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.			
Type Tested Reference Number	Photovoltaic Grid-tied Inverter		
Generating Unit Type	SolarLake 25000TL-PM/ SolarLake 30000TL-PM		
System Supplier Name	Samil Power Co., Ltd.		
Address	No.6 Xuefengshan Road, Suqian High-tech Industrial Development Zone, Jiangsu Province, P. R. China		
Tel	+86-510-83593132	**Fax**	+86-510-83593136
E:mail	info@samilpower.com	**Web site**	www.samilpower.com

Maximum Export Capacity	**Connection Option**
NA	kW single phase
25	kW three phases(SolarLake 25000TL-PM)
30	kW three phases(SolarLake 30000TL-PM)
NA	kW two phases in three phases system
NA	kW two phases split phases system

SSEG manufacturer/supplier declaration.

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.

Signed	江苏新能源股份有限公司 SAMIL POWER CO. LTD.	**On behalf of**	Samil Power Co., Ltd.

SolarLake 30000TL-PM							
Power Quality. Harmonics.							
Generating Unit rating per phase (rpp)				10	**kVA**	**Harmonic % = Measured Value(Amps) *23/rating per phase(kVA)**	
Harmonic		**At 45-55% of rated output**		**100% of rated output**			
		Measured Value (MV) in Amps	**%**	**Measured Value (MV) in Amps**	**%**	**Limit in BS EN 61000-3-12**	
						1 phase	**3 phase**
2	**L1**	0.075	0.345	0.039	0.092	8%	8%
	L2	0.054	0.246	0.041	0.095		
	L3	0.050	0.229	0.051	0.118		
3	**L1**	0.043	0.199	0.084	0.195	21.6%	Not stated
	L2	0.133	0.603	0.136	0.314		
	L3	0.089	0.411	0.045	0.105		
4	**L1**	0.042	0.192	0.035	0.082	4%	4%
	L2	0.058	0.266	0.035	0.080		
	L3	0.057	0.260	0.023	0.053		
5	**L1**	0.297	1.365	0.600	1.396	10.7%	10.7%
	L2	0.261	1.188	0.429	0.989		
	L3	0.430	1.978	0.390	0.906		
6	**L1**	0.004	0.018	0.015	0.034	2.67%	2.67%
	L2	0.006	0.028	0.004	0.008		
	L3	0.005	0.025	0.011	0.025		
7	**L1**	0.153	0.703	0.627	1.460	7.2%	7.2%
	L2	0.114	0.518	0.613	1.413		
	L3	0.169	0.777	0.671	1.559		
8	**L1**	0.015	0.067	0.015	0.034	2%	2%
	L2	0.012	0.054	0.020	0.045		
	L3	0.010	0.047	0.013	0.031		
9	**L1**	0.021	0.095	0.050	0.115	3.8%	Not stated
	L2	0.051	0.234	0.026	0.060		
	L3	0.045	0.205	0.030	0.069		
10	**L1**	0.008	0.038	0.008	0.019	1.6%	1.6%
	L2	0.005	0.023	0.006	0.013		
	L3	0.001	0.006	0.009	0.021		

11	**L1**	0.077	0.355	0.150	0.350	3.1%	3.1%
	L2	0.058	0.262	0.111	0.256		
	L3	0.049	0.225	0.133	0.309		
12	**L1**	0.005	0.023	0.004	0.008	1.33%	1.33%
	L2	0.007	0.033	0.002	0.004		
	L3	0.004	0.020	0.003	0.006		
13	**L1**	0.131	0.602	0.012	0.028	2%	2%
	L2	0.134	0.608	0.015	0.036		
	L3	0.140	0.674	0.023	0.054		
THD	**L1**	-	1.856	-	2.077	23%	13%
	L2	-	1.782	-	1.794		
	L3	-	2.395	-	1.852		
PWHD	**L1**	-	3.24	-	10.38	23%	22%
	L2	-	3.69	-	12.19		
	L3	-	3.36	-	11.00		

SolarLake 30000TL-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_{lt} 2 hours**
Measured Values	0.000	0.000	0.000	0.000	0.000	0.000	0.064	0.064
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	06\05\2014			**Test end date**	06\05\2014			
Test location	Eurofins Product Testing Service (Shanghai)Co.,Ltd.							

SolarLake 25000TL-PM									
Power Quality. DC injection.									
Test power level	**10%**			**55%**			**100%**		
	L1	**L2**	**L3**	**L1**	**L2**	**L3**	**L1**	**L2**	**L3**
Recorded value	0.02	0.018	0.015	0.032	0.03	0.025	0.04	0.032	0.022
as % of rated AC current	0.055	0.049	0.041	0.088	0.082	0.068	0.110	0.088	0.060
Limit	**0.25%**			**0.25%**			**0.25%**		

SolarLake 30000TL-PM									
Power Quality. DC injection.									
Test power level	**10%**			**55%**			**100%**		
	L1	**L2**	**L3**	**L1**	**L2**	**L3**	**L1**	**L2**	**L3**
Recorded value	0.004	0.016	0.007	0.003	0.007	0.025	0.004	0.011	0.012
as % of rated AC current	0.009	0.037	0.016	0.007	0.016	0.057	0.009	0.025	0.028
Limit	**0.25%**			**0.25%**			**0.25%**		

SolarLake 25000TL-PM				
Power Quality. Power factor.				
	216.2V	**230V**	**253V**	**Measured at three voltage levels and at full output. Voltage to be maintained within ±1.5% of the stated level during the test.**
Measured value	0.999	0.999	0.999	
Limit	**>0.95**	**>0.95**	**>0.95**	

SolarLake 30000TL-PM				
Power Quality. Power factor.				
	216.2V	**230V**	**253V**	**Measured at three voltage levels and at full output. Voltage to be maintained within ±1.5% of the stated level during the test.**
Measured value	0.999	0.999	0.999	
Limit	**>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
Note for Voltage tests the Voltage required to trip is the setting ±3.45V. 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 ±4V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.						

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	417	415	376	29750	1.04	Test A at BL
4	100	100	-5	-5	212	217	211	28450	1.06	Test A at IB
5	100	100	-5	0	301	305	303	28370	1.09	Test A at IB
6	100	100	-5	+5	326	330	324	28520	1.12	Test A at IB
7	100	100	0	-5	247	249	248	29840	1.02	Test A at IB
8	100	100	0	+5	332	335	333	29980	1.06	Test A at IB
9	100	100	+5	-5	241	245	243	31530	0.98	Test A at IB
10	100	100	+5	0	311	317	313	31480	1.0	Test A at IB
11	100	100	+5	+5	263	267	266	31370	0.97	Test A at IB
12	66	66	0	-5	206	210	226	19800	1.0	Test B at IB
13	66	66	0	-4	318	323	320	19800	1.01	Test B at IB
14	66	66	0	-3	193	196	195	19810	1.01	Test B at IB
15	66	66	0	-2	242	246	245	19810	1.02	Test B at IB
16	66	66	0	-1	193	196	197	19820	1.03	Test B at IB
2	66	66	0	0	227	232	229	19820	1.04	Test B at BL
17	66	66	0	+1	337	343	338	19820	1.04	Test B at IB
18	66	66	0	+2	329	333	331	19820	1.05	Test B at IB
19	66	66	0	+3	276	279	276	19820	1.06	Test B at IB
20	66	66	0	+4	214	216	213	19820	1.07	Test B at IB
21	66	66	0	+5	365	368	365	19820	1.07	Test B at IB
22	33	33	0	-5	296	299	297	10070	0.99	Test C at IB
23	33	33	0	-4	319	322	318	10070	1.0	Test C at IB
24	33	33	0	-3	324	327	322	10070	1.01	Test C at IB
25	33	33	0	-2	175	178	174	10070	1.02	Test C at IB
26	33	33	0	-1	344	348	345	10070	1.04	Test C at IB
3	33	33	0	0	296	299	297	10070	1.05	Test C at BL
27	33	33	0	+1	349	353	347	10070	1.06	Test C at IB
28	33	33	0	+2	210	213	209	10070	1.07	Test C at IB

29	33	33	0	+3	186	188	184	10070	1.09	Test C at IB
30	33	33	0	+4	253	256	252	10070	1.10	Test C at IB
31	33	33	0	+5	330	334	331	10070	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	188 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

Fault level contribution.					
SolarLake 25000TL-PM			**SolarLake 30000TL-PM**		
For a Inverter SSEG			**For a Inverter SSEG**		
Time After Fault	**Volts**	**Amps**	**Time After Fault**	**Volts**	**Amps**
20ms	23.06	0.94	**20ms**	23.07	0.96
100ms	23.05	0.93	**100ms**	23.06	0.96
250ms	23.05	0.93	**250ms**	23.05	0.95
500ms	23.04	0.92	**500ms**	23.05	0.93
Time to trip	0.022	In seconds	**Time to trip**	0.023	In seconds

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