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CNAS L2885



TEST REPORT

Report No.: **HST202005-02625-WT**

Sample Description.....: **SMF VRLA RECHARGEABLE BATTERY**

Model.....: **See the Table 1**

Assessment Category.: **Entrusted**

Applicant.....: **GLOBAL POWER SOURCE PTE LTD**

Guangdong Huesent Testing & Inspection Technology Co., Ltd.



TEST REPORT

Sample Description	SMF VRLA RECHARGEABLE BATTERY	Trademark	EnerRocket
Model	See the Table 1	Specification	12V100Ah
Assessment Category	Entrusted	Sample Quantity	6 Pieces
Applicant	GLOBAL POWER SOURCE PTE LTD	Sample Status	The samples are sound, intact and fit for test.
Sample Received Date	2020.05.17	Test Date	2020.05.17~2020.07.31
Manufacturer	VIETNAM CENTER POWER TECH CO.LTD.		
Address	Road 5C, Nhon Trach 2 Industrial Zone, Hiep Phuoc Commune, Nhon Trach District, Dong Nai Province, Vietnam		
Factory	VIETNAM CENTER POWER TECH CO.LTD.		
Address	Road 5C, Nhon Trach 2 Industrial Zone, Hiep Phuoc Commune, Nhon Trach District, Dong Nai Province, Vietnam		
Test address	Unit 102,4th Building, Hongji e Valley International Enterprises Port, Tongji West Road, NantouTown,Zhongshan City, Guangdong.		
Test Items	See the Table 2		
Test standard	IEC 60896-21:2004Stationary lead-acid batteries –Part 21:Valve regulated types – Methods of test IEC 60896-22:2004Stationary lead-acid batteries –Part 22:Valve regulated types – Requirements		
Test Conclusion	The results conform to the requirements of standards and customer with respect to the test items. <p style="text-align: right;">(Stamp of Test Unit)</p>		
Remarks	There are fifty models (See the Table 1) for application, shown in this report, with the difference being the outer sizes and capacity. All of the tests were performed on ESC100-12 FR (12V100Ah).		
Tested by: Ben	Sign: <i>Ben</i>	2020.07.31	
Reviewed by: John	Sign: <i>John</i>	2020.07.31	
Approved by: Louis	Sign: <i>Louis</i>	2020.07.31	

Table 1:Models for application			
No.	Models	No.	Models
1	ES7-12	26	ESFT 125-12
2	ES9-12	27	ESFT 150-12
3	ES12-12	28	ESFT 180-12
4	ES18-12	29	ESFT 200-12
5	ES26-12	30	ESH 12-290W
6	ES28-12	31	ESH 12-570W
7	ES33-12	32	ESH 12-320W FR
8	ES42-12	33	ESH 12-400W FR
9	ES55-12	34	ESH 12-420W FR
10	ES65-12	35	ESH 12-450W FR
11	ES75-12	36	ESH 12-500W FR
12	ES80-12	37	ESH 12-540W FR
13	ES90-12	38	ESH 12-560W FR
14	ESC 100-12 FR	39	ESH 12-670W FR
15	ESC 120-12 FR	40	ESH 12-710W FR
16	ESC 130-12 FR	41	ESH 12-820W FR
17	ESC 150-12 FR	42	ESH12-760W FR
18	ESC180-12 FR	43	ESH 12-1010W FR
19	ESC 200-12 FR	44	ESH 42-12 FR [AGM+GEL]
20	ESC 230-12 FR	45	ESH 65-12 FR [AGM+GEL]
21	ESC 250-12 FR	46	ESH 100-12 FR [AGM+GEL]
22	ESFT 50-12	47	ESH 120-12 FR [AGM+GEL]
23	ESFT 75-12	48	ESH 130-12 FR [AGM+GEL]
24	ESFT 100-12	49	ESH 150-12 FR [AGM+GEL]
25	ESFT 105-12	50	ESH 200-12 FR [AGM+GEL]

Table 2:Test Items		
Test Clause	Measures	Purpose
6.1	Gas emission	To determine the emitted gas volume
6.2	High current tolerance	To verify the adequacy of current conduction cross-sections
6.3	Short circuit current and d.c. internal resistance	To provide data for the sizing of fuses in the exterior circuit
6.4	Protection against internal ignition from external spark sources	To evaluate the adequacy of protective features
6.5	Protection against ground short propensity	To evaluate the adequacy of design features
6.6	Content and durability of required markings	To evaluate the quality of the markings and the content of the information
6.7	Material identification	To ensure the presence of material identification markings
6.8	Valve operation	To ensure the correct opening of safety valves
6.9	Flammability rating of materials	To verify the fire hazard class of battery materials
6.10	Intercell connector performance	To verify the maximum surface temperatures of the connectors during high rate discharges
6.11	Discharge capacity	To verify the available capacities at selected discharge rates or discharge durations.
6.12	Charge retention during storage	To provide storage duration data
6.13	Float service with dailydischarge	To determine cyclic performance under floatcharge conditions
6.14	Recharge behaviour	To determine the recovery of capacity or autonomy time after a power outage
6.15	Service life at an operating temperature of 40 °C	To determine the operational life at elevated temperatures
6.16	Impact of a stress temperature of 55 °C or60 °C	To determine the influence of high stresstemperatures on cell or monobloc battery life
6.17	Abusive over-discharge	To determine the expected behaviour when excessive capacity is discharged
6.18	Thermal runaway sensitivity	To determine the expected times to establish acondition of escalating current and temperature
6.19	Low temperature sensitivity	To determine the sensitivity toward damageinduced by electrolyte freezing
6.20	Dimensional stability at elevated internalpressure and temperature	To determine the propensity of the cell ormonobloc battery to be deformed by internalpressure and at elevated temperature
6.21	Stability against mechanical abuse of unitsduring installation	Determine the propensity of the cell ormonobloc battery to fracture or leak whendropped.

TEST RESULT

IEC60896-21:2004, IEC 60896-22:2004			
Items	Requirement – Test	Result - Remark	Verdict
6.1	<p>Gas emission:</p> <p>The test methods are according to clause 6.1.1 to 6.1.14 which are stated in the standard IEC 60896-21</p> <p>Requirement and application: Measure gas volumes (At the rated float charge voltage; At 2,40 Vpc overcharge voltage conditions). State data for all applications: ml gas per cell, h and Ah at 20° or 25 °C; ml gas per cell, h and Ah at 20° or 25 °C.</p>	<p>At the rated float charge voltage Uflo=2.25V/(Ah•h•cell) at 25° C: 1#: Ge=0,0016ml/(hour•Ah) 2#: Ge=0,0015ml/(hour•Ah) 3#: Ge=0,0016ml/(hour•Ah)</p> <p>At 2,40 Vpc overcharge voltage conditions at 25° C: 1#: Ge=0,0047ml/(hour•Ah) 2#: Ge=0,0043ml/(hour•Ah) 3#: Ge=0,0051ml/(hour•Ah)</p>	State the value
6.2	<p>High current tolerance:</p> <p>The test methods are according to clause 6.2.1 to 6.2.6 which are stated in the standard IEC 60896-21</p> <p>Requirement and application: Measure unit voltage, inspect and document the status of the top-lead and terminals of each unit after 30 s current flow. Pass for all applications: Voltage of unit >2,0 Vpc; Show evidence of no incipient melting or of no loss of electrical continuity after 30 s of high current flow (value to be stated).</p>	<p>It has no any damage after 30 s of high current flow.</p> <p>Voltage after open circuit for 5min: 1#: U=12.92V 2#: U=12.96V 3#: U=12.89V</p>	P
6.3	<p>Short circuit current and d.c. internal resistance:</p> <p>The test methods are according to clause 6.3.1 to 6.3.6 which are stated in the standard IEC 60896-21</p> <p>Requirement and application: Define prospective short-circuit value Isc and internal resistance Ri of all units of a type range. State data for all applications: Short-circuit current (Isc) in A; Internal resistance (Ri) in ohms.</p>	<p>1#: Isc=2139.0A Ri =5.61mΩ</p> <p>2#: Isc=2123.9A Ri =5.65mΩ</p> <p>3#: Isc=2131.4A Ri =5.63mΩ</p>	State the value

IEC60896-21:2004, IEC 60896-22:2004			
Items	Requirement – Test	Result - Remark	Verdict
6.4	Requirement for protection against internal ignition from external spark sources	No rapid combustion, no explosion Conformity	P
	The test methods are according to clause 6.4.1 to 6.4.6 which are stated in the standard IEC 60896-21		
	Requirement and application: see table 7 in the standard IEC 60896-22		
6.5	Requirement for Protection against ground short propensity	No ground short, no leakage Conformity	P
	Requirement and application: see table 8 in the standard IEC 60896-22		
	The test methods are according to clause 6.5.1 to 6.5.9 which are stated in the standard IEC 60896-21		
6.6	Content and durability of required markings:	Information remain readable after test and content meet requirement	P
	The durability of the marking shall be tested according to clause 1.7.13 of IEC 60950-1 and the content of marking shall meet the requirement of IEC 60896-22		
	Requirement and application: Expose information to chemicals. Pass all substances for all applications: Information shall remain readable after exposure to chemicals and remain in place Requested information to be present for all applications.	See the ANNEX A	
6.7	Material identification:	All the symbol remain readable; ABS plastic	P
	The test methods are according to clause 6.7.1 to 6.7.4 which are stated in the standard IEC 60896-21		
	Requirement and application: Inspect case and/or cover for ISO 1043-1 materials symbol. Expose to chemicals. Pass for all applications: ISO symbol present on the outside of the cover or/and case. Symbol shall remain readable after exposure to chemicals and remain in place. (NOTE If the material of the case differs from the material of the cover, then a material identification symbol should also be present on the case. Otherwise one symbol on the cover is sufficient.)		

IEC60896-21:2004, IEC 60896-22:2004			
Items	Requirement – Test	Result - Remark	Verdict
6.8	Valve operation:	Gas release had been detected before the stress temperature impact test.	-
	The test methods are according to clause 6.8.1 to 6.8.3 which are stated in the standard IEC 60896-21		
	Requirement and application: Overcharge units and detect gas flow from the valve. Pass for all applications: Gas release detected before and after stress temperature impact test		
6.9	Flammability rating of materials:	The flammability rating level for samples of thickness equivalent to that of case and cover: V-0	State the level
	The test methods are according to clause 6.9.1 to 6.9.4 which are stated in the standard IEC 60896-21		
	Requirement and application: Determine flammability rating of case and cover material. State data for all applications: State the flammability rating level for samples of thickness equivalent to that of case and cover		
6.10	Intercell connector performance:	This test item is not applicable for the samples.	N
	The test methods are according to clause 6.10.1 to 6.10.2 which are stated in the standard IEC 60896-21		
	Requirement and application: Measure and report maximum intercell connector temperature reached. State data for all applications: State maximum temperature reached.		
6.11	Discharge capacity:	See the ANNEX B	P
	The test methods are according to clause 6.11.1 to 6.11.12 which are stated in the standard IEC 60896-21		
	Requirement and application: Determine actual capacity C_a . C_a to be at least X % of C_{rt} with all units at all rates shown below: 10 h 1,80 Vpc; 8 h 1,75 Vpc; 3 h 1,70 Vpc; 1 h 1,60 Vpc; 0.25 h 1,60 Vpc. Comply for all applications: $C_a \geq 95 \% C_{rt}$ (NOTE The requirement of $C_a \geq 95 \% C_{rt}$ applies not to the average but to each individual capacity of each of the 6 units tested with a particular discharge rate.)		

IEC60896-21:2004, IEC 60896-22:2004			
Items	Requirement – Test	Result - Remark	Verdict
6.12	Charge retention during storage	-	-
	The test methods are according to clause 6.12.1 to 6.12.7 which are stated in the standard IEC 60896-21 Requirement and application: see table 16 in the standard IEC 60896-22		
6.13	Float service with daily discharges	-	-
	The test methods are according to clause 6.13.1 to 6.13.5 which are stated in the standard IEC 60896-21 Requirement and application: see table 17 in the standard IEC 60896-22		
6.14	Recharge behavior:	1#: Rbf _{24h} =96.9% Rbf _{168h} =100.1% 2#: Rbf _{24h} =97.2% Rbf _{168h} =100.5% 3#: Rbf _{24h} =97.4% Rbf _{168h} =100.7%	P
	The test methods are according to clause 6.14.1 to 6.14.12 which are stated in the standard IEC 60896-21 Requirement and application: Determine capacity after recharge; Rbf _{24h} (24 h Recharge behaviour factor), Rbf _{168h} (168 h Recharge behaviour factor). Comply for all applications: ≥90 %, ≥98 % (NOTE The requirement applies not to the average but to each of the individual tested units.)		
6.15	service life at an operating temperature of 40 °C	-	-
	The test methods are according to clause 6.15.1 to 6.15.5 which are stated in the standard IEC 60896-21 Requirement and application: see table 19 in the standard IEC 60896-22		
6.16	impact of a stress temperature of 55 °C or 60 °C	-	-
	The test methods are according to clause 6.16.1 to 6.16.8 which are stated in the standard IEC 60896-21 Requirement and application: see table 20 in the standard IEC 60896-22		

IEC60896-21:2004, IEC 60896-22:2004			
Items	Requirement – Test	Result - Remark	Verdict
6.17	Abusive over-discharge:	Unbalanced string over-discharge capacity $C_{aod}: C_{aod} = 0.93 C_{rt(3h\ rate)}$	P
	The test methods are according to clause 6.17.1 to 6.17.15 which are stated in the standard IEC 60896-21		
	Requirement and application: see table 21 in the standard IEC 60896-22	Cyclic over-discharge capacity $C_{aoc}: C_{aoc} = 0.97 C_{rt(3h\ rate)}$	
6.18	information on thermal runaway sensitivity	Ultimate temperature after 168h at 2,45 Vpc: $T_a = 40.8\ ^\circ\text{C}$ Ultimate temperature after 24h at 2,60 Vpc: $T_b = 41.7\ ^\circ\text{C}$	P
	The test methods are according to clause 6.18.1 to 6.18.14 which are stated in the standard IEC 60896-21		
	Requirement and application: see table 22 in the standard IEC 60896-22		
6.19	impact of low temperature service on capacity	$C_{als} = 0.98 C_{rt(3h\ rate)}$ No mechanical damages	P
	The test methods are according to clause 6.19.1 to 6.19.13 which are stated in the standard IEC 60896-21		
	Requirement and application: see table 23 in the standard IEC 60896-22		
6.20	dimensional stability at elevated internal pressures and temperatures	Change in: Length: 0,30% +1.0mm Width: 0,58% +1.0mm	P
	The test methods are according to clause 6.20.1 to 6.20.6 which are stated in the standard IEC 60896-21		
	Requirement and application: see table 24 in the standard IEC 60896-22		
6.21	stability against mechanical abuse of units during installation	No leakage, No broken	P
	The test methods are according to clause 6.21.1 to 6.21.6 which are stated in the standard IEC 60896-21		
	Requirement and application: see table 25 in the standard IEC 60896-22		

TEST RESULT

ANNEX A: 6.6-Requested markings information to be present	
Technical information to be present	
Polarity sign at the positive terminal(s) with a + symbol radius of at least 6 mm	Conformity
Manufacturer and/or vendor name	GLOBAL POWER SOURCE PTE LTD
Country of origin of unit	/
Type designation of unit	ESC100-12 FR (12V100Ah)
At least one rated capacity and its final voltage in Vpc or V per unit at a rate listed in 6.11 of IEC 60896-2-1	100Ah(End voltage 10.8V 25 °C)
Rated temperature (20 °C or 25 °C) for the capacity value	25 °C
Float voltage in Vpc or V per unit at a rated temperature of 20 °C and/or 25 °C	2.20-2.28VPC of 25 °C
Date of manufacture (see Note 1 below) in clear unequivocal mm.yyyy format	/
ISO warning symbols to be present with 11 mm diameter minimum size and in two contrasting colours (See Note 2 and 3 below)	
Warning	P
Electrical danger	P
No open fires and sparks	P
Wear eye protection	P
Read instructions	P
Environmental protection and recycling symbols to be present	
Recycling symbol	P
Crossed out waste bin	P
NOTE 1 For the purpose of this standard the “date of manufacture” is defined as the date of final inspection of the units in the factory of origin.	
NOTE 2 When the physical dimensions of the units do not allow to apply the symbols on the unit itself then a separate label to be affixed near the battery or on the battery operating instructions is acceptable.	
NOTE 3 The background colour is considered to be one colour.	

TEST RESULT

ANNEX B: 6.11-Discharge capacity(ESC100-12 FR)											
Capacity Sample No.	C _{rt} =100Ah		/		C _{rt} =72.3Ah		C _{rt} =61.0Ah		/		Remark
	C ₁₀ (Ah)	%of C _{rt}	C ₈ (Ah)	%of C _{rt}	C ₃ (Ah)	%of C _{rt}	C ₁ (Ah)	%of C _{rt}	C _{0.25} (Ah)	%of C _{rt}	
1#	112.2	112.2	/	/	101.5	140.4	85.89	140.8	/	/	25°C C _a ≥95%C _{rt}
2#	113.9	113.9	/	/	105.2	145.5	85.58	140.3	/	/	
3#	112.6	112.6	/	/	102.1	141.2	85.10	139.5	/	/	
4#	112.9	112.9	/	/	101.8	140.8	85.71	140.5	/	/	
5#	113.4	113.4	/	/	102.7	142.1	84.97	139.3	/	/	
6#	112.5	112.5	/	/	103.8	143.5	86.13	141.2	/	/	

Photo(s) of the tested samples

ESC100-12 FR (12V100Ah):



ESC100-12 FR (12V100Ah):



--End of Report --

Report Statement

- 1.This test report is invalid if altered, additions and deletions.
- 2.This test report is responsible for tested samples only .
- 3.Objections to the test report must be submitted to Guangdong Huesent Testing & Inspection Technology Co., Ltd. within 15 days.
- 4.The test report is invalid without the signatures of tester, reviewer ,approver ,and official stamp of test unit.
- 5.Without permission of Guangdong Huesent Testing & Inspection Technology Co., Ltd., This report is not permitted to be duplicated in extracts.
- 6.“P”=Pass=Test item conform to the requirement
“F”= Fail=Test item not conform to the requirement
“N”= Not Applicable =Test item Not Applicable to the test object