

TEST REPORT

Product Name : LowPower Generating sets(EcoflowSmart Generator Dual Fuel)
Model Number : EFG200

Prepared for : EcoFlow Inc.
Address : Plant A202, Founder Technology Industrial Park, Shiyan Sub-district, Bao'an District Shenzhen, Guangdong 518000 China

Prepared by : EMTEK (DONGGUAN) CO., LTD.
Address : -1&2F, Building 2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No.9, Xincheng Avenue, Songshanhu High-technology Industrial Development Zone, Dongguan, Guangdong, China

Tel: +86-769-22807078
Fax: +86-769-22807079

Report Number : EDG2206280228S00101R
Date(s) of Tests : June 29, 2022 to July 11, 2022
Date of issue : July 12, 2022



TEST REPORT

California Appliance Efficiency Regulations – Federally regulated battery chargers

Reference No.: EDG2206280228S00101R

Compiled by (+ signature): Silence Li

Approved by (+ signature): Billy Wang

Date of issue: July 12, 2022

Contents: 15 pages



Testing laboratory

Name: EMTEK (DONGGUAN) CO., LTD.

Address: -1&2F., Building 2, Zone A, Zhongda Marine Biotechnology Research and Development Base, No. 9, Xincheng Avenue, Songshanhu High-technology Industrial Development Zone, Dongguan, Guangdong, China

Testing location: Same as above

Client

Applicant name: EcoFlow Inc.

Address: Plant A202, Founder Technology Industrial Park, Shiyan Sub-district, Bao'an District Shenzhen, Guangdong 518000 China

Manufacturer name: Chongqing Rato Technology Co., Ltd.

Address: Zone B, Shuangfu Industry Park, Jiangjin District, Chongqing, China

Factory name: Chongqing Rato Technology Co., Ltd.

Address: Zone B, Shuangfu Industry Park, Jiangjin District, Chongqing, China

Test specification

Standard: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609


Test Method: 10 C.F.R. section 430.23(aa); Appendix Y to Subpart B of Part 430 (Uniform Test Method for Measuring the Energy Consumption of Battery Chargers) as it appeared in the Code of Federal Regulations

Non-standard test method: N.A.

Test item

/

Description: LowPower Generating sets(EcoflowSmart Generator Dual Fuel)

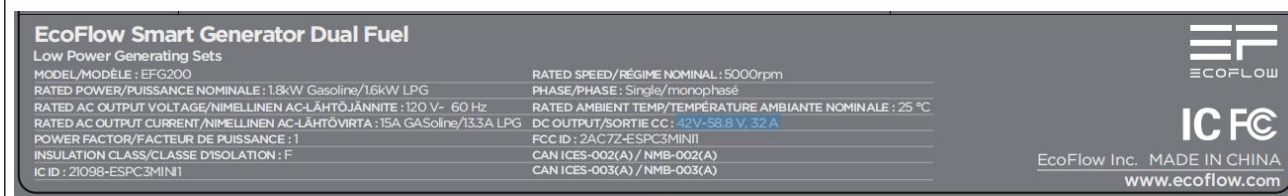
Trademark: 

Model and/or type reference: EFG200

Rating.....: RATED POWER: 1.8kW Gasoline/1.6kW LPG
RATED AC OUTPUT VOLTAGE: 120 V~ 60 Hz
RATED AC OUTPUT CURRENT: 15A GASoline / 13.3A LPG
DC OUTPUT: 42V~58.8 V, 32 A
Internal battery pack: 12.8V, 1.5Ah, 19.2Wh

Copy of marking plate:

Label for Unit:



Summary of test:

The product fulfils the requirements of California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609.

Possible test case verdicts:

- test case does not apply to the test object..... : N (N/A)
- test object does meet the requirement..... : P (Pass)
- test object does not meet the requirement..... : F (Fail)

Testing

Date of receipt of test item..... : June 29, 2022

Date(s) of performance of tests..... : June 29, 2022 to July 11, 2022

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 ☐ comma / ☒ point is used as the decimal separator.

The battery pack consists of four cells in tandem, and the single cells is 3.2V, 1.5Ah, 4.8Wh

The model of cells: 536089LX-1

General product model information:

N/A

1. Test item particulars:

Battery charger type: <input checked="" type="checkbox"/> Federally regulated battery chargers <input type="checkbox"/> Large battery charger system <input type="checkbox"/> Small battery charger system <input type="checkbox"/> Inductive battery charger <input type="checkbox"/> Battery backup and Uninterruptible Power Supplies <input type="checkbox"/> Multi-port Charger <input type="checkbox"/> Multi-voltage Charger <input type="checkbox"/> Multi-capacity Charger <input type="checkbox"/> à la carte charger	
Battery information: Internal rechargeable Lithium-ion (Li-ion) battery used	
Battery chemistry	<input type="checkbox"/> Valve-Regulated Lead Acid (VRLA) <input type="checkbox"/> Flooded Lead Acid <input type="checkbox"/> Silver Zinc <input type="checkbox"/> Nickel Cadmium (NiCd) <input type="checkbox"/> Nickel Metal Hydride (NiMH) <input type="checkbox"/> Lithium-ion Polymer <input type="checkbox"/> Rechargeable Alkaline <input type="checkbox"/> Nanophosphate Lithium-ion <input checked="" type="checkbox"/> Lithium-ion (Li-ion) <input type="checkbox"/> Li-Polymer <input type="checkbox"/> Others, please specify:
The manufacturer of the battery:	HANGZHOU SKYRICH POWER CO., LTD
The model number of the battery:	P12-15-FP
Rating of battery:	12.8V, 1.5Ah, 19.2Wh
Discharge cut off voltage(V)	10V
Number of charger ports (N)	1
The manufacturer of EPS	N/A
The model number of EPS	N/A
BC ¹ marking Location	N/A
Consideration of the foreseeable misuse <input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> Covered through the applied standard <input type="checkbox"/> Covered by the following comment <input type="checkbox"/> Covered by attached risk analysis 1. State-regulated battery charger systems must continue to comply with the requirement to mark the device with a “BC” inside of a circle, as required under Section 1607(d)(10) of Title 20 of the CCR.	

Federally Regulated Battery Chargers Manufactured on or after June 13, 2018. Federally regulated battery chargers manufactured on or after June 13, 2018 must have a unit energy consumption (UEC) less than or equal to the prescribed “Maximum UEC” standard when using the equations for the appropriate product class and corresponding rated battery energy as shown in Table W-1:

Table W-1 Standards for Federally Regulated Battery Chargers Manufactured on or after June 13, 2018

Product class	Product class description	Battery energy(E _{batt} **)	Special characteristic or battery voltage	Maximun UEC (kWh/yr) (as a function of E _{batt} **)
1	Low-Energy	≤5 Wh	Inductive Connection*.	3.04
2	Low-Energy, Low-Voltage	<100 Wh	<4 V	$0.1440 * E_{batt} + 2.95$
3	Low-Energy, Medium-Voltage		4-10 V	For $E_{batt} < 10\text{Wh}$, UEC = 1.42 kWh/yr $E_{batt} \geq 10\text{Wh}$, UEC = $0.0255 * E_{batt} + 1.16$
4	Low-Energy, High-Voltage		>10 V	$0.11 * E_{batt} + 3.18$
5	Medium-Energy, Low-Voltage	≥100 and ≤3000 Wh	<20 V	$0.0257 * E_{batt} + 0.815$
6	Medium-Energy, High-Voltage		≥20 V	$0.0778 * E_{batt} + 2.4$
7	High-Energy	>3000 Wh		$0.0502 * E_{batt} + 4.53$
*Inductive connection and designed for use in a wet environment (e.g. electric toothbrushes).				
** E _{batt} =Rated battery energy as determined in 10 C.F.R. part 429.39(a).				

TABLE 3.2.1—BATTERY SELECTION FOR TESTING

Type of charger			Tests to perform
Multi-voltage	Multi-port	Multi-capacity	Battery selection (from all configurations of all associated batteries)
No	No	No	Any associated battery.
No	No	Yes	Highest charge capacity battery.
No	Yes	Yes or No	Use all ports. Use the maximum number of identical batteries with the highest nameplate battery charge capacity that the charger can accommodate.
Yes	No	No	Highest voltage battery.
Yes	Yes to either or both		Use all ports. Use the battery or configuration of batteries with the highest individual voltage. If multiple batteries meet this criteria, then use the battery or configuration of batteries with the highest total nameplate battery charge capacity at the highest individual voltage.

TABLE 3.3.2—REQUIRED BATTERY DISCHARGE RATES AND END-OF-DISCHARGE BATTERY VOLTAGES

Battery chemistry	Discharge rate (C)	End-of-discharge voltage* (volts per cell)
Valve-Regulated Lead Acid (VRLA)	0.2	1.75
Flooded Lead Acid	0.2	1.70
Nickel Cadmium (NiCd)	0.2	1.0
Nickel Metal Hydride (NiMH)	0.2	1.0
Lithium Ion (Li-Ion)	0.2	2.5
Lithium Polymer	0.2	2.5
Rechargeable Alkaline	0.2	0.9
Nanophosphate Lithium Ion	0.2	2.0
Silver Zinc	0.2	1.2

*If the presence of protective circuitry prevents the battery cells from being discharged to the end-of-discharge voltage specified, then discharge battery cells to the lowest possible voltage permitted by the protective circuitry

Table

The Unit Energy Consumption Calculation:

Unit energy consumption (UEC) shall be calculated for a battery charger using one of the two equations (equation (i) or equation (ii)) listed in this section. If a battery charger is tested and its charge duration as determined in section 3.3.2 of this appendix minus 5 hours is greater than the threshold charge time listed in table 3.3.3 of this appendix (i.e. $(t_{cd} - 5) \cdot n > t_{a\&m}$), equation (ii) shall be used to calculate UEC; otherwise a battery charger's UEC shall be calculated using equation (i).

$$(i) UEC = 365(n(E_{24} - 5P_m - E_{batt}) \frac{24}{t_{cd}} + (P_m(t_{a\&m} - (t_{cd} - 5)n)) +$$

$$(P_{sb}t_{sb}) + (P_{off}t_{off})) \text{ or,}$$

$$(ii) UEC = 365(n(E_{24} - 5P_m - E_{batt}) \frac{24}{(t_{cd}-5)} + (P_{sb}t_{sb}) + (P_{off}t_{off}))$$

Where:

E_{24} = 24-hour energy as determined in section 3.3.10 of this appendix,

E_{batt} = Measured battery energy as determined in section 3.3.8 of this appendix,

P_m = Maintenance mode power as determined in section 3.3.9 of this appendix,

P_{sb} = Standby mode power as determined in section 3.3.11 of this appendix,

P_{off} = Off mode power as determined in section 3.3.12 of this appendix,

t_{cd} = Charge test duration as determined in section 3.3.2 of this appendix, and

$t_{a\&m}$, n , t_{sb} , and t_{off} , are constants used depending upon a device's product class and found in the following table:

TABLE 3.3.3—BATTERY CHARGER USAGE PROFILES:

Product class				Hours per day***			Charges (n)	Thresh old charge time*
Number	Description	Rated battery energy (ebatt)**	Special characteristic or battery voltage	Active + maintenance ($t_{a\&m}$)	Standby (t_{sb})	Off (t_{off})	Number per day	Hours
1	Low-Energy	≤ 5 Wh	Inductive Connection****	20.66	0.10	0.00	0.15	137.73
2	Low-Energy, Low-Voltage	< 100 Wh	< 4 V	7.82	5.29	0.00	0.54	14.48
3	Low-Energy, Medium-Voltage		4-10 V	6.42	0.30	0.00	0.10	64.20
4	Low-Energy, High-Voltage		> 10 V	16.84	0.91	0.00	0.50	33.68
5	Medium-Energy, Low-Voltage	100-3000 Wh	< 20 V	6.52	1.16	0.00	0.11	59.27
6	Medium-Energy, High-Voltage		≥ 20 V	17.15	6.85	0.00	0.34	50.44

Table

7	High-Energy	>3000 Wh		8.14	7.30	0.00	0.32	25.44
---	-------------	----------	--	------	------	------	------	-------

*If the duration of the charge test (minus 5 hours) as determined in section 3.3.2 of appendix Y to subpart B of this part exceeds the threshold charge time, use equation (ii) to calculate UEC otherwise use equation (i).

** E_{batt} = Rated battery energy as determined in 10 CFR part 429.39(a).

***If the total time does not sum to 24 hours per day, the remaining time is allocated to unplugged time, which means there is 0 power consumption and no changes to the UEC calculation needed.

****Inductive connection and designed for use in a wet environment (e.g. electric toothbrushes).



Table

2. General test condition

Ambient temperature(°C): (20±5°C)	23.7°C
Maximum air speed (m/s):<0.5m/s	0.4m/s
For AC input: --	
Test frequency tolerance(Hz): (±1%)	--
Test voltage (V): (±1%)	14.4V
Maximum THD of voltage: (≤2%)	≤2%
Crest factor: (1.34-1.49)	1.40
For DC input, the AC ripple voltage (RMS)shall be	
≤ 0.2V for DC voltages up to 10V, or	--
≤ 2 percent of the DC voltage for DC voltages over 10V	--

3.List Of Measured Or Calculated Values and Test Result

Measurement data			
Sample No.	01	02	03
Input Required Voltage(V)	14.4	14.4	--
Input Required Frequency (Hz)	--	--	--
Input Measured Voltage(V)	14.4	14.4	--
Input Measured Frequency (Hz)	--	--	--
Measured battery energy, E_{batt} (Wh)	20.073	20.440	--
Duration of the charge and maintenance mode test, t_{cd} (h)	24.0	24.0	--
Measured 24-hour energy consumption, E_{24} (Wh)	21.343	21.697	--
Measured maintenance mode power, P_m (W)	0.001	0.001	--
Measured standby mode power, P_{sb} (W)	0	0	--
Measured Off mode power, P_{off} (W)	--	--	--
Active + maintenance ($t_{a\&m}$)	16.84	16.84	--
Standby (t_{sb})	0.91	0.91	--
Off (t_{off})	0	0	--
Charges (n)	0.50	0.50	--
$(t_{cd} - 5) * n$	9.50	9.50	--
Unit energy consumption, UEC (kWh/yr)	0.234	0.231	--
UEC limits (kWh/yr)	5.388	5.428	--
Test result	Pass		

Table

Calculation

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

	UEC	P _m	P _{sb}	P _{off}	E _{batt}	E ₂₄	t _{cd}
\bar{x}	0.233	0.001	0	--	20.257	21.52	24.00

$$UCL = \bar{x} + t_{0.975} \left(\frac{s}{\sqrt{n}} \right)$$

Where:

UCL = Upper Confidence Limit
= Sample mean

n = Number of samples

t_{0.975} = t-statistic for a 97.5% one-tailed confidence interval with
n-1 degrees of freedom (from DOE Appendix A)

s = Sample standard deviation

	UEC
$UCL/_{1.05}$	0.239

(i) for (t_{cd} - 5) * n < t_{a&m}

$$(i) UEC = 365(n(E_{24} - 5P_m - E_{batt}) \frac{24}{t_{cd}} + (P_m(t_{a\&m} - (t_{cd} - 5)n)) + (P_{sb}t_{sb}) + (P_{off}t_{off}))$$

Or , (ii) for (t_{cd} - 5) * n > t_{a&m}

$$(ii) UEC = 365(n(E_{24} - 5P_m - E_{batt}) \frac{24}{(t_{cd}-5)} + (P_{sb}t_{sb}) + (P_{off}t_{off}))$$

Result:

UEC (kWh/yr)	UEC limits (kWh/yr)	P _m	P _{sb}	P _{off}	E _{batt}	E ₂₄	t _{cd}
0.239	5.408	0.01	0	--	20.257	21.52	24.00

Battery chargers manufactured on or after June 13, 2018, must have a unit energy consumption (UEC) less than or equal to the prescribed "Maximum UEC" standard when using the equations for the appropriate product

The results ☒ comply ☐ do not comply with the requirements in US CEC: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 4. Appliance Efficiency Regulations, Sections 1601 through 1609.

Table

Equipment list					
Instrument Code	Instrument Type	Manufacturer	Model	Rating	Calibrate
ESD-300	Digital Power Meter	YOKOGAWA	WT310	600Vac, 20A, 0.5Hz-100KHz, 0-12000W	2022-05-12 to 2023-05-11
ESD-133	Electronic Load	ITECH	IT8512C	120V,60A,300W	2022-05-12 to 2023-05-11
ESD-234	anemometer	BENETECH	GM8901	0~45m/s($\pm 3\%$), 0~45°C($\pm 2\%$)	2022-05-16 to 2023-05-15
ESD-235	Battery analysis meter	Shenzhen Tested Electronic Co., Ltd.	BTS-2004	24V, 5A, 200M Ω	2022-05-12 to 2023-05-11
ESD-062	Stop watch	/	SH-052	24h	2022-05-17 to 2023-05-16
ESD-328	Temperature&Humidity recorder	THPIM	X6U-TH-B	-20°C~70°C, 0~100%RH	2022-05-17 to 2023-05-16

Pictures



Fig. 1 —Overview



Fig. 2 —Overview

Pictures



Fig. 3 — Overview

***End of Report ***

声明 Statement

1. 本报告无授权批准人签字及“检验报告专用章”无效;

This report will be void without authorized signature or special seal for testing report.

2. 未经许可本报告不得部分复制;

This report shall not be copied partly without authorization.

3. 本报告的检测结果仅对送测样品有效, 委托方对样品的代表性和资料的真实性负责;

The test results or observations are applicable only to tested sample. Client shall be responsible for representativeness of the sample and authenticity of the material.

4. 本检测报告中检测项目标注有特殊符号则该项目不在资质认定范围内, 仅作为客户委托、科研、教学或内部质量控制等目的使用;

The observations or tests with special mark fall outside the scope of accreditation, and are only used for purpose of commission, research, training, internal quality control etc.

5. 本检测报告以实测值进行符合性判定, 未考虑不确定度所带来的风险, 本实验室不承担相关责任, 特别约定、标准或规范中有明确规定的除外;

The test results or observations are provided in accordance with measured value, without taking risks caused by uncertainty into account. Without explicit stipulation in special agreements, standards or regulations, EMTEK shall not assume any responsibility.

6. 对本检测报告若有异议, 请于收到报告之日起 20 日内提出;

Objections shall be raised within 20 days from the date receiving the report.