TEST REPORT

Product Name : Portable Power Station
Model Number : EFD330

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	:	EDG2206220214S00101R
Date(s) of Tests	:	June 30, 2022 to July 25, 2022
Date of issue	:	July 26, 2022

TEST REPORT
California Appliance Efficiency Regulations – Federally regulated battery chargers

Reference No.:	EDG2206220214S00101R
Compiled by (+ signature):	Silence Li
Approved by (+ signature):	Billy Wang
Date of issue:	July 25, 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:	EcoFlow Inc.
Address:	Plant A202, Founder Technology Industrial Park, Shiyan Sub-district, Bao'an District Shenzhen, Guangdong 518000 China
Factory name:	EcoFlow Innovation ltd.
Address:	Plant A201, Founder Technology Industrial Park, Shiyan Sub-district, Bao'an District Shenzhen, Guangdong 518000 China

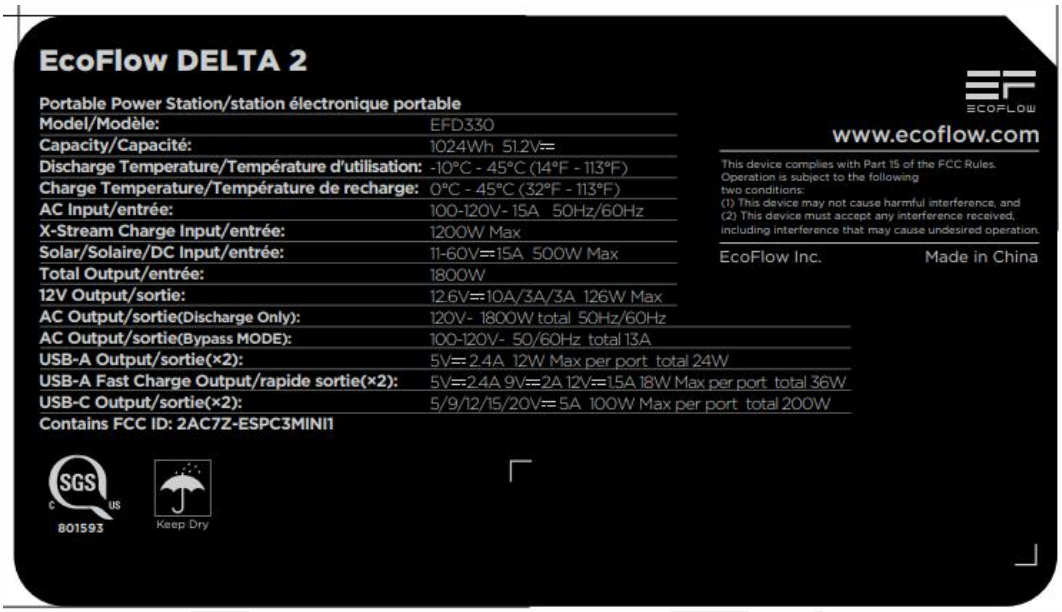
Test specification

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:	Portable Power Station
Trademark:	ECOFLOW
Model and/or type reference:	EFD330
Rating:	Input: AC Input: 100-120V, 15A, 50Hz/60Hz DC Input: 10-60V ⎓ 15A, 500W Max. Internal battery pack: 51.2V, 20Ah, 1024Wh

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 30, 2022 Date(s) of performance of tests.....: June 30, 2022 to July 25, 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 16 cells in tandem, and the single cells is 3.2V, 20Ah, 64Wh The model of cells: C40
General product model information: N/A

1. Test item particulars:

Battery charger type: ☒ Federally regulated battery chargers ☐ Large battery charger system ☐ Small battery charger system ☐ Inductive battery charger ☐ Battery backup and Uninterruptible Power Supplies ☐ Multi-port Charger ☐ Multi-voltage Charger ☐ Multi-capacity Charger ☐ à la carte charger	
Battery information: Internal rechargeable Lithium-ion (Li-ion) battery used	
Battery chemistry	☐ Valve-Regulated Lead Acid (VRLA) ☐ Flooded Lead Acid ☐ Silver Zinc ☐ Nickel Cadmium (NiCd) ☐ Nickel Metal Hydride (NiMH) ☐ Lithium-ion Polymer ☐ Rechargeable Alkaline ☐ Nanophosphate Lithium-ion ☒ Lithium-ion (Li-ion) ☐ Li-Polymer ☐ Others, please specify:
The manufacturer of the battery:	EVE Energy CO., LTD
The model number of the battery:	EFD330
Rating of battery:	51.2V, 20Ah, 1024Wh
Discharge cut off voltage(V)	40V
Number of charger ports (N)	2
The manufacturer of EPS	N/A
The model number of EPS	N/A
BC[1] marking Location	N/A
Consideration of the foreseeable misuse ☒ Not applicable ☐ Covered through the applied standard ☐ Covered by the following comment ☐ 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(Ebatt**)	Special characteristic or battery voltage	Maximun UEC (kWh/yr) (as a function of Ebatt**)
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} < 10Wh, UEC = 1.42 kWh/yr E_{batt} ≥ 10Wh, 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). ** Ebatt =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) * n > $t_{a\&m}$), equation (ii) shall be used to calculate UEC; otherwise a battery charger's UEC shall be calculated using equation (i).

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

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

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)	Threshold 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℃)	23.7°C
Maximum air speed (m/s):<0.5m/s	0.4m/s
For AC input: --	
Test frequency tolerance(Hz): (±1%)	-0.183%
Test voltage tolerance (V): (±1%)	0.217%
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)	115.0	115.0	--
Input Required Frequency (Hz)	60	60	--
Input Measured Voltage(V)	115.25	115.25	--
Input Measured Frequency (Hz)	60	60	--
Measured battery energy, E_{batt} (Wh)	1015.40	1013.40	--
Duration of the charge and maintenance mode test, t_{cd} (h)	24.00	24.00	--
Measured 24-hour energy consumption, E_{24} (Wh)	1449.14	1446.20	--
Measured maintenance mode power, P_m (W)	7.31	7.43	--
Measured standby mode power, P_{sb} (W)	0.00	0.00	--
Measured Off mode power, P_{off} (W)	0.00	0.00	--
Active + maintenance (ta&m)	17.15	17.15	--
Standby (tsb)	6.85	6.85	--
Off (toff)	0	0	--
Charges (n)	0.34	0.34	--
(t_{cd} - 5)* n	6.46	6.46	--
Unit energy consumption, UEC (kWh/yr)	77.814	78.091	--
UEC limits (kWh/yr)	81.398	81.243	--
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}
$\bar{x}$	77.952	7.37	0.00	0.00	1014.40	1447.67	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
$UCL/_{1.05}$	75.918

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

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

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

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

Result:

UEC (kWh/yr)	UEC limits (kWh/yr)	P_m	P_{sb}	P_{off}	E_{batt}	E_{24}	t_{cd}
78.091	81.242	7.43	0.00	0.00	1013.40	1446.20	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(±3%), 0~45℃(±2%)	2022-05-16 to 2023-05-15
ESD-235	Battery analysis meter	Shenzhen Tested Electronic Co., Ltd.	BTS-2004	24V, 5A, 200MΩ	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℃~70℃, 0~100%RH	2022-05-17 to 2023-05-16

Pictures

Fig. 1 —Overview

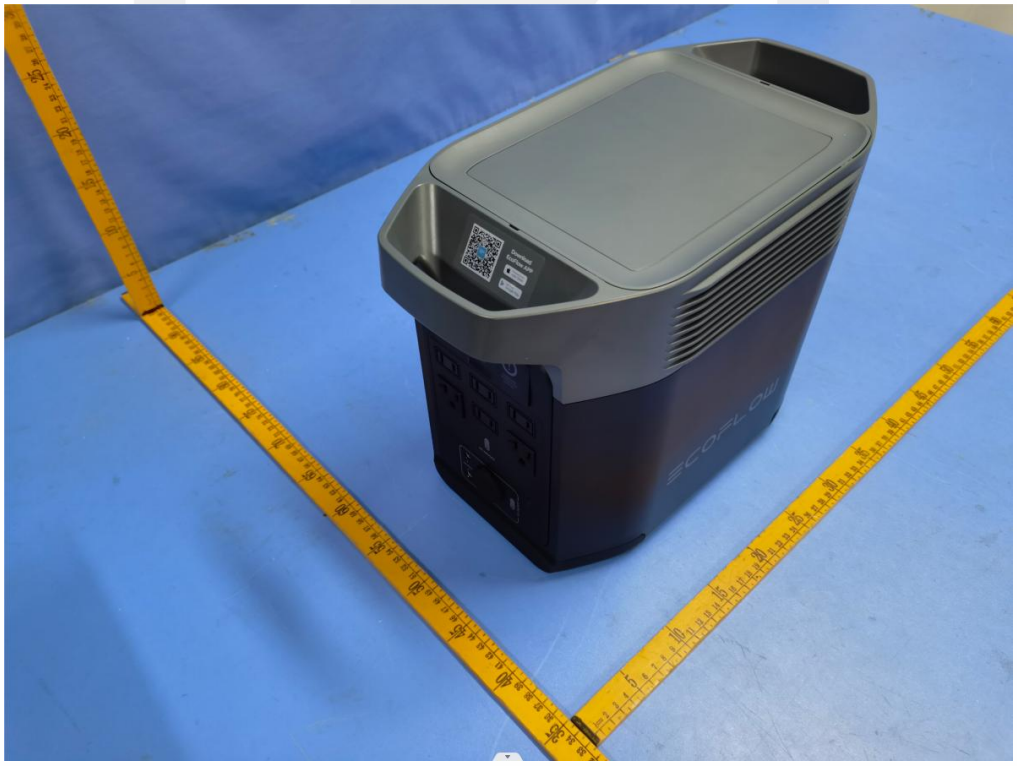


Fig. 2 —Overview

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.