verification Test Report (UK-G59 Issue 3)**

It includes the Generating Units supplier declaration of compliance with the requirements of Engineering Recommendation G59/3.			
<b>Type Tested Reference Number</b>		Photovoltaic Grid-tied Inverter	
<b>Generating Unit Type</b>		SolarLake 12000TL-PM/ SolarLake 15000TL-PM/ SolarLake 17000TL-PM/ SolarLake 20000TL-PM	
<b>System Supplier Name</b>		Samil Power Co., Ltd.	
<b>Address</b>		No.6 Xuefengshan Road, Suqian High-tech Industrial Development Zone, Jiangsu Province, P. R. China	
<b>Tel</b>	+86-510-83593132	<b>Fax</b>	+86-510-83593136
<b>E:mail</b>	info@samilpower.com	<b>Web site</b>	www.samilpower.com
<b>Maximum Export Capacity</b>		<b>Connection Option</b>	
		NA	kW single phase
		12	kW three phases(SolarLake 12000TL-PM)
		15	kW three phases(SolarLake 15000TL-PM)
		17	kW three phases(SolarLake 17000TL-PM)
		20	kW three phases(SolarLake 20000TL-PM)
		NA	kW two phases in three phases system
NA	kW two phases split phases system		
<b>SSEG manufacturer/supplier declaration.</b>			
I certify on behalf of the company named above as a supplier of a generating unit, that all products supplied by the company with the above Type Test reference number will be manufactured and tested to ensure that they perform as stated in this document, prior to shipment to site and that no site modifications are required to ensure that the product meets all the requirements of G59/3.			
<b>Signed</b>			On behalf of Samil Power Co., Ltd.



SolarLake 20000TL-PM							
Power Quality. Harmonics.							
Generating Unit rating per phase (rpp)			6.6	kVA		Harmonic % = Measured Value(Amps) *23/rating per phase(kVA)	
Harmonic	At 45-55% of rated output			100% of rated output		Limit in BS EN 61000-3-12	
	Measured Value (MV) in Amps	%	Measured Value (MV) in Amps	%	1 phase	3 phase	
2	L1	19.046	0.154	0.032	0.112	8%	8%
	L2	19.010	0.128	0.015	0.051		
	L3	19.025	0.096	0.033	0.113		
3	L1	0.029	0.259	0.054	0.185	21.6%	Not stated
	L2	0.024	0.054	0.021	0.071		
	L3	0.018	0.304	0.060	0.208		
4	L1	0.049	0.019	0.004	0.012	4%	4%
	L2	0.010	0.036	0.001	0.003		
	L3	0.058	0.040	0.009	0.032		
5	L1	0.004	0.200	0.090	0.311	10.7%	10.7%
	L2	0.007	0.058	0.072	0.249		
	L3	0.008	0.170	0.088	0.302		
6	L1	0.038	0.003	0.003	0.01	2.67%	2.67%
	L2	0.011	0.016	0.004	0.014		
	L3	0.032	0.025	0.002	0.006		
7	L1	0.000	0.108	0.073	0.253	7.2%	7.2%
	L2	0.003	0.117	0.061	0.21		
	L3	0.005	0.006	0.039	0.133		
8	L1	0.020	0.038	0.003	0.009	2%	2%
	L2	0.022	0.024	0.007	0.023		
	L3	0.001	0.037	0.006	0.021		
9	L1	0.007	0.188	0.045	0.155	3.8%	Not stated
	L2	0.005	0.035	0.012	0.043		
	L3	0.007	0.141	0.033	0.115		
10	L1	0.036	0.054	0.000	0.001	1.6%	1.6%
	L2	0.007	0.016	0.001	0.005		
	L3	0.027	0.025	0.003	0.009		



<b>11</b>	<b>L1</b>	0.029	0.152	0.009	0.031	3.1%	3.1%
	<b>L2</b>	0.030	0.160	0.012	0.04		
	<b>L3</b>	0.025	0.134	0.020	0.07		
<b>12</b>	<b>L1</b>	0.005	0.025	0.005	0.017	1.33%	1.33%
	<b>L2</b>	0.001	0.005	0.009	0.03		
	<b>L3</b>	0.003	0.016	0.003	0.01		
<b>13</b>	<b>L1</b>	0.032	0.166	0.037	0.128	2%	2%
	<b>L2</b>	0.028	0.145	0.025	0.085		
	<b>L3</b>	0.031	0.162	0.047	0.163		
<b>THD</b>	<b>L1</b>	-	0.635	-	0.615	23%	13%
	<b>L2</b>	-	0.507	-	0.5		
	<b>L3</b>	-	0.605	-	0.621		
<b>PWHD</b>	<b>L1</b>	-	0.411	-	0.359	23%	22%
	<b>L2</b>	-	0.413	-	0.353		
	<b>L3</b>	-	0.409	-	0.417		



SolarLake 20000TL-PM								
Power Quality. Voltage fluctuations and Flicker.								
	Starting			Stopping			Running	
	$d_{max}$ [%]	$d_c$ [%]	$d_{(t)}$ [%]	$d_{max}$ [%]	$d_c$ [%]	$d_{(t)}$ [%]	$P_{st}$	$P_{it}$ 2 hours
Measured Values	0.37	0.16	0	0.40	0.22	0	0.08	0.08
Normalised to standard impedance and 3.68kW for multiple units	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Limits set under BS EN 61000-3-2	4%	3.3%	3.3% 500ms	4%	3.3%	3.3% 500ms	1.0	0.65
Test start date	02\09\2014			Test end date	02\09\2014			
Test location	Eurofins Product Testing Service (Shanghai)Co.,Ltd.							

SolarLake 12000TL-PM									
Power Quality. DC injection.									
Test power level	10%			55%			100%		
	L1	L2	L3	L1	L2	L3	L1	L2	L3
Recorded value	0.017	0.001	0.009	0.020	0.013	0.030	0.019	0.019	0.018
as % of rated AC current	0.096	0.008	0.051	0.115	0.076	0.173	0.111	0.111	0.100
Limit	0.25%			0.25%			0.25%		

SolarLake 20000TL-PM									
Power Quality. DC injection.									
Test power level	10%			55%			100%		
	L1	L2	L3	L1	L2	L3	L1	L2	L3
Recorded value	0.011	0.015	0.015	0.017	0.013	0.001	0.010	0.018	0.001
as % of rated AC current	0.039	0.051	0.052	0.060	0.045	0.002	0.035	0.064	0.003
Limit	0.25%			0.25%			0.25%		



<b>SolarLake 12000TL-PM</b>				
<b>Power Quality. Power factor.</b>				
	<b>216.2V</b>	<b>230V</b>	<b>253V</b>	<b>Measured at three voltage levels and at full output. Voltage to be maintained within <math>\pm 1.5\%</math> of the stated level during the test.</b>
<b>Measured value</b>	0.999	0.999	0.999	
<b>Limit</b>	>0.95	>0.95	>0.95	

<b>SolarLake 20000TL-PM</b>				
<b>Power Quality. Power factor.</b>				
	<b>216.2V</b>	<b>230V</b>	<b>253V</b>	<b>Measured at three voltage levels and at full output. Voltage to be maintained within <math>\pm 1.5\%</math> of the stated level during the test.</b>
<b>Measured value</b>	0.999	0.999	0.999	
<b>Limit</b>	>0.95	>0.95	>0.95	



Protection. Frequency tests						
Function	Setting		Trip test		"No trip tests"	
	Frequency	Time delay	Frequency	Time delay	Frequency/Time	Confirm no trip
U/F stage 1	47.5Hz	20s	47.49 Hz	20.01s	47.7Hz/ 25s	No Trip
U/F stage 2	47Hz	0.5s	46.97 Hz	0.504 s	47.2Hz/ 19.98s	No Trip
					46.8Hz/ 0.48s	No Trip
O/F stage 1	51.5Hz	90s	51.53 Hz	90.01 s	51.3Hz/ 95s	No Trip
O/F stage 2	52Hz	0.5s	52.03 Hz	0.509 s	51.8Hz/ 89.98s	No Trip
					52.2Hz/0.48s	No Trip

Protection. Voltage tests						
L1						
Function	Setting		Trip test		"No trip tests"	
	Voltage	Time delay	Voltage	Time delay	Voltage /Time	Confirm no trip
U/V stage 1	200.1 V	2.5s	200.8 V	2.52 s	204.1V/ 3.5s	No trip
U/V stage 2	184 V	0.5s	184.9 V	0.54 s	188V/ 2.48s	No trip
					180V/ 0.48s	No trip
O/V stage 1	262.2 V	1.0s	260.4 V	1.003 s	258.2V/ 2.0s	No trip
O/V stage 2	273.7 V	0.5s	273.2 V	0.573 s	269.7V/ 0.98s	No trip
					277.7V/ 0.48s	No trip
L2						
Function	Setting	Trip test	"No trip tests"	Function	Setting	Trip test
	Voltage	Time delay	Voltage	Time delay	Voltage /Time	Confirm no trip
U/V stage 1	200.1 V	2.5s	200.6 V	2.52 s	204.1V/ 3.5s	No trip
U/V stage 2	184 V	0.5s	184.8 V	0.576 s	188V/ 2.48s	No trip
					180V/ 0.48s	No trip
O/V stage 1	262.2 V	1.0s	260.2 V	1.004 s	258.2V/ 2.0s	No trip
O/V stage 2	273.7 V	0.5s	273.0 V	0.577 s	269.7V/ 0.98s	No trip
					277.7V/ 0.48s	No trip
L3						



Function	Setting	Trip test	“No trip tests”	Function	Setting	Trip test
	Voltage	Time delay	Voltage	Time delay	Voltage /Time	Confirm no trip
U/V stage 1	200.1 V	2.5s	200.2 V	2.60 s	204.1V/ 3.5s	No trip
U/V stage 2	184 V	0.5s	184.3 V	0.54 s	188V/ 2.48s	No trip
					180V/ 0.48s	No trip
O/V stage 1	262.2 V	1.0s	260.0 V	1.007 s	258.2V/ 2.0s	No trip
O/V stage 2	273.7 V	0.5s	272.6 V	0.56 s	269.7V/ 0.98s	No trip
					277.7V/ 0.48s	No trip
<p><b>Note for Voltage tests the Voltage required to trip is the setting <math>\pm 3.45V</math>. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting <math>\pm 4V</math> and for the relevant times as shown in the table above to ensure that the protection will not trip in error.</b></p>						



Protection. Loss of Mains test according BS EN 62116										
Test conditions			Frequency : 50+/-0.1 Hz $U_N = 230+/-3$ Vac Distortion factor of chokes < 2% Quality = 1							
Disconnection limit			0.5 s							
No.	$P_{EUT}$ (% of EUT rating)	Reactive load (% of $Q_L$ in 6.1.d)	$P_{AC}$ (% of nominal)	$Q_{AC}$ (% of nominal)	Run on Time (ms)			$P_{EUT}$ (W)	$Q_f$	Remarks
1	100	100	0	0	330.5	331.0	330.0	19975	1.04	Test A at BL
4	100	100	-5	-5	76.5	77.5	78.5	19980	1.06	Test A at IB
5	100	100	-5	0	261.0	260.0	259.5	19965	1.09	Test A at IB
6	100	100	-5	+5	241.0	242.0	242.5	19985	1.12	Test A at IB
7	100	100	0	-5	114.5	115.0	116.0	19975	1.02	Test A at IB
8	100	100	0	+5	239.0	238.0	237.5	19968	1.06	Test A at IB
9	100	100	+5	-5	69.0	70.0	71.0	19980	0.98	Test A at IB
10	100	100	+5	0	278.0	279.5	279.0	19960	1.0	Test A at IB
11	100	100	+5	+5	218.0	218.5	219.5	19985	0.97	Test A at IB
12	66	66	0	-5	81.0	81.5	82.0	13202	1.0	Test B at IB
13	66	66	0	-4	73.0	74.0	73.5	13210	1.01	Test B at IB
14	66	66	0	-3	69.5	70.0	71.0	13195	1.01	Test B at IB
15	66	66	0	-2	321.0	320.5	320.0	13205	1.02	Test B at IB
16	66	66	0	-1	224.5	225.0	225.5	13206	1.03	Test B at IB
2	66	66	0	0	247.0	246.5	247.5	13198	1.04	Test B at BL
17	66	66	0	+1	249.0	247.5	248.0	13210	1.04	Test B at IB
18	66	66	0	+2	243.0	242.0	242.5	13190	1.05	Test B at IB
19	66	66	0	+3	223.0	223.5	221.5	13200	1.06	Test B at IB
20	66	66	0	+4	280.5	279.5	279.0	13210	1.07	Test B at IB
21	66	66	0	+5	369.5	370.0	369.5	13196	1.07	Test B at IB
22	33	33	0	-5	69.0	70.0	70.5	6605	0.99	Test C at IB
23	33	33	0	-4	65.0	65.5	64.5	6610	1.0	Test C at IB
24	33	33	0	-3	274.0	275.0	274.0	6595	1.01	Test C at IB
25	33	33	0	-2	192.0	192.5	192.0	6590	1.02	Test C at IB
26	33	33	0	-1	214.0	214.5	215.0	6602	1.04	Test C at IB
3	33	33	0	0	279.5	278.0	277.5	6608	1.05	Test C at BL
27	33	33	0	+1	345.0	345.5	344.5	6610	1.06	Test C at IB





28	33	33	0	+2	269.5	270.5	271.0	6602	1.07	Test C at IB
29	33	33	0	+3	385.0	384.0	383.5	6596	1.09	Test C at IB
30	33	33	0	+4	262.5	263.0	262.5	6605	1.10	Test C at IB
31	33	33	0	+5	174.0	174.5	175.0	6610	1.11	Test C at IB

Protection. Frequency change, Stability test				
	Start Frequency	Change	End Frequency	Confirm no trip
Positive Vector Shift	49.5Hz	+9 degrees		No trip
Negative Vector Shift	50.5Hz	-9 degrees		No trip
Positive Frequency Drift	49.5Hz	+0.19Hz/sec	51.5Hz	No trip
Negative Frequency Drift	50.5Hz	-0.19Hz/sec	47.5Hz	No trip

Protection. Re-connection timer.					
Test should prove that the reconnection sequence starts after a minimum delay of 20 seconds for restoration of voltage and frequency to within the stage 1 settings of table 1.					
Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of table 1.			
180 s	185 s	At 266.2 V	At 196.1 V	At 47.4 Hz	At 51.6 Hz
Confirmation that the SSEG does not re-connect.		No re-connect	No re-connect	No re-connect	No re-connect



<b>Fault level contribution.</b>					
<b>SolarLake 12000TL-PM</b>			<b>SolarLake 20000TL-PM</b>		
<b>For a Inverter SSEG</b>			<b>For a Inverter SSEG</b>		
<b>Time After Fault</b>	<b>Volts</b>	<b>Amps</b>	<b>Time After Fault</b>	<b>Volts</b>	<b>Amps</b>
<b>20ms</b>	23.06	0.94	<b>20ms</b>	23.07	0.96
<b>100ms</b>	23.05	0.93	<b>100ms</b>	23.06	0.96
<b>250ms</b>	23.05	0.93	<b>250ms</b>	23.05	0.95
<b>500ms</b>	23.04	0.92	<b>500ms</b>	23.05	0.93
<b>Time to trip</b>	0.022	In seconds	<b>Time to trip</b>	0.023	In seconds

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