

Engineering Recommendation G59/2

GENERATING PLANT DETAILS

Generating Plant Type reference: STL 400		
Generating Plant Technology: PHOTOVOLTAIC GRID TIED INVERTER		
Manufacturer: SELCO s.r.l.	Tel: +39 049 9413200	Address: Via Palladio 19 35019 Onara di Tombolo (PADOVA) ITALY
	Fax: +39 049 9413331	
Technical file reference No:		
Maximum export capability (Generating Plant rating less parasitic load): 4000W		

TEST HOUSE DETAILS

Name and address of test house:	SELCO s.r.l. R&D Laboratory Via Palladio 19, 35019 Onara di Tombolo (PADOVA) - ITALY
Telephone number:	+39 049 9413200
Facsimile number:	+39 049 9413331
Email address:	info@selcoenergy.it

Signed	 Lino Frasson – Chief Executive SELCO s.r.l. – Via Palladio 19 – 35019 Onara di Tombolo (PD) - ITALY
Date: 28/2/2013	

G59/2 - Appendix A13.1 - Type Verification Test Report

POWER QUALITY

Harmonics Emissions								
Minimal Short Circuit Ratio R_{scc} : 33								
Value of Short Circuit Power S_{sc} corresponding to R_{scc} : 396kVA								
Equipment Phases: Single Phase								
Description	Harmonic Current % = $100I_n/I_1$						Harmonic Current Distortion Factors (%)	
Harmonic:	I_3	I_5	I_7	I_9	I_{11}	I_{13}	THD	PWHD
Limit at $R_{scc} = 33$:	21.6	10.7	7.2	3.8	3.1	2	23	23
Actual Value:	0.252	0.267	0.356	0.095	0.337	0.184	0.993	0.669
Notes: Detailed requirements are specified in BSEN 61000-3-12								

Voltage Fluctuations					
Equipment meets BSEN 61000-3-3: Yes					
If equipment does not meet BSEN 61000-3-3:					
i)	Does equipment require a supply rated $\geq 100A$?			--	
ii)	If the answer to i) is no, specify the value of Z_{ref} :			--	
iii)	If the answer to i) is no, specify the value of Z_{max} :			--	
	Voltage Disturbance				
	P_{st}	P_{lt}	$d(t) > 3.3\%$	$d_c\%$	$d_{max}\%$
Limit (at Z_{ref})	1.0	0.65	0.5	3.3	4
Actual Value (at Z_{ref})	0.252	0.249	0.0	0.1	1.1
Notes: Detailed requirements are specified in BSEN 61000-3-11 and BSEN 61000-3-3.					

PROTECTION TESTS

	DC injection			Power factor		
Limit	0.25% I_{NOM} = 43mA tested at three power levels			0.95 lag – 0.95 lead at three voltage levels		
Test Point	10%	55%	100%	212V	230V	248V
Value Measured	10mA	10mA	10mA	>0.99	>0.99	>0.99

Protection	Setting		Test Result	
Over Voltage Stage 1	Volts	Sec	Volt	Sec
L1-N or L1-L2	262.2V	1 s	265.7V	1.0 – 1.5s
L2-N or L1-L3	--	--	--	--
L3-N or L1-L3	--	--	--	--
Over Voltage Stage 2	Volts	Sec	Volt	Sec
L1-N or L1-L2	273.7V	0.5 s	277.2V	0.5 – 1.0s
L2-N or L1-L3	--	--	--	--
L3-N or L1-L3	--	--	--	--
Under Voltage Stage 1	Volts	Sec	Volt	Sec
L1-N or L1-L2	200.1V	2.5 s	196.5V	2.5 – 3.0s
L2-N or L1-L3	--	--	--	--
L3-N or L1-L3	--	--	--	--
Under Voltage Stage 2	Volts	Sec	Volt	Sec
L1-N or L1-L2	184V	0.5 s	180.4V	0.5 – 1.0s
L2-N or L1-L3	--	--	--	--
L3-N or L1-L3	--	--	--	--
Over Frequency Stage 1	Hertz	Sec	Hertz	Sec
	51.5 Hz	90 s	51.6Hz	90.0 – 90.5s
Over Frequency Stage 2	Hertz	Sec	Hertz	Sec
	52 Hz	0.5 s	52.1Hz	0.5 – 1.0s
Under Frequency Stage 1	Hertz	Sec	Hertz	Sec
	47.5 s	20 s	47.4Hz	20.0 - 20.5s
Under Frequency Stage 2	Hertz	Sec	Hertz	Sec
	47 Hz	0.5 s	46.9Hz	0.5 – 1.0s
Other relevant protection	--	--	--	--

LOSS OF MAINS TEST

Method used: Frequency shift and Active Power variation			
Output power level	10%	55%	100%
Trip setting	0.5s	0.5s	0.5s
Trip value	<0.5s	<0.5s	<0.5s

RECONNECTION TIMES

Reconnection Time	Under/Over Voltage	Under/Over Frequency	Loss of mains
Minimum value	180 s	180 s	180 s
Actual Setting	180 s	180 s	180 s
Recorded value	>190s	>190s	>190s

FAULT LEVEL CONTRIBUTION

As Photovoltaic SSEGs are inverter-connected, they are deemed to automatically comply with regulations and no further tests are required.

SELF MONITORING – SOLID STATE SWITCHING

Not applicable as electro-mechanical relays are used.