सीएसआईआर - केंद्रीयविद्युतरसायनअनुसंधान संस्थान
CSIR - Central Electrochemical Research Institute
कारैकुडी /Karaikudi -630003
CSIR-Battery Performance Testing and Evaluation Centre
☎ 04565-241423 ✉ director@cecri.res.in 🌐 www.cecri.res.in

Dated: 14.09.2022	Report No: CSIRBPTEC/Mesha/060/01/2022	Customer Specification

Manufacturer	: Mesha Energy Solutions Pvt. Ltd., Yeshvanthpur, Bangalore Bangalore -560022
Test item	: *12 V 130 Ah Tubular Flooded LAB*
Identification	: *NA* Serial No : NA
Receipt No.: NA	Date of receipt : 05.04.2022
Testing laboratory and its address:	Battery Performance Testing and Evaluation Centre *CSIR-Central Electrochemical Research Institute* *Karaikudi 630 003, Tamilnadu.* *India*
Test specification:	Validation of Simulation tests conducted by the Customer at their facility.
Test Result:	*The test item passed / failed the test specification(s).*
Other Aspects:	*Nil*
This test report relates to the test sample submitted.	

Tested by:	Approved by / Authorized Signatory:	Issued by:
P. Seenichamy	Sundar Mayavan	Sundar Mayavan
Date: 14/09/2022	Date: 14/9/22	Date: 14/9/22

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TEST REPORT

Report No .....:	**CSIR-BPTEC/Mesha/060/01/2022**
Date of issue ..... :	14.09.2022
Total number of pages .....:	
Testing Laboratory .....:	**Battery Performance Testing and Evaluation Centre**
Address .....:	CSIR- Central Electrochemical Research Institute Karaikudi – 630 003, Tamilnadu, India
Manufacturer's name .....:	**Mesha Energy Solutions Pvt. Ltd.,**
Address	Mesha Energy Solutions Pvt. Ltd., Yeshvanthpur, Bangalore Bangalore -560022
Test specification:	
Standard..... :	Customer specification
Test procedure ..... :	Compliance Report
Non-standard test method.....	N/A
Test Report Form No..... :	NA
Test Report Form(s) Originator :	NA
Master TRF..... ... :	NA
Test item description .....:	12 V/ 130 Ah battery with META incorporated
Trade Mark..... :	NA
Model/Type reference .....:	NA
Ratings .....:	12 V/ 130 Ah
Other Documents submitted.....:	*NA*

Tested by:	**Approved by / Authorized Signatory:**	**Issued by:**
P. Seenichamy	Sundar Mayavan	Sundar Mayavan
Date: 14/09/2022	**Date:** 14/9/22	**Date:** 14/9/22.

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TEST SUMMARY:

Description	Measurement/ testing	Page No.
3-W drive simulation	Test protocol provided by the customer based on their tests conducted at their facility for over 119 cycles: •Charging: In the CCCV mode at 30A (C/4.3) •Discharge: Load profile based on 3W EV test data. Includes combination of acceleration, cruise, start and stop and uphill.	7

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Table – List of Attachments

Attachment No.	Attachment Description	No. of pages in Attachment
Attachment – 1	Pictorial view of the equipment	1

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.

Test item particulars ..... .:

Classification of installation and use..... :

Connection to the mains..... :

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 .....: 24.06.2019

Date(s) of performance of tests..... :

Laboratory conditions ..... :

Ambient Temperature..... : 27 ^{0}C

Ambient Humidity ..... : 50-60 %

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General product information:

1) Application details / Description of the product: Batteries for 3 Wheeler Applications.

2) Differences between the models: NA

Model No. tested with-in the family series: NA

Family Series Model No.s: NA

3) Options:

The equipment was tested without any optional accessory installed. Hence, this report does not cover parameters that are influenced by the installation of optional accessory that might affect safety in the meaning of this standard.

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Cl. No.	Test / Requirement name
1	Test Method : 3-W Drive simulation
	3-W Drive simulation *(as per customer specification)* *•Charging: In the CCCV mode at 30A (C/4.3)* *•Discharge: Load profile based on 3W EV test data. Includes combination of acceleration, cruise, start and stop and uphill.*
	1. Charging mode: a. CC-CV Mode b. Maximum Voltage: 15V c. CC Mode Current: 30A d. Charging duration: 5½ Hours 2. Discharging mode: a. As per load profile given below **Simulation : Microcycle**

Time duration for each segment	Current	Cumulative Time
3s	20A	3s
1s	45A	4s
5s	0A (Idle)	9s
7s	20A	16s
1s	30A	17s
1s	45A	18s
4s	0A (Idle)	22s
7s	20A	29s
1s	30A	30s
1s	45A	31s
4s	0A (Idle)	35s
16s	20A	51s
10s	30A	61s
32s	45A	93s
6s	0A (Idle)	99s
16s	20A	115s
10s	30A	125s
32s	45A	157s
6s	0A (Idle)	163s
16s	20A	179s
10s	30A	189s
32s	45A	221s
6s	0A (Idle)	227s

The above sub cycle is repeated continuously till the battery voltage reaches 9.6 V, which constitutes a cycle. After completion of the each micro cycle the battery is charged for further microcycles.

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Cycle no.	Charge			Discharge			
	Ah	Wh	Duration(h)	Ah	Wh	Duration(h)	EOD (V)
1				71.8	820.5	2.433	10.5
2	94.8	1373.8	5	78.1	898	2.642	10.5
3	96.8	1398.5	5	79.0	909.3	2.673	10.5
4	97.2	1404.7	5	79.9	920.4	2.702	10.5
5	98.0	1416.5	5	80.2	925.2	2.710	10.5
6	97.7	1413	5	80.8	932.4	2.734	10.5
7	98.1	1418.9	5	82.01	948.4	2.77	10.5
8	98.8	1430.4	5	82.5	953.2	2.79	10.5
9	99	1432.4	5	82.6	954.6	2.80	10.5
10	100	1446.4	5	82.6	955	2.80	10.5
11	98.8	1429.5	5	83.0	960.7	2.81	10.5
12	101.1	1463.3	5½	97.6	1107.8	3.30	9.6
13	114.9	1660.1	5½	101.9	1163.2	3.46	9.6
14	118.8	1714	5½	98.9	1131.4	3.34	9.6
19	118.9	1719	5½	101.3	1157.9	3.43	9.6
29	121.2	1755.8	5½	100.1	1155.6	3.38	9.6
37	119.5	1738.1	5½	96.3	1119.8	3.26	9.6
47	114.7	1660.9	5½	88.7	1022.3	3.00	9.6
57	116	1688.6	5½	88.8	1036.9	3.00	9.6
58	115.3	1676.7	5½	88.7	1036.9	3.00	9.6
59	116.2	1690.1	5½	88.7	1037.6	3.00	9.6
70	109.3	1599.2	5½	76.9	912	2.6	9.6
80	117.2	1699	5½	88.8	1030.9	3.00	9.6
90	114.0	1661.4	5½	84.9	998.1	2.87	9.6
100	120	1734.4	5½	92.5	1065.7	3.13	9.6
110	120.2	1745.1	5½	91.9	1071.5	2.91	9.6
120	113.9	1663.9	5½	83.3	986.2	2.82	9.6
130	122.7	1774.5	5½	92.4	1068.3	3.13	9.6
140	123.1	1788.8	5½	90.1	1056.6	3.05	9.6
150	126.3	1824.1	5½	95.1	1097.8	3.21	9.6
160	128.4	1846.7	5½	96.1	1098.7	3.25	9.6
170	131.4	1896.8	5½	99.5	1148.3	3.37	9.6
174	131.2	1898.6	5½	99.9	1158.7	3.38	9.6
200	128.1	1846.1	5½	90.8	1040.9	3.07	9.6
210	123.5	1793.8	5½	85.7	999.4	2.90	9.6
221	126.7	1839.5	5½	85.2	990.8	2.88	9.6
237	125.0	1839.5	5½	85.2	990.8	2.88	9.6

Table 1: EV simulation results performed on 12V, 130 Ah tubular flooded lead acid battery

---------END OF THE TEST REPORT---------

Dated: 14.09.2022	Report No: CSIRBPTEC/Mesha/060/01/2022	Customer Specification

	Observation
	1. The 12 V/130 Ah battery has completed 237 cycles and each cycle comprises of simulation microcycles. Table 1 shows the charging Ah, Wh, duration and discharge Ah, Wh, duration and end of discharge (EOD) V.