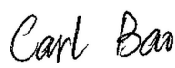


Test Report issued under the responsibility of:



TEST REPORT IEC 62133-1 Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications - Part 1: Nickel systems	
Report Number.....	200902251SHA-003
Date of issue.....	2020-11-18
Total number of pages	16
Applicant's name	SAS PERMA-BATTERIES
Address	6 Mas De Baffol 46301 ST-chanarand-France.
Test specification:	
Standard.....	IEC 62133-1:2017
Test procedure	Testing
Non-standard test method	N/A
Test Report Form No.	IEC62133_1A
Test Report Form(s) Originator	TÜV SÜD
Master TRF	Dated 2017-09-14
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Test item description :	Ni-Fe Battery	
Trade Mark :		
Manufacturer	Henan Hengming Fengyun Power Source Co., Ltd Zhou Village, No. 8 Bridge Xinhui Road, Xinxing City, Hennan Province, P. R. China	
Model/Type reference	PB-60	
Ratings	60Ah 1.2V	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒ Testing Laboratory:	Intertek Testing Services Shanghai	
Testing location/ address :	Building No.86, 1198 Qinzhou Road (North), 20033 Shanghai, China	
Tested by (name, function, signature) :	Liping Chen	
Approved by (name, function, signature) ... :	Carl Bao	
Testing procedure: CTF Stage 1:		
Testing location/ address :		
Tested by (name, function, signature) :		
Approved by (name, function, signature) ... :		
Testing procedure: CTF Stage 2:		
Testing location/ address :		
Tested by (name + signature)		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature) ... :		
Testing procedure: CTF Stage 3:		
Testing procedure: CTF Stage 4:		
Testing location/ address :		
Tested by (name, function, signature) :		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature) ... :		
Supervised by (name, function, signature) :		

List of Attachments (including a total number of pages in each attachment):

No.	Content	Page
1	Photos of product	16

Summary of testing:

The results indicate that the specimen complies with standard "IEC 62133-1:2017" except the 7.2.3 case stress at high ambient temperature test and 7.3.3 free fall test.

Tests performed (name of test and test clause):

Test Item	Clause
Continuous low-rate charging (cells)	7.2.1
Vibration	7.2.2
Temperature cycling	7.2.4
Incorrect installation (cells)	7.3.1
External short circuit	7.3.2
Mechanical shock (crash hazard)	7.3.4
Thermal abuse (cells)	7.3.5
Crushing of cells	7.3.6
Low pressure (cells)	7.3.7
Overcharge	7.3.8
Forced discharge (cells)	7.3.9

Testing location:

Intertek Testing Services Shanghai
Building No.86, 1198 Qinzhou Road (North),
200233 Shanghai, China

Summary of compliance with National Differences

None

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



Batterie Nickel-Fer
PB-60
60Ah-1.2V

bulk/absorption: 1.60V ~ 1.70V

float: 1.45V

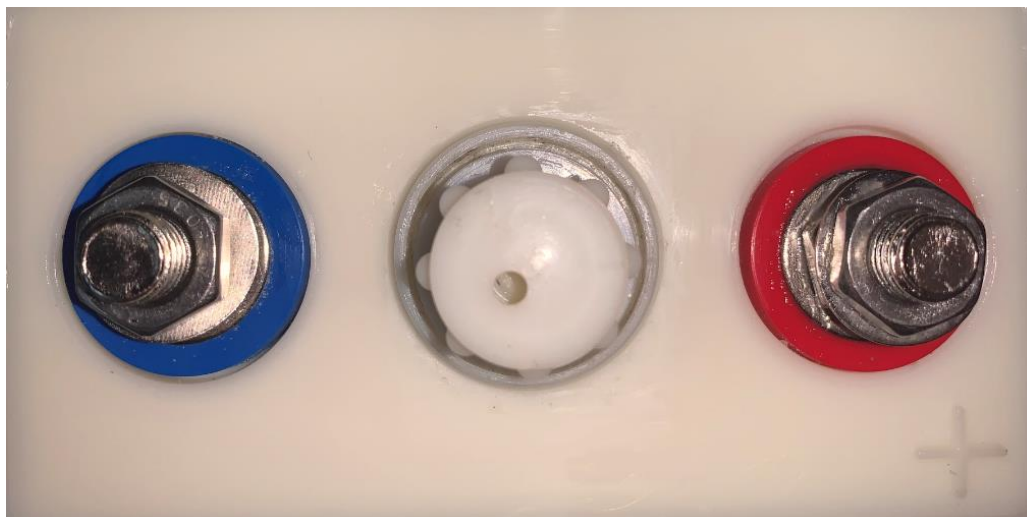
compensation T°: ~3mv / C°

Electrolyte : ~20 % KOH / 5 % LiOH



www.perma-batteries.com

Polarity mark on enclosure



Note: The manufacture date is presented in YYYYMM printed on cell case, e.g. 202009 denotes manufacture date is September 2020

Test item particulars.....:	
Classification of installation and use.....:	Battery for general use
Supply connection.....:	---
Recommend charging method declared by the manufacturer	12A/1.5V
Discharge current (0,2 I_t A)	12A
Specified final voltage	1.0V
Chemistry	Ni-Fe systems
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	2020-09-29
Date (s) of performance of tests	2020-10-15 to 2020-11-10
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. Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty. As the requirement of the customer, the case stress at high ambient temperature test and free fall test do not consider in the report. Throughout this report a ☐ comma / ☒ point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60080-02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided : ☐ Yes ☒ Not applicable	
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies)	Same as applicant
General product information:	
The products covered by this report is Rechargeable Ni-Fe battery, which equipped with a single cell, cell model no. is PB-60. The battery has no protective components. The battery shall be charged per specification which provided by the manufacturer.	

IEC 62133-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	Parameter measurement tolerances		P
	Parameter measurement tolerances		P
5	General safety considerations		P
5.1	General		P
5.2	Insulation and wiring		P
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ	No non-electrical contact metal surfaces.	N/A
	Insulation resistance (MΩ) :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		P
	Orientation of wiring maintains adequate creepage and clearance distances between conductors		P
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		P
5.3	Venting		P
	Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition	Safety valve for venting exists.	P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		N/A
5.4	Temperature, voltage and current management		P
	Batteries are designed such that abnormal temperature-rise conditions are prevented		P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		P
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that associated chargers are designed to maintain charging within the temperature, voltage and current limits specified		P
5.5	Terminal contacts		P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		P

IEC 62133-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Terminal contacts are arranged to minimize the risk of short circuits		P
5.6	Assembly of cells into batteries		P
5.6.1	If there is more than one battery housed in a single battery case, cells used in the assembly of each battery have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		N/A
	Battery has some type of safety device or feature for charging.		N/A
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer /designer may ensure proper design and assembly		P
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer		N/A
	Protective circuit components are added as appropriate and consideration given to the end-device application		N/A
	When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this document		N/A
5.7	Quality plan		P
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery	ISO 9001 certificate of manufacturer was provided.	P

6	Type test and sample size		P
	Tests were made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old		P
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.		P

7	Specific requirements and tests		P
7.1	Charging procedure for test purposes		P
7.2	Intended use		P
7.2.1	Continuous low-rate charging (cells)		P
	Results: No fire. No explosion	(See Table 7.2.1)	P
7.2.2	Vibration		P
	Results: No fire. No explosion. No leakage	(See Table 7.2.2)	P

IEC 62133-1			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.3	Case stress at high ambient temperature(batteries)		Not checked
	Oven temperature (°C)..... :		
	Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells		Not checked
7.2.4	Temperature cycling		P
	Results: No fire. No explosion. No leakage.		P
7.3	Reasonably foreseeable misuse		P
7.3.1	Incorrect installation (cells)		P
	The test was carried out using: - Four fully charged cells of the same brand, type, size and age connected in series, with one of them reversed; or		P
	- A stabilized dc power supply.		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.1)	P
7.3.2	External short circuit		P
	The cells or batteries were tested until one of the following occurred: - 24 hours elapsed; or		P
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.2)	P
7.3.3	Free fall		Not checked
	Results: No fire. No explosion.		Not checked
7.3.4	Mechanical shock (crash hazard)		P
	Results: No fire. No explosion. No leakage.		P
7.3.5	Thermal abuse (cells)		P
	Oven temperature (°C)..... :	130	—
	Results: No fire. No explosion.		P
7.3.6	Crushing of cells		P
	The crushing force was released upon: - The maximum force of 13 kN ± 0.78 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	The cell is prismatic type and a second set of samples was tested, rotated 90° around longitudinal axis compared to the first set		P
	Results: No fire. No explosion..... :	(See Table 7.3.6)	P

IEC 62133-1			
Clause	Requirement + Test	Result - Remark	Verdict
7.3.7	Low pressure (cells)		P
	Chamber pressure (kPa).....: 11.6		—
	Results: No fire. No explosion. No leakage.		P
7.3.8	Overcharge		P
	Results: No fire. No explosion.....: (See Table 7.3.8)		P
7.3.9	Forced discharge		P
	Results: No fire. No explosion.....: (See Table 7.3.9)		P

8	Information for safety		P
8.1	General		P
	The manufacturer of secondary cells ensures that information is provided about current, voltage and temperature limits of their products.	Information is mentioned in the cell specification.	P
	The manufacturer of batteries ensures that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards.	Information is mentioned in the manual.	P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product	Information is mentioned in the manual.	P
	As appropriate, information relating to hazard avoidance resulting from a system analysis is provided to the end user	Information is mentioned in the manual.	P
	Guidance is provided in IEC TR 62188 on the design are provided for information in Annex A and Annex B.	Information is mentioned in the manual.	P
8.2	Small cell and battery safety information		N/A
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N/A
	-Keep small cells and batteries which are considered swallowable out of the reach of children.		N/A
	-Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2h of ingestion.		N/A
	-In case of ingestion of a cell or battery, seek medical assistance promptly.		N/A

9	Marking		P
9.1	Cell marking		N/A
	Cells marked as specified in the applicable cell standards: IEC 61951-1 or IEC 61951-2.		N/A

IEC 62133-1			
Clause	Requirement + Test	Result - Remark	Verdict
	By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked.		N/A
	However, cell marking can be indicated with the battery, the instructions and/or the specifications.		N/A
9.2	Battery marking		P
	Batteries marked as specified in the applicable cell standards: IEC 61951-1 or IEC 61951-2.	The listed standards are not suitable to the product, only applicable clauses of IEC 61951-2 were considered.	P
	Batteries marked with an appropriate caution statement.		P
	Terminals have clear polarity marking on the external surface of the battery.		P
	Batteries with keyed external connector need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		N/A
9.3	Caution for ingestion of small cells and batteries		N/A
	Small cells and batteries determined to be small are including a caution statement regarding the hazards of ingestion in accordance with 8.2.		N/A
	Small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion are given on the immediate package.		N/A
9.4	Other information		P
	Storage and disposal instructions marked on or supplied with the battery.		P
	Recommended charging instructions marked on or supplied with the battery.		P

10	Packaging		P
	Packaging for button cells are not be small enough to fit within the limits of the ingestion gauge of Figure 2		N/A
	Annex C for information regarding packaging		P

Annex A (informative)	Recommendations to equipment manufacturers and battery assemblers		P
Annex B (informative)	Recommendations to the end-users		N/A
Annex C (informative)	Packaging		P

IEC 62133-1			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE: Critical components information					P
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity ¹⁾
Enclosure	Hennan Hengming Fengyun Power Source Co., Ltd	PB-60	Min. Thickness: 3.5mm, size: 139*79*295mm, ABS	IEC 62133-1	Tested with appliance
Cell	Hennan Hengming Fengyun Power Source Co., Ltd	PB-60	60Ah 1.2V	IEC 62133-1	Tested with appliance
-Positive Electrode tab	Hennan Hengming Fengyun Power Source Co., Ltd	T-151	Cold-rolled even ribs size: 60*7*1 mm, iron nickel plated pole size: φ 10*35 mm	IEC 62133-1	Tested with appliance
-Negative Electrode tab	Hennan Hengming Fengyun Power Source Co., Ltd	T-151-2	Cold-rolled even ribs size: 60*7*1 mm, iron nickel plated pole size: φ 10*35 mm	IEC 62133-1	Tested with appliance
-Separator	Hennan Hengming Fengyun Power Source Co., Ltd	HM-09	ABS, Min. thickness: 1.5mm, shutdown temperature: 50°C	IEC 62133-1	Tested with appliance
-Electrolyte	Hennan Hengming Fengyun Power Source Co., Ltd	HM-03	KOH+LiOH+H ₂ O, mass ratio: H ₂ O:KOH+LiOH =3:1	IEC 62133-1	Tested with appliance
-Negative electrode	Hennan Hengming Fengyun Power Source Co., Ltd	F-018	Fe powder + Graphite powder, size: 154*124*4mm	IEC 62133-1	Tested with appliance
-Positive electrode	Hennan Hengming Fengyun Power Source Co., Ltd	N-004	NiOH+Graphite powder, size: 154*124*3mm	IEC 62133-1	Tested with appliance
Supplementary information:					
¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

IEC 62133-1			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.1	TABLE: Continuous low rate charge (cells)					P
Sample no.	Recommended charging method, (CC, CV, or CC/CV)	Recommended charging voltage V_c , (Vdc)	Recommended charging current I_{rec} , (A)	OCV at start of test, (Vdc)	Results	
1	CC/CV	1.5	12A	1.311	P	
2				1.298	P	
3				1.306	P	
4				1.310	P	
5				1.299	P	
Supplementary information: - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain)						

7.2.2	TABLE: Vibration		P
Sample no.	OCV at start of test, (Vdc)	Results	
1	1.320	P	
2	1.317	P	
3	1.322	P	
4	1.321	P	
5	1.319	P	
Supplementary information: - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain)			

IEC 62133-1			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.1	TABLE: Incorrect installation (cells)		P
Sample no.	OCV of reversed cell, (Vdc)	Results	
1	1.315	P	
2	1.319	P	
3	1.313	P	
4	1.320	P	
5	1.316	P	
Supplementary information: - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain)			

7.3.2	TABLE: External short circuit					P
Sample no.	Ambient (at 20°C ± 5°C or 55°C ± 5°C)	OCV at start of test, (Vdc)	Resistance of circuit, (Ω)	Maximum case temperature rise ΔT, (°C)	Results	
1	23°C	1.322	76	1	P	
2		1.321	77	0	P	
3		1.316	76	0	P	
4		1.323	81	0	P	
5		1.320	84	0	P	
6	55°C	1.313	76	4	P	
7		1.325	77	4	P	
8		1.318	76	5	P	
9		1.321	81	3	P	
10		1.322	84	3	P	
Supplementary information: - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain)						

IEC 62133-1			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.6	TABLE: Crush			P
Model no.	OCV at start of test, (Vdc)	OCV at removal of crushing force, (Vdc)	Results	
1	1.328	1.328	P	
2	1.324	1.324	P	
3	1.322	1.322	P	
4	1.327	1.327	P	
5	1.324	1.324	P	
Supplementary information: - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain)				

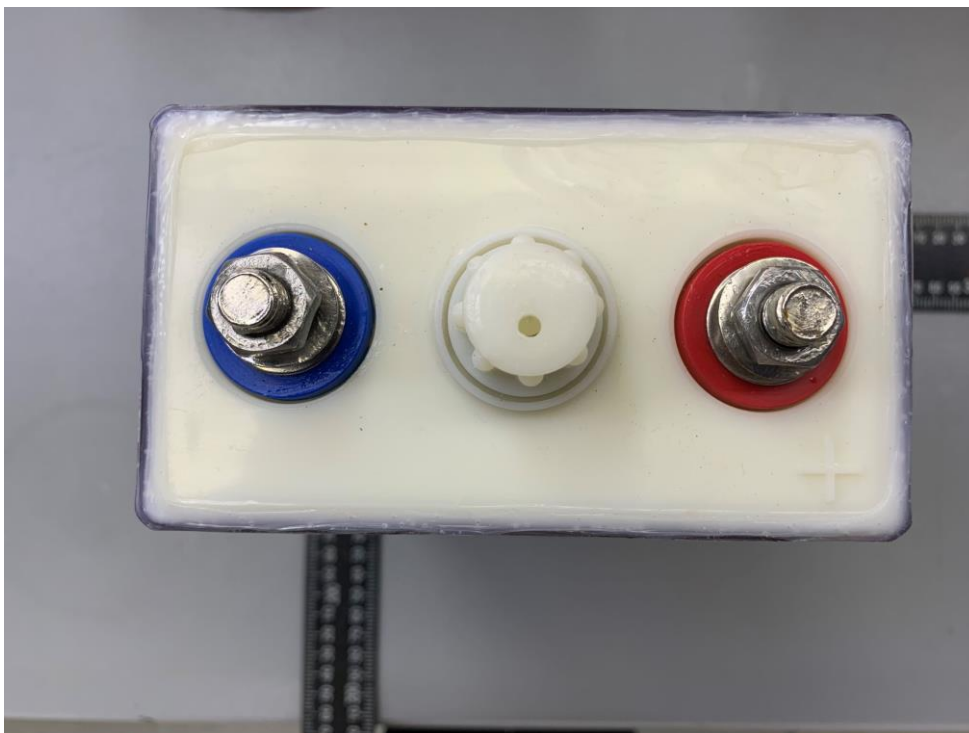
7.3.8	TABLE: Overcharge				P
Sample no.	OCV prior to charging, (Vdc)	Maximum charge current, (mA)	Time for charging, (hours)	Results	
1	1.225	30000	8	P	
2	1.208			P	
3	1.213			P	
4	1.211			P	
5	1.205			P	
Supplementary information: - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain)					

IEC 62133-1			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.9	TABLE: Forced discharge (cells)				P
Sample no.	OCV before application of reverse charge, (Vdc)	Measured reverse charge I_t , (A)	Time for reversed charge, (minutes)	Results	
1	1.315	60	90	P	
2	1.321			P	
3	1.327			P	
4	1.319			P	
5	1.318			P	
Supplementary information: - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain)					

Appendix No. 1: Photos of product

Overall view 1



Overall view 2

