Tesla, Inc.

3500 Deer Creek Road

Palo Alto, California, 94304

Product: Powerwall 3, Model #: 1707000-xx-y and

Backup Gateway 2.0, Model#: 1152100-xx-y

Registered Capacity: 11.04kW

Manufacturers Declaration of Conformity

Tesla, Inc. certify and declare under their sole responsibility that the above-referenced product(s), is in conformity with the following specifications applied:

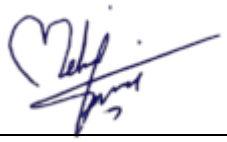
G100 Issue 2 – Amendment 2

Engineering Recommendation G100 Issue 2 2022 Amendment 2

Technical Requirements for Customers' Export and Import Limitation Schemes

Products must be installed and operated with reference to the instructions in the Product Manual.

The following Notified Body; SGS Tecnos S.A. located at C/ Trespaderne, 29 - Edificio Barajas 1 28042 Madrid, Spain has issued a positive Statement of Opinion based on test report number 230419RECO01C_AM1.



04/11/2024 (mm/dd/yyyy)

Mehran Zamani Date

Grid Staff Compliance Engineer

Appendix B – Manufacturer's CLS Product Information

This form is available in a Microsoft Word version from the ENA's website.

G100/2 - Form B - Compliance Verification Report for Customer Export or Import Limitation Schemes

This form shall be used by the **Manufacturer** to demonstrate and declare compliance with the requirements of EREC G100. The form can be used in a variety of ways as detailed below:

1. For **Fully Type Tested** status
   The **Manufacturer** can use this form to obtain **Fully Type Tested** status for a **CLS** by registering this completed form with the Energy Networks Association (ENA) Type Test Register.
2. To obtain **Type Tested** status for a product
   The **Manufacturer** can use this form to obtain **Type Tested** status for one or more **Components** which are used in a **CLS** by registering this form with the relevant parts completed with the Energy Networks Association (ENA) Type Test Register.
3. One-off Installation
   The **Installer** can use this form to confirm that the **CLS** has been tested to satisfy the requirements of this EREC G100. This form shall be submitted to the **DNO** before commissioning.

A combination of (2) and (3) can be used as required, together with Form C where compliance of the **CLS** is to be demonstrated on site.

Note:

If the **CLS** is **Fully Type Tested** and registered with the Energy Networks Association (ENA) Type Test Register, Form C shall include the **Manufacturer**'s reference number (the Type Test Register system reference), and this form does not need to be submitted.

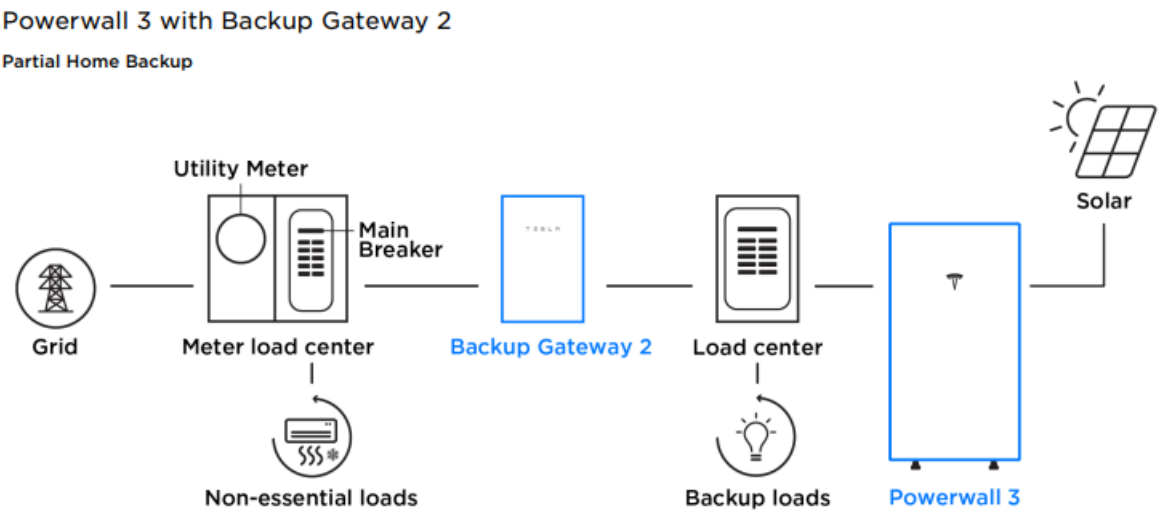
Where the **CLS** is not registered with the ENA Type Test Register or is not **Fully Type Tested** this form (all or in parts as applicable) shall be completed and provided to the **DNO**, to confirm that the **CLS** has been tested to satisfy all or part of the requirements of this EREC G100.

CLS Designation		Powerwall 3 + Backup Gateway 2	
Manufacturer name		Tesla Inc.	
Address		3500 Deer Creek Road Palo Alto, California, 94304	
Tel	1-408-876-1303	Web site	www.tesla.com
E:mail	mzamani@tesla.com		
Installer's name			
Address			
Tel		Web site	
E:mail			

Export/Import capabilities			
Export	Y	Import	N

Description of Operation

EREC G100 requires a description of the **CLS**, and schematic diagram, to be provided to the **Customer**. Please provide that description and the diagram here.



CLS is composed of Powerwall 3 and Backup Gateway 2 that controls the export on the Point of Coupling. Within the Backup Gateway enclosure is a microprocessor controlled power contactor, inclusive of line- and load-side voltage sensing and current measurement. In addition, the Backup Gateway contains a meter in which the CTs that measure the site net load connect to.

Powerwall 3 is managed by a software platform that allows the system to provide grid services, economic returns, and energy security while maintaining system limits. System limits can vary depending on the connection of the Powerwall 3, the electrical infrastructure on site, and the interconnection of the system.

Power Control System (PCS) is a term used by Tesla to refer software controls of production sources (Solar & Battery) to maintain system limits. PCS software can limit the power of a Powerwall 3 system to safely interconnect with a variety of home electrical system ratings. As a result, PCS can help avoid expensive electrical upgrades, complicated load relocation, or a reduction in system performance.
PCS methodology and implementation can be used to manage a system to enforce the following limits:

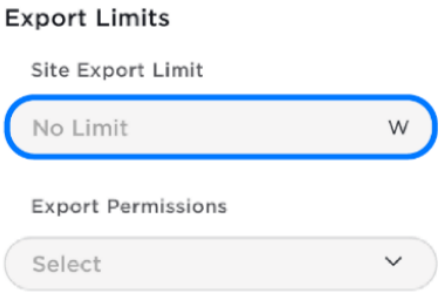
- Site Limit: To prevent excess Import/Export through the site meter to/from the utility connection. Tesla PCS software curtails both battery and/or solar, and compensates by having Powerwall charge or discharge to prevent exceeding the configured limits
- Conductor Limit: To prevent excess current through specific monitored and controlled conductors. Tesla PCS software both curtails battery and/or solar, and compensates by having Powerwall charge or discharge to prevent exceeding the configured limits
- Panel Limit: To prevent excess current experienced by a virtual panel, fed by a sum of site, solar, and batteries. Tesla PCS software curtails battery and/or solar to prevent exceeding the configured limits

Tesla PCS software manages the output of the battery and controlled solar in a best effort approach to prevent exceeding each of the configured limits.
Tesla uses Site Limit feature to comply with G100 CLS requirements.
Every system has a Site meter which monitors energy flow to and from the grid. The Site Limit feature allows the installer to set Site Export limits to ensure the system does not exceed the amount of power

that can be exported per site requirements. As described below, Site Export limits can be set to restrict export to a numerical value (e.g. can only export up to 10 kW).

Site Export Permissions: Site Export Permissions determine whether Powerwall 3 (the battery) and/or Solar can export to the grid. Site Export Permissions are determined by the utility, the permit, and the interconnect agreement. Installer can configure the site export while commissioning.

Site Export Limits: For systems that can export to the grid, there may be a limit on how much power the site is allowed to export. In this case a Site Export Limit can be set to comply with that power limit. The Site Export Limit is set on the Import & Export Limits page in the Setup App. Once the system is commissioned with the site limits set, the limits cannot be changed by installer/end-user and Tesla support is needed.



4.3.2 State 2 – Occasional Excursion

In case of excursion beyond the limit, the Backup Gateway 2 controls the Powerwall 3 by reducing its power. The reduction of power is achieved as fast as possible and always in less than 15s.

4.3.3 State 3 – Failed State

State 3 is not achieved by the system, as there is no case in which the limit is overpassed for more than 15s, and failures on component supply are not possible on a simple fault condition. (Several faults, including grid fault are necessary to cause a failure of supply on the control system). Test have been performed to probe that communication faults lead to disconnection of the Powerwall 3

Communications Media
Document the provisions made for the use of various communication media, and both the inherent characteristics and the design steps made to ensure security and reliability.
Tesla PCS software controls the entire energy storage site and communicates over CAN bus at 10Hz. Backup Gateway is a part of a Powerwall 3 system and contain current sensor(s) per phase as needed, to act as a site and/or solar meter, which measure the grid and uncontrolled power production sources. CAN bus is only used by Tesla equipment, with each device uniquely enumerated, and built in message prioritization. CAN is also a "Push" style messaging service, so devices like meters report their data right when it is available, significantly reducing latency or jitter and reducing overhead and data usage. Backup Gateway communicates to Powerwall at 250k Baud rate over the CAN.
Cyber Security
Confirm that the **Manufacturer** or **Installer** of the **CLS** has provided a statement describing how the **CLS** has been designed to comply with cyber security requirements.
Manufacturer has provided the following statement declaration for cybersecurity compliance. The Tesla Energy Cybersecurity Program is modelled after the NISTIR 7628 framework, which itself is modelled after the following publications: • NIST 800-53, Revision 3, Recommended Security Controls for Federal Information Systems and Organizations, August 2009 • NERC CIP 002, 003-009, Version 5 • Catalog of Control Systems Security: Recommendations for Standards Developers, Department of Homeland Security, March 2010 • ISA99 / IEC62443
Power Quality Requirements
Where the **CLS** includes the power electronics that controls generation or loads (as opposed to the power electronics being included in **Devices** that are subject to their own power quality compliance requirements) please submit the harmonic and disturbance information here as required by EREC G5 and EREC P28.
Tested according G99 standard: Refer to result tables below.

2. Power Quality – Harmonics:
For **Power Generating Module**s of **Registered Capacity** of less than 75 A per phase (ie 50 kW) the test requirements are specified in Annex A.7.1.5. These tests should be carried out as specified in BS EN 61000- 3-12, and measurements for the 2^{nd} – 13^{th} harmonics should be provided. The results need to comply with the limits of Table 2 of BS EN 61000-3-12 for single phase equipment and Table 3 of BS EN 610000-3-12 for three phase equipment. For three phase **Power Generating Module**s, measurements for all phases should be provided.
For **Power Generating Module**s of **Registered Capacity** of greater than 75 A per phase (ie 50 kW) the installation shall be designed in accordance with EREC G5.

The rating of the **Power Generating Module** (per phase) should be provided below, and the Total Harmonic Distortion (THD) and Partial Weighted Harmonic Distortion (PWHD) should be provided at the bottom of this section.

Power Generating Module tested to BS EN 61000-3-12

Power Generating Module rating per phase (rpp)				11.04		kVA	Harmonic % = Measured Value (A) x 23/rating per phase (kVA)	
Single or three phase measurements (for single phase measurements, only complete L1 columns below).				1 Phase Powerwall 3 is a single-phase device whereas Backup Gateway (CLS) is a 3-Phase device, thus we can connect Powerwall 3 on each phase of the Backup Gateway.				
Harmonic	At 45-55% of **Registered Capacity**						Limit in BS EN 61000-3-12	
	Measured Value (MV) in Amps			Measured Value (MV) in %				
	L1	L2	L3	L1	L2	L3	1 phase	3 phase
2	0.051	--	--	0.107	--	--	8%	8%
3	0.279	--	--	0.580	--	--	21.6%	Not stated
4	0.016	--	--	0.033	--	--	4%	4%
5	0.281	--	--	0.585	--	--	10.7%	10.7%
6	0.015	--	--	0.031	--	--	2.67%	2.67%
7	0.255	--	--	0.532	--	--	7.2%	7.2%
8	0.015	--	--	0.030	--	--	2%	2%
9	0.194	--	--	0.403	--	--	3.8%	Not stated
10	0.014	--	--	0.030	--	--	1.6%	1.6%
11	0.142	--	--	0.295	--	--	3.1%	3.1%
12	0.015	--	--	0.030	--	--	1.33%	1.33%
13	0.112	--	--	0.234	--	--	2%	2%

THD[27]	0.560	--	--	1.167	--	--	23%	13%
PWHD[28]	0.010	--	--	0.022	--	--	23%	22%
Harmonic	At 100% of **Registered Capacity**							
	Measured value (MV) in Amps			Measured value (MV) in %			Limit in BS EN 61000-3-12	
	L1	L2	L3	L1	L2	L3	1 phase	3 phase
2	0.077	--	--	0.159	--	--	4%	8%
3	0.421	--	--	0.878	--	--	21.6%	Not stated
4	0.018	--	--	0.038	--	--	4%	4%
5	0.265	--	--	0.552	--	--	10.7%	10.7%
6	0.026	--	--	0.055	--	--	2.67%	2.67%
7	0.285	--	--	0.595	--	--	7.2%	7.2%
8	0.023	--	--	0.049	--	--	2%	2%
9	0.283	--	--	0.590	--	--	3.8%	Not stated
10	0.033	--	--	0.070	--	--	1.6%	1.6%
11	0.223	--	--	0.465	--	--	3.1%	3.1%
12	0.028	--	--	0.058	--	--	1.33%	1.33%
13	0.184	--	--	0.384	--	--	2%	2%
THD[29]	0.761	--	--	1.586	--	--	23%	13%
PWHD[30]	0.022	--	--	0.045	--	--	23%	22%

[27] THD = Total Harmonic Distortion

[28] PWHD = Partial Weighted Harmonic Distortion

[29] THD = Total Harmonic Distortion

[30] PWHD = Partial Weighted Harmonic Distortion

3. Power Quality – Voltage fluctuations and Flicker:

For **Power Generating Module**s of **Registered Capacity** of less than 75 A per phase (ie 50 kW) these tests should be undertaken in accordance with Annex A.7.1.4.3. Results should be normalised to a standard source impedance, or if this results in figures above the limits set in BS EN 61000-3-11 to a suitable Maximum Impedance.

For **Power Generating Module**s of **Registered Capacity** of greater than 75 A per phase (ie 50 kW) the installation shall be designed in accordance with EREC P28.

The standard test impedance is 0.4 Ω for a single phase **Power Generating Module** (and for a two phase unit in a three phase system) and 0.24 Ω for a three phase **Power Generating Module** (and for a two phase unit in a split phase system). Please ensure that both test and standard impedance are completed on this form. If the test impedance (or the measured impedance) is different to the standard impedance, it must be normalised to the standard impedance as follows (where the **Power Factor** of the generation output is 0.98 or above):

d max normalised value = (Standard impedance / Measured impedance) x Measured value.

Where the **Power Factor** of the output is under 0.98 then the X to R ratio of the test impedance should be close to that of the standard impedance.

The stopping test should be a trip from full load operation.

The duration of these tests needs to comply with the particular requirements set out in the testing notes for the technology under test.

The test date and location must be declared.

Test start date		07/12/2023		Test end date			14/03/2024	
Test location		47400 Kato Rd, Fremont, CA 94538						
	Starting[1]			Stopping[1]			Running	
	d max	d c	d(t)	d max	d c	d(t)	P st	P lt 2 hours
Measured Values at test impedance	1.48	1.36	0.00	1.48	1.36	0.00	0.13	0.12
Normalised to standard impedance	3.29	3.02	0.00	3.29	3.02	0.00	0.29	0.27
Normalised to required maximum impedance	<4%	<3.3%	<3.3%	<4%	<3.3%	<3.3%	<1.0	<0.65
Limits set under BS EN 61000-3-11	4%	3.3%	3.3%	4%	3.3%	3.3%	1.0	0.65
Test Impedance	R	0.15		Ω	Xl	0.15		Ω

Standard Impedance	R	0.24 * 0.4 ^	Ω	Xl	0.15 * 0.25 ^	Ω
Maximum Impedance	R	--	Ω	Xl	--	Ω

* Applies to three phase and split single phase **Power Generating Module**s. Delete as appropriate.

^ Applies to single phase **Power Generating Module** and **Power Generating Module**s using two phases on a three phase system. Delete as appropriate.
([1]) Ramp up/down of 20 seconds.

4. Power quality – DC injection: The tests should be carried out on a single Generating Unit. Tests are to be carried out at three defined power levels ±5%. At 230 V a 50 kW three phase Inverter has a current output of 217 A so DC limit is 543 mA. These tests should be undertaken in accordance with Annex A.7.1.4.4.

The % DC injection ("as % of rated AC current" below) is calculated as follows:

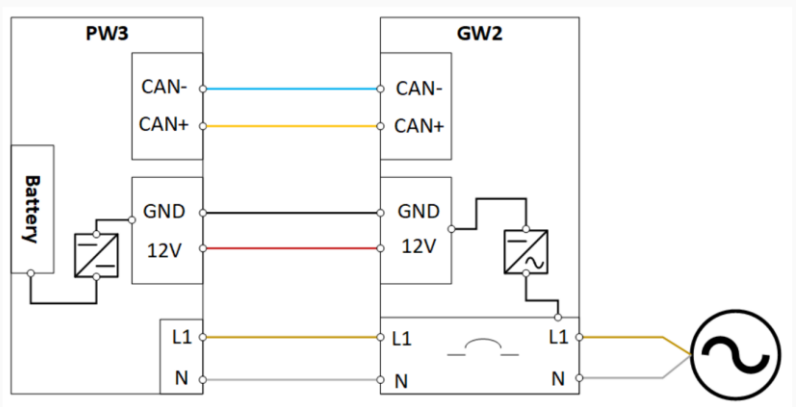
% DC injection = Recorded DC value in Amps / Base current

where the base current is the Registered Capacity (W) / Vphase. The % DC injection should not be greater than 0.25%.

Test power level	10%	55%	100%
Recorded DC value in Amps	0.031	0.043	0.028
as % of rated AC current	0.06	0.09	0.06
Limit	0.25%	0.25%	0.25%

Fail Safe

CLS internal failure: please submit here the description of the internal **Fail Safe** design and operation. Please also document how it has been demonstrated, including the non-volatile recording of times and numbers of state 2 operations, and confirm the overall response of the **CLS** to this internal failure.



The elements considered are represented in the diagram. As can be seen, the supply of the Backup Gateway 2 (GW2) is provided by 2 paths, from Grid, and also from Battery of Powerwall 3 (PW3), that's why failure of supply has not been considered.

It has also been considered the failure of the Current Transducer CT included in the Gateway. Considered as a loss of communication failure.

Communication and power supply failures between **Components** and **Devices**. Please document here compliance with EREC G100 section

Component/Device number/description	Communication failure test	Power supply failure test
CAN Open circuit	Refer to section 4.3 of report 230419RECO01C	N/A
CAN Short circuit (Recovery)	Refer to section 4.3 of report 230419RECO01C	N/A
CT Wire open 1	Refer to section 4.3 of report 230419RECO01C	N/A
CT Wire open 2	Refer to section 4.3 of report 230419RECO01C	N/A
CT Wire open 3	Refer to section 4.3 of report 230419RECO01C	N/A

Operational Tests						
In accordance with EREC G100 undertake the tests A to D to confirm correct operation in state 1 and state 2, that transition into state 3 occurs as required, and that behaviour in state 3 is also as required.						
Test A						
Nominal Export Limit (for type tests this will be at maximum, minimum and one intermediate setting) in Amp:				max MEL 10514 W (45.7 A) min MEL 500 W (2.2 A)		
Nominal Import Limit (for type tests this will be at maximum, minimum and one intermediate setting) in Amp:						
No	Starting level P (%P_{MEL})	Step value ΔP (%P_{MEL})	**CLS** registers change in level?	**CLS** and/or **Component** and/or **Device** initiates correct response of ≥ 5%?	Duration of step in test	Correct state 1/ state 2 operation
1	94.9%	10%	Yes	Maximum MEL Test A.1 Yes, It reduces to State 1	58 s	YES
2	89.8%	15%	Yes	Maximum MEL Test A.2 Yes, It reduces to State 1	58 s	YES
3	74.9%	25%	Yes	Maximum MEL Test A.3 Yes, It reduces to State 1	58 s	YES
4	95.1%	10%	Yes	Mid-point MEL Test A.1 Yes, It reduces to State 1	58 s	YES
5	90.1%	15%	Yes	Mid-point MEL Test A.2 Yes, It reduces to State 1	58 s	YES
6	74.9%	25%	Yes	Mid-point MEL Test A.3 Yes, It reduces to State 1	58 s	YES

7	96.4%	10%	Yes	Minimum MEL Test A.1 Yes, It reduces to State 1	58 s	YES
8	91.0%	15%	Yes	Minimum MEL Test A.2 Yes, It reduces to State 1	58 s	YES
9	79.0%	25%	Yes	Minimum MEL Test A.3 Yes, It reduces to State 1	58 s	YES
Test B						
Nominal Export Limit:					max MEL 10514 W (45.7 A) min MEL 500 W (2.2 A)	
Nominal Import Limit						
No	Starting level P (%P_{MEL})	Step value ΔP (%P_{MEL})	**CLS** registers change in level?	**CLS** and/or **Component** and/or **Device** initiates correct response of ≥ 5%?	Duration of step in test	Correct state 3 operation
10	94.9%	10%	Yes	Maximum MEL Yes, it reduces to State 1	62 s	YES
11	95.1%	10%	Yes	Mid-point MEL Yes, it reduces to State 1	62 s	YES
12	95.1%	10%	Yes	Minimum MEL Yes, it reduces to State 1	62 s	YES

State 3 Reset
Please document how the reset from state 3 to state 1 has been demonstrated. Please include how the reset is achieved. Please confirm that for **CLSs** to be installed in **Domestic installations** three (3) resets causes lockout or that for non-domestic installations lockout can only be reset after four hours. Please explain how lockout is reset.
Disconnection (state 3) is reached only if there are communication failures. Communication failures are not required to lead to a lock of the device. If state-3 is locked out, it can be reset my Tesla or Installer's via remote control.