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Discipline/Group Name:	Electrical/ Batteries & cells	Dated: 06/09/2023

TEST REPORT

Name and Address of customer	Aspiro Global Electric Pvt Ltd. Near Zila Sahkari Bank, Subhash Nagar, Paniyala Road, Roorkee, Haridwar, Uttarakhand, India-247667
PART A - PARTICULARS OF THE SAMPLE SUBMITTED BY CUSTOMER	
a) Sample Name	12V 200AH SOLAR TUBULAR BATTERY
b) Sample description (Rating/Class/Type etc.)	12V 200AH
c) Model No.	12V 200AH SOLAR TUBULAR BATTERY
d) Brand Name	--
e) Quantity of Sample	10
f) Condition of the sample	OK
g) Date of Receipt of Sample	23/08/2023
h) Date of Commencement of Testing	23/08/2023
i) Date of Completion of Testing	02/09/2023
j) Environmental conditions	Temperature: 20±5°C, 60%RH±15%RH
k) Decision Rule Applicable	~~YES~~/NO
PART-B: SUPPLEMENTARY INFORMATION	
a) Refrence to sampling procedure, wherever applicable:	
b) Supporting documents for the measurement taken and resultsderived like graph, tables,sketches and/or photographs, as appropriate to test report, if any	
c) Deviation from the test method as prescribed in relevant ISS/work instruction,	

Tested By:

Approved By:

IEC TEST LABS LLP DELHI-39

S.No	Test Parameters and Reference Clause	Specifications as per Customer Requirements (Reference IEC 60896-21:2004, IEC 60896-22:2004)	Test Results/Verdicts
1	Functional Requirements (Cl.4 of IEC 60896-22)	Safe operation requirements: These Requirements define essential safe operation properties and features of stationary lead-acid battery of the valve regulated type. See clause (6.1 to 6.10)	Complied
		Performance requirements: These Requirements define Performance properties of stationary lead-acid battery of the valve regulated type. See clause (6.11 to 6.14)	Complied
		Durability requirements: These Requirements define essential Durability properties of stationary lead-acid battery of the valve regulated type. See clause (6.15 to 6.21)	Complied
		Test requirements: The Test method required to verify the requirement define in 6.1 to 6.21, are stated and maintained in the separate standard IEC 60896-21.	Complied
2	Reporting format (Cl.5 of IEC 60896-22)	Application related definition of appropriate performance and durability requirement	Complied
		Battery user or specifier statement of requirements (Annex A)	Complied
		Battery manufactures or vendor statement of test results (Annex B)	Complied

	Requirements and characteristics		
3	Gas emission (Cl.6.1 of IEC 60896-21)	The gas collection shall be carried out, for example, with a volumetric measurement or gas collection device	Complied
		After 72 h ± 0,1 h of float charge, the gas collection shall commence and the collection of gas be continued for four periods each of 168 h ± 0,1 h duration.	Complied
		The normalized gas emission Ge per cell at elevated charge voltage (2,40 Vpc) conditions shall be calculated for the 48 h ± 0,1 h period	Complied
4	High current tolerance (Cl.6.2 of IEC 60896-21)	The test units shall have, before starting the test, an actual capacity Ca of at least Crt (3 h rate – U final 1, 70 Vpc at the selected reference temperature), be fully charged and have unit temperature between 20 °C and 25 °C.	Complied (Temp: 24°C)
		The test units shall be discharged for 30s with a current equal to 3 times the 5 min rate current (to U final 1,80 Vpc at 20 °C or 25 °C)	Complied
		The test units shall be examined, after the discharge, internally and externally for effects of high current flow and signs of melting.	Conforms (No defect and melting observed)
5	Short-circuit current and d.c. internal resistance (Cl.6.3 of IEC 60896-21)	The test shall be carried out with three cells or three monobloc batteries.	Complied
		The test units shall be selected and prepared according to 5.2.	Conforms
		The test units shall have, before starting the test, an actual capacity Ca of at least Crt (3 h rate – U final 1,70 Vpc at the selected reference temperature), be fully charged and have unit temperature between 20 °C and 25 °C.	Complied
		The voltage of the test units shall be measured at the terminals of each test unit in order to make sure that no external voltage drop interferes with the test result.	Complied (No external voltage drop)

6	Protection against internal ignition from external spark sources (Cl.6.4 of IEC 60896-21)	The test shall be carried out under the guidance of the safety procedures described in IEC 61430 (1997).	Complied
		The test shall be carried out according to IEC 61430 Clause 4.2 using a test fixture and placed in an explosion test chamber. The test shall be carried out at an ambient temperature between 15 °C and 30 °C.	Complied (Temp: 25°C)
		The test shall be carried out according to the following procedures and sub clauses of IEC 61430.	Complied
		The outcome of the test shall be reported and, for the purposes of IEC 60896-21 and IEC 60896-22, the valve assembly is deemed to have passed the test when no explosion or rapid combustion event occurred within the test fixture.	Complied (No Explosion or rapid combustion occurred)
7	Protection against ground short propensity (Cl.6.5 of IEC 60896-21)	The test unit shall have, before starting the test, an actual capacity Ca of at least 0,95 Crt (3 h rate – U final 1,70 Vpc at the selected reference temperature), be fully charged and have unit temperature between 20 °C and 25 °C.	Complied
		The presence or absence of ground short/leakage phenomena shall be reported.	Complied (No Leakage/ Ground short)
8	Content and durability of required markings (Cl.6.6 of IEC 60896-21)	The durability of the marking shall be tested accordingto clause 1.7.13 of IEC 60950-1 and the content of marking shall meet the requirement of IEC 60896-22	Satisfactory (No effect found)
		Requirement and application: Expose information tochemicals. Pass all substances for all applications: Informationshall remain readable after exposure to chemicals and remain in place	Satisfactory (No effect found)
		Requested information to be present for all applications	See the ANNEX A
9	Material identification (Cl.6.7 of IEC 60896-21)	The cover and case shall be visually inspected for a marking showing an ISO 1043-1 defined abbreviation of the name of the polymer(s) forming the bulk of the case and/or cover. The stability of the marking shall be tested, if needed, with the test outlined in 6.6.	Complied
10	Valve operation (Cl.6.8 of IEC 60896-21)	The units shall be tested for valve opening before and at the end of the stress temperature impact test at 55 °C or 60 °C	Complied (Temp: 60°C)
		The observed valve opening (adequate opening or otherwise) before and after the test of 6.16 shall be reported.	Complied
11	Flammability rating of materials (Cl.6.9 of IEC 60896-21)	The test shall be carried out with appropriately sized samples of the material used for the manufacture of the cell or monobloc battery case and, if different, also of the cell or monobloc battery cover.	Complied

12	Intercell connector performance (Cl.6.10 of IEC 60896-21)	The test shall be carried out with the cells and monobloc batteries destined for the test of 6.11 (discharge capacity at the C0,25 or 0,25 h rate with a current I0.25 to U final = 1,60 Vpc) or alternatively with the highest discharge current for a particular unit and intercell connector size as specified/allowed by the manufacturer in the relevant technical documentation of the product range The temperature of the units at the start of the test shall be between 20 °C and 25 °C.	N/A
13	Discharge capacity (Cl.6.11 of IEC 60896-21)	The test shall be carried out with five times six cells or five times six monobloc batteries.	Conforms
		The test shall be carried out with the units fully charged and with each unit temperature between 18 °C and 27 °C measured immediately prior the discharge.	Complied (Temp: 26°C)
		The measured capacity Ca (Ah) at the initial temperature θ shall be calculated as the product of the discharge current (A) and tdisch i.e. the discharge time (h).	Complied (Ca (Ah): 200.5Ah)
14	Charge retention during storage (Cl.6.12 of IEC 60896-21)	The test shall be carried out with six cells or six monobloc batteries.	Complied
		The test units shall have, before starting the test, an actual capacity Ca of at least Crt (3 h rate – Ufinal 1,70 Vpc at the selected reference temperature), and be fully charged.	Complied
15	Float service with daily discharges (Cl.6.13 of IEC 60896-21)	The test units shall have, before starting the test, an actual capacity Ca of at least 0,95 Crt (3 h – Ufinal 1,70 Vpc at the selected reference temperature) and be fully charged.	Complied
		The test sequence a) to g) shall be repeated until, in the steps f) and g), the test units show a capacity Caf and Cab lower than 80% of Crt (3 h rate to Ufinal 1,70 Vpc at the selected reference temperature).	Complied
		The test results: a) Number of cycles achieved by each unit before reaching 1,80 Vpc during the 2 h of discharge	Complied
		b) Capacity Caf expressed in % of Crt after 168 h float charge	Complied (Capacity: 200.6Ah (100.22%)
		c) Capacity Cab expressed in % of Crt after the manufacturer's specified boost charge treatment	Complied (Capacity: 200.5Ah (100.18%)

16	Recharge behavior (Cl.6.14 of IEC 60896-21)	The capacity found after 24 h of charge Ca24 shall be expressed as percentage of the initial actual capacity (recharge behavior factor Rbf): Rbf24h = (Ca24 × 100) / Ca %	Complied (Capacity-Ca24: 200.11Ah (100.1%)
		The capacity found after 168 h Ca168 shall be expressed as percentage of the initial actual capacity charge (recharge behavior factor Rbf): Rbf168 h = (Ca168 × 100) / Ca %	Complied (Capacity-Ca168: 200.25Ah (100.2%)
17	Service life at an operating temperature of 40 °C (Cl.6.15 of IEC 60896-21)	The units shall be float charged at 40 °C with the manufacturer's recommended float voltage for 25 °C.	Complied
		Every 118 days ± 3 days the units shall, after cooling down to room temperature under float charge voltage setting, be subjected within 24 h ± 12 h to a determination of their individual actual capacity Ca (Crt 3 h – Ufinal 1,70 Vpc at the selected reference temperature).	Complied
18	Impact of a stress temperature of 55 °C or 60 °C (Cl.6.16 of IEC 60896-21)	The units shall be placed in a hot air enclosure with such an air temperature that the monobloc batteries have a temperature of 55 °C ± 2 K or 60 °C ± 2 K. The relative humidity level of the air of the chamber shall be lower than 35 % and its actual value reported	Complied (Temperature: 60°C Humidity: 30% RH)
		When tested at 60 °C, the units shall be cooled down, every 30 days ± 3 days, to room temperature under float charge and subjected, within 24 h ± 12 h, to a determination of their individual actual capacity Ca (at the 3 h rate to Ufinal 1,70 Vpc and/or at the 0,25 h rate to Ufinal 1,60 Vpc at the selected reference temperature).	Complied (Capacity Measured: 198Ah)
19	Abusive over-discharge (Cl.6.17 of IEC 60896-21)	One of the 4 units shall be discharged, at a unit temperature of 18 °C to 27 °C, with a current of I10 for 3 h and then connected to the remaining 3 fully charged units in series and with the intercell connectors giving, between each units, an air gap of 10 mm or as specified in the appropriate technical documentation of the product range.	Complied (Temp: 24°C)
		After the discharge and a 24 h ± 0,1 h stand in the discharged state, the four unit string shall be recharged in series for 168 h ± 0,1 h with a current limited to I = 2,0 I10 and a voltage limited to the float voltage specified by the manufacturer for either 20°C or 25°C.	Complied (Temp: 20°C)

20	Information on thermal runaway sensitivity (Cl.6.18 of IEC 60896-21)	At the conclusion of tests the test data shall be assembled and presented as follows: a) Duration of charge until a unit temperature of 60 °C ± 1 K (probe a) is reached or the effective temperature (probe a) after 168 h of charge with 2,45 Vpc	Complied
		b) Duration of charge until a unit temperature of 60 °C ± 1 K (probe a) is reached or the effective temperature (probe a) after 168 h of charge with 2,60 Vpc	Complied
		c) Graphic or trace of the temperatures recorded by probes a), b) and c) during both test d) Graphic or trace of string current during both test	Complied
21	Impact of low temperature service on capacity (Cl.6.19 of IEC 60896-21)	The test methods are according to clause 6.19.1 to 6.19.13 which are stated in the standard IEC60896-21	Complied
		Requirement and application: see table 23 in the standard IEC 60896-22	Complied
22	Dimensional stability at elevated internal pressures and temperatures (Cl.6.20 of IEC 60896-21)	The maximum outside dimension (width and length) of the cell case shall be measured before pressurization and recorded.	Complied (Length: 503mm, Width: 187mm, Height: 410mm)
		The increase in the cell case dimensions after 24 h ± 0,1 h at 50 °C ± 2 K shall be reported both as percentage deviation from the value before the test and as measured change in mm.	Complied (% Deviation: 1.5mm (0.29%)
23	Stability against mechanical abuse of units during installation (Cl.6.21 of IEC 60896-21)	The units shall be dropped according to the height prescriptions of IEC 60068-2-32 and amendment. Two “Free Fall”, for resistance against leakages caused by two drops each onto a smooth, level concrete floor from drop heights as specified below:	Complied
		Fall from 100 mm for units weighing up to 50 kg	NA
		Fall from 50 mm for units weighing between 50 kg and 100 kg	Complied (Battery Weight: 68.5Kg)
		Fall from 25 mm for units weighing more than 100 kg	NA
		Each of the units shall be inspected, after the two consecutive drops, for gas and liquid leaks with adequate and sensitive means such as a high voltage (2 kV to 5 kV) dielectric breakdown test, helium leak detectors, hydrogen detectors, pH indicator paper and the like and the findings documented and reported.	Complied (No leakage and breakage found)

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Photograph of sample:





12V 200AH SOLAR TUBULAR BATTERY

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***** End of Test Report*****