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CNAS L2885

TEST REPORT

Report No. ……....:	**HST202005-03046-WT**
Sample Description.....:	**Sealed Lead-acid Battery**
Model……...:	**LFP12100**
Assessment Category.:	**Entrusted**
Applicant……....:	**SHENZHEN FIRSTPOWER TECHNOLOGY CO.，LTD**

Guangdong Huesent Testing & Inspection Technology Co., Ltd.

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TEST REPORT

Sample Description	Sealed Lead-acid Battery	Trademark	FirstPower
Model	LFP12100	Specification	12V100Ah
Assessment Category	Entrusted	Sample Quantity	6 Pieces
Applicant	SHENZHEN FIRSTPOWER TECHNOLOGY CO.，LTD	Sample Status	The samples are sound, intact and fit for test.
Sample Received Date	2020.05.30	Test Date	2020.05.30~2020.10.12
Manufacturer	SHENZHEN FIRSTPOWER TECHNOLOGY CO.，LTD		
Address	RM, L, M, N 15/F BUILDING A, FORTUNE PLAZA NO.7002, SHENNAN ROAD SHENZHEN CHINA		
Factory	HUIZHOU FIRSTPOWER TECHNOLOGY CO.，LTD		
Address	Tai Yang Ao Industrial Zone Bai Hua Town, Hui Dong, Huizhou		
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 60896-21:2004 Stationary lead-acid batteries –Part 21:Valve regulated types – Methods of test IEC 60896-22:2004 Stationary 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. (Stamp of Test Unit)		
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 LFP12100 (12V100AH).		
Tested by ：Ben	Sign：Ben		
Reviewed by：John	Sign：John		
Approved by：Louis	Sign：Louis		

Table 1:Models for application			
No.	Models	No.	Models
1	FP1270	26	LFP1290
2	FP1290	27	LFP1295
3	FP12120	28	LFP12100
4	FP12150	29	LFP12100V
5	FP12170	30	LFP12110
6	FP12180	31	LFP12120A
7	FP12200	32	LFP12120
8	FP12240	33	LFP12134
9	FP12240A	34	LFP12150
10	FP12260	35	LFP12180
11	FP12260A	36	LFP12200
12	FP12280	37	LFP12250
13	FP12280A	38	LFP1255FT
14	LFP1233	39	LFP1275FT
15	LFP1235	40	LFP12100FT
16	LFP1240	41	LFP12105FT
17	LFP1245	42	LFP12110AFT
18	LFP1250	43	LFP12125FT
19	LFP1255	44	LFP12150FT
20	LFP1260	45	LFP12180FT
21	LFP1265	46	LFP12200FT
22	LFP1270	47	LFP1250FT
23	LFP1275	48	LFP12120FT
24	LFP1280	49	LFP12155KFT
25	LFP1280A	50	LFP12180KFT

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.
6.13	Float service with daily discharge	To determine cyclic performance under float charge conditions
6.14	Recharge behaviour	To determine the recovery of capacity or autonomy time after a power outage
6.16	Impact of a stress temperature of 55 °C or 60 °C	To determine the influence of high stress temperatures 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 a condition of escalating current and temperature
6.19	Low temperature sensitivity	To determine the sensitivity toward damage induced by electrolyte freezing
6.20	Dimensional stability at elevated internal pressure and temperature	To determine the propensity of the cell or monobloc battery to be deformed by internal pressure and at elevated temperature
6.21	Stability against mechanical abuse of units during installation	Determine the propensity of the cell or monobloc battery to fracture or leak when dropped.

TEST RESULT

IEC 60896-21:2004, IEC 60896-22:2004			
Items	**Requirement – Test**	**Result - Remark**	**Verdict**
6.1	**Gas emission:** The test methods are according to clause 6.1.1 to 6.1.14 which are stated in the standard IEC 60896-21 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.	At the rated float charge voltage Uflo=2.25V/(Ah•h•cell) at 25° C: 1#: Ge=0,0017ml/(hour•Ah) 2#: Ge=0,0017ml/(hour•Ah) 3#: Ge=0,0017ml/(hour•Ah) At 2,40 Vpc overcharge voltage conditions at 25° C: 1#: Ge=0,0020ml/(hour•Ah) 2#: Ge=0,0019ml/(hour•Ah) 3#: Ge=0,0020ml/(hour•Ah)	State the value
6.2	**High current tolerance:** The test methods are according to clause 6.2.1 to 6.2.6 which are stated in the standard IEC 60896-21 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).	It has no any damage after 30 s of high current flow. Voltage after open circuit for 5min: 1#: U=12.60V 2#: U=12.58V 3#: U=12.61V	P
6.3	**Short circuit current and d.c. internal resistance:** The test methods are according to clause 6.3.1 to 6.3.6 which are stated in the standard IEC 60896-21 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.	1#: Isc=2409.6A Ri =4.98mΩ 2#: Isc=2419.4A Ri =4.96mΩ 3#: Isc=2414.5A Ri =4.97mΩ	State the value

IEC 60896-21:2004, IEC 60896-22:2004			
Items	**Requirement – Test**	**Result - Remark**	**Verdict**
6.4	**Requirement for protection against internal ignition from external spark sources**	Batteries 1#, 2#, 3# both 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**	Battery 4#, 5#, 6# 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.)		

IEC 60896-21:2004, IEC 60896-22:2004			
Items	**Requirement – Test**	**Result - Remark**	**Verdict**
6.8	**Valve operation:** 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	The valve adequate opening Gas release detected before and after stress temperature impact test Valve pressure: 20.3kpa~24.5kpa	P
6.9	**Flammability rating of materials:** 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	The flammability rating level for samples of thickness equivalent to that of case and cover: V-0	State the level
6.10	**Intercell connector performance:** 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.	This test item is not applicable for the samples.	N
6.11	**Discharge capacity:** 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.)	See the ANNEX B	P

IEC 60896-21:2004, IEC 60896-22:2004			
Items	**Requirement – Test**	**Result - Remark**	**Verdict**
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	On doing	-
6.14	**Recharge behavior:** 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.)	1#: Rbf_{24h} =96.9% Rbf_{168h} =99.8% 2#: Rbf_{24h} =97.1% Rbf_{168h} =100.2% 3#: Rbf_{24h} =97.2% Rbf_{168h} =99.9%	P
6.16	**impact of a stress temperature of 55 ℃ or 60 ℃** 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	At 60°C: Duration=126days $C_{0.25h\ \text{rate}}$=0.79C_{rt}	P
6.17	**Abusive over-discharge:** The test methods are according to clause 6.17.1 to 6.17.15 which are stated in the standard IEC 60896-21	Unbalanced string over-discharge capacity C_{aod}: C_{aod} =0.93 $C_{rt(3h\ rate)}$	P
	Requirement and application: see table 21 in the standard IEC 60896-22	Cyclic over-discharge capacity C_{aoc}: C_{aoc} =0.96 $C_{rt(3h\ rate)}$	
6.18	**information on thermal runaway sensitivity** 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	Ultimate temperature after 168h at 2,45 Vpc: T_a=39.8°C Ultimate temperature after 24h at 2,60 Vpc: T_b=40.5 °C	P

IEC 60896-21:2004, IEC 60896-22:2004			
Items	**Requirement – Test**	**Result - Remark**	**Verdict**
6.19	**impact of low temperature service on capacity**	C_{als} =0.99 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	SHENZHEN FIRSTPOWER TECHNOLOGY CO.，LTD
Country of origin of unit	Made in China
Type designation of unit	LFP12100 (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 1.8Vpc 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	13.5V 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. NOITE 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(LFP12100)											
Capacity / Sample No.	C_{rt}=100Ah		C_{rt}=96Ah		C_{rt}=75.6Ah		C_{rt}=62Ah		C_{rt}=41.25Ah		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#	102.2	102.2	99.0	103.1	79.6	105.3	65.8	106.2	44.0	106.6	25°C $C_a \geq 95\% C_{rt}$
2#	102.4	102.4	99.1	103.2	79.5	105.1	66.2	106.8	44.2	107.1	
3#	102.8	102.8	98.8	102.9	79.0	104.5	65.4	105.5	44.1	106.8	
4#	102.7	102.7	99.2	103.3	79.5	105.2	66.4	107.1	43.8	106.2	
5#	101.9	101.9	99.0	103.1	79.2	104.7	65.9	106.3	43.9	106.5	
6#	102.3	102.3	99.3	103.4	79.1	104.6	66.2	106.8	44.1	106.9	

Photo(s) of the tested samples
LFP12100 (12V100Ah):

LFP12100 (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