TEST REPORT
EN ISO 8528-13
Safety of reciprocating internal combustion engine driven generating sets

Report Reference No. ..... :	211000090HZH-001
Compiled by (+ signature)..... :	Derek Yang .....
Approved by (+ signature) ..... :	Prince Tang .....
Date of issue ..... :	2021-12-06
	Amendment 1: 2022-06-24
Content ..... :	19 pages (Test report 17 pages + Appended Photos 2 pages)
Testing Laboratory name ..... :	Intertek Testing Services Zhejiang Ltd., Hangzhou Branch
Address ..... :	4th Floor, Building 4#, No. 22, 22nd Street, Qiantang District Hangzhou, China 310018
Testing location ..... :	As above
Applicant's name ..... :	ECOFLOW INC.
Address ..... :	Plant A202, Founder Technology Industrial Park, Shiyan Sub-district, Bao'an District Shenzhen, Guangdong 518000 China
Test specification:	
Standard ..... :	EN ISO 8528-13:2016
Test procedure ..... :	UKCA
Non-standard test method..... :	N/A
Test Report Form No. ..... :	TTRF_EN ISO 8525_13A
TRF Originator ..... :	Intertek
Master TRF ..... :	2017-03
Test item description ..... :	Low Power Generating Sets (EcoFlow Smart Generator Dual Fuel)
Trade Mark ..... :	EcoFlow
Model and/or type reference ..... :	EFG100, EFG200
Manufacturer ..... :	Same as applicant
Rating(s) ..... :	230V, 50Hz, EFG100: 1,8kW, Max. 1,9kW, CosΦ=1,0 / DC42-58,8V, 32A EFG200: 1,8kW(Gasoline)/1,6kW(LPG), Max. 1,9kW(Gasoline)/1,7kW(LPG), CosΦ=1,0 / DC42-58,8V, 32A
Remark ..... :	See general information

Test item particulars:		
Equipment mobility	:	Portable
Operating condition	:	Continuous
Supply connection	:	N.A.
Mass of appliance	:	EFG100: 29,3kg EFG200: 30,5kg
Output type	:	Neutral floating
IP number	:	IP23M
Possible test case verdicts:		
- test case does not apply to the test object	:	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	:	2022-05-23
Date (s) of performance of tests	:	2022-05-23 to 2022-06-24

General remarks:

The test results presented in this report relate only to the object tested.

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"(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 is used as the decimal separator.

Determinations of the test results include consideration of measurement uncertainty from the test equipment and methods.

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Noise test location is subcontracted.

General information :

This machine is portable Gasoline/LPG engine driven generator with AC 230V, 50Hz output and DC 42-58,8V output.
EFG100 and EFG200 are identical except fuel type, EFG100 is Gasoline powered, EFG200 is Gasoline/LPG powered.

Factory information: Chongqing Rato Technology Co., Ltd.

Zone B, Shuangfu Industry Park, Jiangjin District, Chongqing 402247, China

Summary of testing:

All tests are carried out in according to the standard EN ISO 8528-13:2016. And the test results meet the requirements specified in the above-mentioned standard.

Amendment 1:

The original test report 211000090HZH-001 dated on 2021-12-06 was modified on 2022-06-24 include the following changes and/or additions:

1. Added one new model EFG200;
2. Added the information of LPG hose and LPG regulator.

Deviations between above standards/changes have been checked.

The relevant tests and evolutions have been taken into account as above-motioned change.
Rating test and handling test were conducted, other test results refer to original report.

Copy of nameplate

EcoFlow Smart Generator Low Power Generating Sets EFG100			
AC rated voltage	230V~	AC rated current (Max.)	7,8A
DC rated voltage	42-58,8V	DC rated current (Max.)	32A
Rated power (AC+DC total)	1,8kW	Max. power	1,9kW
Frequency	50Hz	Power factor	1,0
Performance class	G1	Quality class	A
Protection class	IP23M	Max. ambient temperature	40℃
Max. site altitude	1000m	Mass	29,3kg
Year of manufacture	2022	S.N.	
ECOFLOW INC. Plant A202, Founder Technology Industrial Park, Shiyan Sub-district, Bao'an District Shenzhen, Guangdong 518000 China			UKCA

EcoFlow Smart Generator Low Power Generating Sets EFG200			
AC rated voltage	230V~	Frequency	50Hz
DC rated voltage	42-58,8V	DC rated current (Max.)	32A
Rated power (Gasoline, AC+DC total)	1,8kW	AC rated current (Gasoline, Max.)	7,8A
Rated power (LPG, AC+DC total)	1,6kW	AC rated current (LPG, Max.)	7,0A
Max. power (Gasoline)	1,9kW	Max. power (LPG)	1,7kW
Power factor	1,0	Protection class	IP23M
Performance class	G1	Quality class	A
Max. ambient temperature	40℃	Max. site altitude	1000m
Mass	30,5kg	Year of manufacture	2022
S.N.			
ECOFLOW INC. Plant A202, Founder Technology Industrial Park, Shiyan Sub-district, Bao'an District Shenzhen, Guangdong 518000 China			UKCA

XXXXX

Note: the marking of EC type-approval No. will place on engine or appliance.

Warning label:

Near the fuel inlet:

Not to refuel when operating

Noise label:

Main components list					
object/part No.	manufac-turer/trademark	type/model	technical data	standard	mark(s) of conformity[1)]
AC receptacle	Shenzhen B-Star Technology Co., Ltd.	BS-Y01-1 BS-Y01-2	AC250V, 13A	BS 1363-2	TUV PS/ B1024270004
DC receptacle	SHENZHEN NOXTLON ELECTRONIC CO., LTD	J13G-XT150-EF-F-P	DC58,8V, 32A	EN 61984	Intertek/ 211000740 SHA-001
Fuse for DC output	LITTELFUSE INC	FK3	DC80V, 40A UL certificate: E10480	EN ISO 8528-13	Tested in appliance
Inverter AC module	Chongqing Rundian Technology Co., Ltd.	1.8kW	AC230V, 1,8kW	EN ISO 8528-13	Tested in appliance
Inverter DC module	Chongqing Rundian Technology Co., Ltd.	1.8kW	DC58,8V, 1,8kW	EN ISO 8528-13	Tested in appliance
Starting motor	Chongqing Jili Yunfeng Industry (Group) Co., LTD	09000-Z800410-00A0	DC12V	EN ISO 8528-13	Tested in appliance
Alt.	Chongqing Jili Yunfeng Industry (Group) Co., LTD	09000-Z800510-00A0	DC12V	EN ISO 8528-13	Tested in appliance
Alt.	Chongqing Yangdi Electromechanical Co., LTD	09000-Z800410-00A0	DC12V	EN ISO 8528-13	Tested in appliance
Alt.	Chongqing Yangdi Electromechanical Co., LTD	09000-Z800510-00A0	DC12V	EN ISO 8528-13	Tested in appliance
Battery	Hangzhou Skyrich Power Co., Ltd.	P12-15-FP	DC12,8V, 1500mAh Li-ion, 4ICP28/71/132	IEC 62133-2 UNT 38.3 Rev.7	Intertek/ 210900721 HZH-001 Shanghai Institute of Chemical Industry Testing Co., Ltd./ 1121080742
Generator	Chongqing Rato Technology Co., Ltd.	30120-YMZ	AC230V, 1,8kW, Class 155, at 22,6°C, Main: 4,575Ω, Aux: 0,868Ω, DC: 5,452Ω	EN ISO 8528-13	Tested in appliance
Engine for EFG100	Chongqing Rato Technology Co., Ltd.	R80-i	79,7cm^3, 2,3kW, 5000rpm, gasoline powered	EN ISO 8528-13	Tested in appliance
Engine for EFG200	Chongqing Rato Technology Co., Ltd.	R80N-i	79,7cm^3, 2,3kW, 5000rpm, gasoline/LPG powered	EN ISO 8528-13	Tested in appliance
Spark plug	Weichai Torch Technology Co., Ltd	A5RTC	0,6-0,8mm	EN ISO 8528-13	Tested in appliance

Carburetor	Zhejiang Ruixing carburetor manufacturing Co., Ltd	16100-Z80 16100-Z3G	---	EN ISO 8528-13	Tested in appliance
Alt.	FUDING Huayi locomotive parts factory	16100-Z80 16100-Z3G	---	EN ISO 8528-13	Tested in appliance
Alt.	Chongqing Saipu Electromechanical Co. LTD	16100-Z80 16100-Z3G	---	EN ISO 8528-13	Tested in appliance
Alt.	Zhejiang Yinlong Locomotive Parts Co. LTD	16100-Z80 16100-Z3G	---	EN ISO 8528-13	Tested in appliance
Alt.	Chongqing Dechuang Electromechanical Co., LTD	16100-Z80 16100-Z3G	---	EN ISO 8528-13	Tested in appliance
Alt.	Chongqing Kama Electromechanical Co. LTD	16100-Z80 16100-Z3G	---	EN ISO 8528-13	Tested in appliance
LPG hose	Foshan Shunde Guangfeng Plastic Manufacture Co Ltd	LL38	3/8 inches, Max. working pressure: 350psi	EN ISO 8528-13 UL 569	CSA/ 232968+ tested in appliance
Alt.	Foshan Shunde Guangfeng Plastic Manufacture Co Ltd	LL516	3/16 inches, Max. working pressure: 350psi	EN ISO 8528-13 UL 569	CSA/ 232968+ tested in appliance
LPG regulator	Ningbo Wanan Co., Ltd.	R228-C	Max. working pressure: 232psi	EN ISO 8528-13 EN 16129	Intertek/ 210903022 GZU-001+ tested in appliance
Internal wire	WUXI DINGHAISHENG ELECTRIC CO., LTD.	1015	600V, 105°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E498006	EN ISO 8528-13	Tested in appliance
		1007	300V, 80°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E498006	EN ISO 8528-13	Tested in appliance

Alt.	XINYA ELECTRONIC CO LTD	1015	600V, 105°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E170689	EN ISO 8528-13	Tested in appliance
		1007	300V, 80°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E170689	EN ISO 8528-13	Tested in appliance
Alt.	LTK ELECTRIC WIRE(HUIZHOU)LTD	1015	600V, 105°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E148000	EN ISO 8528-13	Tested in appliance
		1007	300V, 80°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E148000	EN ISO 8528-13	Tested in appliance
Alt.	WUXI VIGOROUS ELECTRIC CO LTD	1015	600V, 105°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E339228	EN ISO 8528-13	Tested in appliance
		1007	300V, 80°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E339228	EN ISO 8528-13	Tested in appliance
Alt.	DONG GUAN YONG SHENG CABLES TECHNOLOGY CO LTD	1015	600V, 105°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E310859	EN ISO 8528-13	Tested in appliance
		1007	300V, 80°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E310859	EN ISO 8528-13	Tested in appliance

Alt.	ZHEJIANG YUEQING XINGDA ELECTRONICS WIRE&CABLE CO LTD	1015	600V, 105°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E187208	EN ISO 8528-13	Tested in appliance
		1007	300V, 80°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E187208	EN ISO 8528-13	Tested in appliance
Alt.	SHENZHEN HONGGUANSHENG SCIENCE AND	1015	600V, 105°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E465814	EN ISO 8528-13	Tested in appliance
		1007	300V, 80°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E465814	EN ISO 8528-13	Tested in appliance
Alt.	SHENZHEN DINGYU ELECTRICAL	1015	600V, 105°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E365423	EN ISO 8528-13	Tested in appliance
		1007	300V, 80°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E365423	EN ISO 8528-13	Tested in appliance
Alt.	SHANGHAI WEIRONG CABLE CO LTD	1015	600V, 105°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E498092	EN ISO 8528-13	Tested in appliance
		1007	300V, 80°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E498092	EN ISO 8528-13	Tested in appliance

Alt.	DANYANG WINPOWER WIRE & CABLE MFG CO LTD	1015	600V, 105°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E330446	EN ISO 8528-13	Tested in appliance
		1007	300V, 80°C, control circuit: 18-26AWG, generator lead wire: 16AWG UL certificate: E330446	EN ISO 8528-13	Tested in appliance
Alt.	Zhongshan City Dingxiang Electrical Co Ltd	3512	600V, 200°C, AC/DC output circuit: 10/12AWG UL certificate: E354487	EN ISO 8528-13	Tested in appliance
Alt.	CHONGQING YONG SHENG CABLES TECHNOLOGY CO LTD	QVR-105	Ignition circuit: 0,5mm^2	EN ISO 8528-13	Tested in appliance
Alt.	3F Electronics Industry Corp	QVR-105	Ignition circuit: 0,5mm^2	EN ISO 8528-13	Tested in appliance
1) An asterisk indicates a mark which assures the agreed level of surveillance.					

EN ISO 8528-13:2016			
Clause	Requirement - Test	Result - Remark	Verdict
6	**Safety requirements**		
6.11	**Handling**		
6.11.1	**Requirements**		
	Generating sets above 140 kg have provisions for lifting attachments to attach lifting devices to lift the generating set or parts of it according to the manufacturers' instructions.		N/A
	The lifting attachments shall be designed to withstand at least 1,5 times the mass lifted by lifting attachments		N/A
	The lifting attachments shall be located to allow at least 20mm clearance between lifting rope or chain or belt and any generating set components, unless the components are designed to withstand the contact during a lifting operation without permanent deformation or damage to the rope, chain or belt.		N/A
	The access to the lifting attachments shall allow an easy attachment of the lifting hook or shackle.		N/A
	Lifting attachments shall be so located that lifting ropes, chains or belts converge over the centre of gravity (if not cross beam is used) when the generating set or its lifted components is in the normal position specified by the manufacturer.		N/A
	Generating sets below 140 kg intended for transportation by persons shall have carrying handles or an adequate frame design to transport it according to the manufacturers' manual.		P
	The handles shall be designed to withstand at least 2,5 times the mass lifted divided by the number of carrying handles.	Withstand 76,3kg by the carrying handle	P
6.11.2	**Verification**		
	Compliance with the requirements of 6.11.1 regarding the number and the location of the lifting attachments is verified by inspection.		N/A

EN ISO 8528-13:2016			
Clause	Requirement - Test	Result - Remark	Verdict
	The strength of the lifting attachments to withstand the mass to be lifted is verified by testing or calculation.		N/A

EN ISO 8528-13:2016			
Appendix ISO 8528-8:2016			
Clause	Requirement - Test	Result - Remark	Verdict
3	**Terms and definitions**		
3.4	Maximum power		
	Power given by multiplying the current and voltage that the generating set is capable of delivering for at least 5 min within the voltage and frequency limits.		P
	Note 1 to entry: Prescribed output voltage shall be within ±10% of the rated voltage and prescribed output frequency shall be within ±8% of the rated frequency.		P
	Note 2 to entry: The protective device shall not be activated for a period of 5 min and the overload conditions shall meet the requirements of 6.4. The minimum ratio between the power rating (COP) and the maximum power (MAX) shall be Prated/Pmax ≥ 0,75		P
7	**Operating characteristics, power output, quality class and fuel consumption**		
7.1	Standard reference conditions:		
	For the purpose of determining operating characteristics, power output, quality class and fuel consumption, the following standard reference conditions shall be used.		P
	The standard reference conditions according to ISO 3046-1 and ISO 15550 are as follows: — ambient air temperature: 25 °C, 298 K; — ambient air pressure: 100 kPa; — relative humidity: 30 %.		P
	The test conditions shall be according to Clause 5.		P
7.3	Determination of performance class, quality class and fuel consumption		
7.3.1	Performance class		
	Generating sets shall be prepared and started in accordance with the operating instructions. After approximately 5 min warming-up time for the reciprocating internal combustion engine, the upper limit values for voltage and frequency shall be measured with the generator on no-load.		P
	The generating set shall be run for a minimum of 60 min at rated power (COP) and at the rated power factor. The power test is performed by gradually increasing the load from generator no-load operation to rated power output or up to the power output limit.		P

EN ISO 8528-13:2016			
Appendix ISO 8528-8:2016			
Clause	Requirement - Test	Result - Remark	Verdict
	A check shall be completed to ascertain whether, during the loading sequence, voltage and frequency parameters comply with class G1 of ISO 8528-5:2013, Table 4.		P
7.3.2	Quality class		
	The generating set shall be run for a minimum of 60 min. at rated power (COP) and at the rated power factor. The active power is measured directly using an active-power meter and the apparent power is calculated by taking the product of current and voltage.		P
	Where pressure and/or ambient temperature at the test location deviate during measurement from the standard reference conditions specified in this part of ISO 8528 (see 7.1) the relevant measured values of the RIC engine shall be corrected according to ISO 3046-1.		P
	According to the corrected power, the generating sets shall be classified according to 2 quality classes:		P
	Class A: the value of the corrected power to standard reference conditions shall not be less than 95% of the maximum power.		P
	Class B: the value of the corrected power to standard reference conditions shall not be less than 90% of the maximum power.		N/A

EN ISO 8528-13:2016			
Appendix ISO 8528-8:2016			
Clause	Requirement - Test	Result - Remark	Verdict

7.3	**Appended Table: Operating characteristics (LPG)**			P
	Performance class selected:			G1
	Frequency behaviour (steady-state, Dynamic)			
	No load frequency, $f_{i,r}$ (Hz).....:		49,99	
	Load frequency, f_{arb} (Hz).....:		49,99	
	Undershoot frequency in case of increasing load, $f_{d,min}$ (Hz) .....:		49,99	
	Rated frequency, f_r (Hz).....:		50	
	Overshoot frequency in case of decreasing load, $f_{d,max}$ (Hz) .....:		49,99	
	Frequency droop, δf_{st}		0%	Limit < 8%
	Transient frequency difference from initial frequency δf_d	100% sudden power decrease	0%	Limit < +18%
		Sudden power increase	0%	Limit < - (15+δf_{st})%
	Transient frequency difference from rated frequency δf_{dyn}	100% sudden power decrease	0%	Limit < +18%
		Sudden power increase	0%	Limit < - 25%
	Steady-state voltage behaviour			
	Rated voltage (V)		230	
	Steady condition, for all power between no-load and rated output at rated power factor	Maximum voltage (V)	230,3	
		Minimum voltage (V)	229,9	
	Steady-state voltage deviation δU_{st}		0,1%	Limit ≤ ± 5%

3.4 LPG	**Appended Table: maximum power**	**P**
	Measured	**Limit**
Max. power	1700W	-
Prated/Pmax	1600/1700=0,94	⩾0,75
Measured voltage	228,3V	-
Rated voltage	230V	-
Deviation	-0,7%	±10%
Measured frequency	49,99Hz	-
Rated frequency	50Hz	-
Deviation	0,02%	±8%

EN ISO 8528-13: 2016			
Appendix ISO 8528-3: 2005			
Clause	Requirement - Test	Result - Remark	Verdict
4.	**Other requirements and additional regulations**		P
5	**Rating**		
5.1	General		
	The generator rating class shall be specified in accordance with the requirements of IEC 60034-1		P
	In case of generators for RIC engine driven generating sets, the continuous rating (duty type S1) or rating with discrete constant loads (duty type S10) shall be specified.	S1	P
5.2	Basic continuous rating (BR)		
	For the purposes of this part of ISO 8528, the maximum continuous rating based on duty type S1 is called the basic continuous rating (BR).		P
5.3	Peak continuous rating (PR)		N/A
6	Limits of temperature and temperature rise		
6.1	Basic continuous rating		
	The generator shall be capable of delivering its BR over the whole range of operating conditions (e.g. minimum to maximum coolant temperature with total temperature) not exceeding 40°C plus the temperature rises specified in Table 1 of IEC 60034-1	See Appendix IEC/EN 60034-1	P
6.2	Peak continuous rating		N/A
7	Rated power and speed characteristics		P
8	Voltage characteristics		P
9	Parallel operation		N/A
10	Special load condition	See Appendix IEC/EN 60034-1	P
11	Effect of electromechanical frequency of vibrations when sets operate in parallel		N/A
12	Asynchronous generators with excitation equipment		N/A
13	Operating limit values		
	Four performance classes are defined to describe the generator characteristics	G1	P
	Rated range of voltage setting	Limit: ±5%	N/A
	Steady-state voltage deviation	Limit: ±5%	P
	Transient voltage deviation on load increase	Limit: -30%	P

EN ISO 8528-13: 2016			
Appendix ISO 8528-3: 2005			
Clause	Requirement - Test	Result - Remark	Verdict
	Transient voltage deviation on load decrease	Limit: 35%	P
	Voltage recovery time	Max. 0,5s	P
	Voltage unbalance	Limit: 1%	N/A
14	Rating plate	The generator is associated with relevant generating set	N/A