NATIONAL AUTOMOTIVE TEST TRACKS

[Under NATIONAL AUTOMOTIVE BOARD (Ministry of Heavy Industries), Govt. of India]

N	T	0	B-Li	S	0026

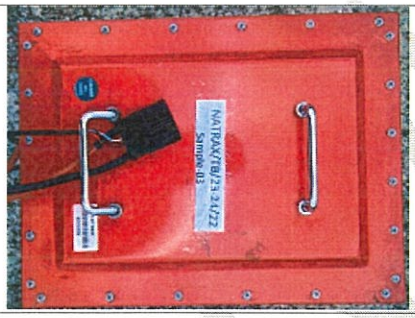
Dated: 15-09-2023

TEST REPORT

1.0	NAME AND ADDRESS OF THE CUSTOMER	**M/s Redon Lithium Industries LLP** Ground Floor, Plot No. 91, Sompura Industrial Area, 1st Stage, Dobbaspet, Karnataka 562111
1.1	NAME AND ADDRESS OF THE MANUFACTURER	**M/s Redon Lithium Industries LLP** Ground Floor, Plot No. 91, Sompura Industrial Area, 1st Stage, Dobbaspet, Karnataka 562111
2.0	TESTING REFERENCE LETTER No.	REDON/NATRAX/CMVR/AIS156/REDYR51100L/1, 21.07.2023

3.0 DESCRIPTION OF DEVICE UNDER TEST (DUT):

S.No	Particulars	Description
i	DUT NAME	REESS (Battery Pack)
ii	Trade Mark	Redon Lithium Industries LLP
iii	Battery Type	Lithium-ion (Prismatic)
iv	Battery Pack Capacity (Ah)	100 Ah
v	Operating Voltage	40 V ~ 58.4V
vi	Rated Voltage	51.2 V
vii	Battery Pack Id/Model	REDYR51100L
viii	Battery Dimensions (l*b*h)	417mm X314mm X 295mm
ix	Battery Weight In (Kg)	52.5 Kg
x	Battery Module Drawing no.	RESAL0018
xi	Battery Pack Sr. no.	RED2370202



Remarks: Refer page 25 of 25 for Disclaimer

NATRAX CASE ID: NATRAX/TB/23-24/22

Authorized Signatory:

Format no. NATRAX/TB/L/2023/01

PREPARED BY	CHECKED BY	APPROVED BY
Rishikesh Sharma	Manish Mandloi	Umesh Raghuwanshi
Engineer	Sr. Engineer	Asst. Manager

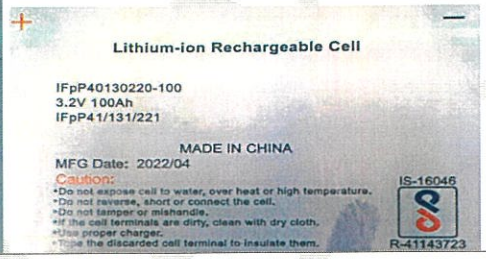
NATIONAL AUTOMOTIVE TEST TRACKS

NATIONAL AUTOMOTIVE TRACKS (NATRAX)
Agra-Mumbai Highway HN-52, Next to Pithampur Flyover, Village-Post Khandwa (Near Pithampur),
Distt. Dhar (M.P.)-454 774

N	T	0	B-Li	S	0026	Dated: 15-09-2023

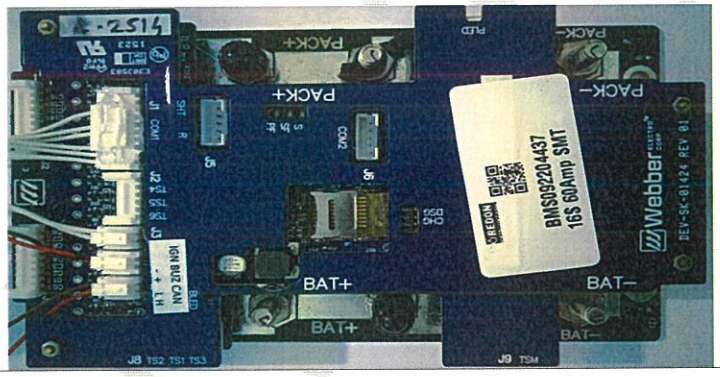
4	Cell	Description
i	Cell Manufacture Name	Jiangsu Highstar Battery Manufacturing Co., Ltd.
ii	Cell Chemistry, Form Factor & Dimensions	Lithium - ion Rechargeable Cell, Prismatic, IFpP40130220-100
iii	Cell Voltage & Capacity	3.2V, 100AH
iv	Cell Model No.	IFpP40130220-100
v	Cell Batch Code No.	IFpP41/131/221
vi	Configuration of cells	16S1P
vii	Cell Type	Prismatic
viii	Cell certification report/Date	IEC/22121204- 03/01/2023

CELL PHOTO



5	BMS	Description
I	BMS Make	WEBBER ELECTROCORP PRIVATE LIMITED
Ii	BMS Model/ ID No.	WBMS-SW 16S 80A
Iii	BMS Software version/ Hardware version	v18.3.23.1/ v3.1.2.3
iv	BMS Communication Protocol	CAN, RS485
v	BMS EMC Test Report (referred)	CT0MS0662, 11.09.2023

BMS PHOTO



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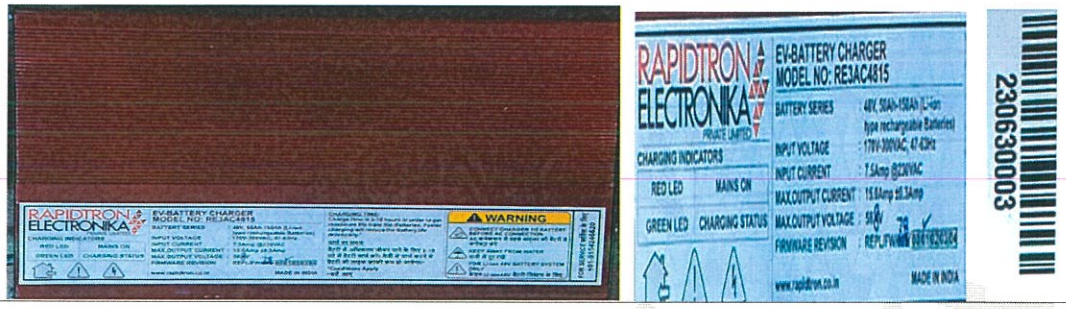
Rishikesh Sharma	Manish Mandloi	Umesh Raghuwanshi
Engineer	Sr. Engineer	Asst. Manager

NATIONAL AUTOMOTIVE TEST TRACKS (NATRAX)

Agra-Mumbai Highway HN-52, Next to Pithampur Flyover, Village-Post Khandwa (Near Pithampur),
Distt. Dhar (M.P.)-454 774

6	Battery Charger	Description
i	Charger Sr. no.	230630003
ii	Charger (External/On Board)	External
iii	Charger Make / Model	RAPIDTRON ELECTRONIKA /RE3AC4815
iv	Trade Name of Charger	EV-BATTERY CHARGER
v	Charger Type	External Charger
CHARGER PHOTO		

	Sample Receipt date	17-07-2023
8	Condition of Sample	Good (No physical damage observed)
9	Test Objective	To validate the safety requirements with respect to the Rechargeable Electrical Energy Storage System (REESS) of L category vehicle as per the requirements of AIS-156(Part II) 2022 amendment 3 Phase 2.
10	Functional Verification	Functional verification done and REESS was found satisfactory
11	Test Method	Test method referred from AIS-156(Part II) 2022 amendment 3 Phase 2.
12	Test Description and date of Performance	Please refer the ANNEXURE-1 of this report
13	Conclusion	The REESS specified in Sr. No. 3.0 of this test report met all the test requirements when tested as per AIS-156(Part II) 2022 amendment 3 Phase 2 as mentioned in Annexure-1 of this report.
14	Test Results	Please refer the test requirements and results in ANNEXURE-I of this report
15	Test Location	EV Test Lab, NATRAX
16	Any Deviation or Exclusion from Test Method: NO	
17	Total No. of Pages	27 (Report with Annexures) + 2 (Drawings)

PREPARED BY	CHECKED BY		APPROVED BY
Rishikesh Sharma	Manish Mandloi		Umesh Raghuwanshi
Engineer	Sr. Engineer		Asst. Manager

ANNEXURE-1

1.0 TEST REQUIREMENTS AND RESULTS:

1.1	**Vibration Test** **Reference Standard: AIS 156(Part II)-2022 (A3P2)**			
1.1.1	**Procedure**			
Sample ID: NATRAX/TB/23-24/22-03	**Particulars**	**Parameter During Test**		
	Test Component	REESS Subsystem (Battery Pack)		
	Ambient temperature (20 ± 10°C)	26 °C		
	Test Component SOC (>50%)	85 %		
	Protection Devices of DUT	Fuse		
	Test Axis	Z-Axis (Vertical Axis)		
	Test Component Weight	52.5 Kg		
	Frequency Type	Sinusoidal		
	Frequency Sweep	7 Hz to 200 Hz to 7 Hz Frequency [Hz] 7-18		
	For Weight 12Kg or More	**Frequency [Hz]**	**Acceleration [m/s2]**	
		7-18	10	
		18 - approximately 25	Gradually increased from 10 to 20	
		25 - 200	20	
	Frequency Sweep Time	15 Minutes		
	Total Frequency Sweep	12		
	Test Duration	3 Hours		
	Observation duration after Standard Cycle	1 Hour		
	Test Start Date	21.07.2023		
	Test End Date	21.07.2023		
1.1.2	**Test Result**			
	Requirement		**Observations**	
	During the test, there shall be no evidence of: (a) Electrolyte leakage (b) Rupture c) Fire (d) Explosion		No Electrolyte leakage, no rupture, no fire and no explosion.	
	Standard cycle		Standard cycle was feasible after test.	
	The isolation resistance measured after the test		Isolation resistance was found greater than 100Ω/Volt.	

ANNEXURE-1

1.1.3	Vibration Test Setup (Photo)

Test Report

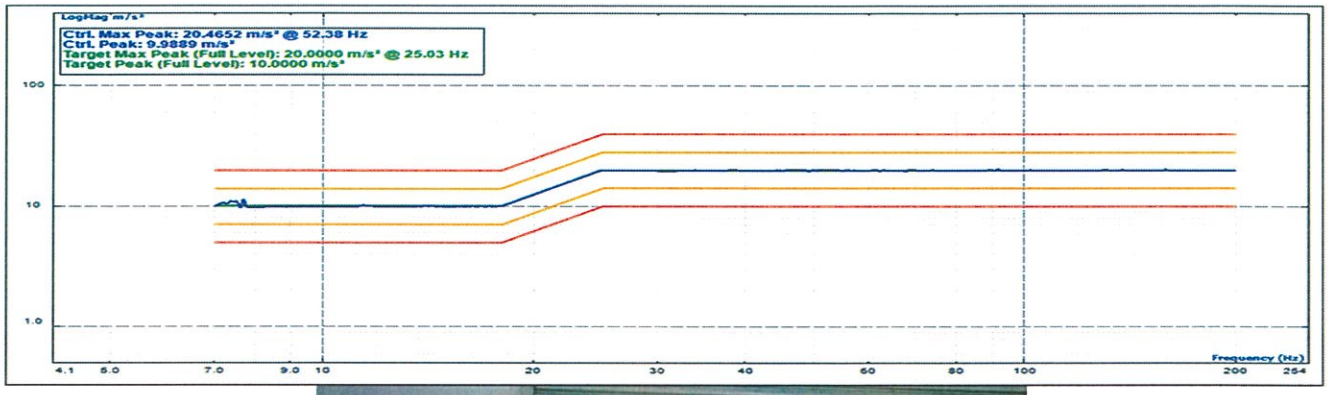
Report time: Jul-21-2023 15:49:18
Test name: Battery Vibration Test Neuron
Test status: Test Stopped (Schedule Finished)

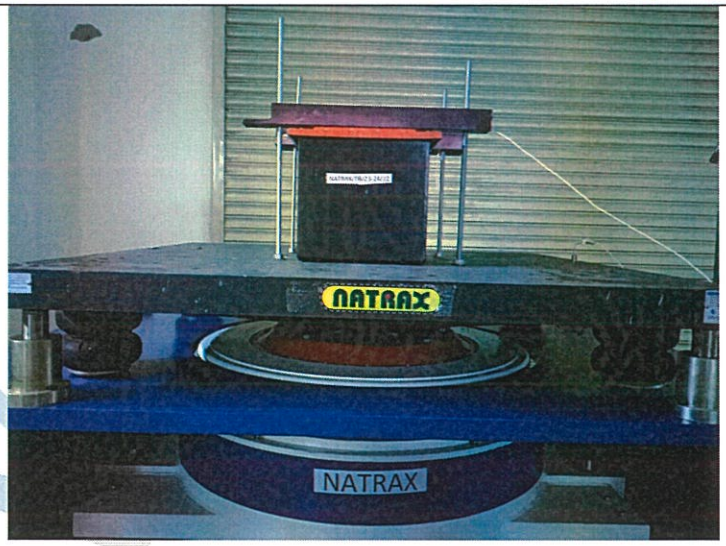
Data measured at: Jul-21-2023 15:39:47
Test type: VCS (Swept Sine)
Run folder: Z-DIRECTION SHOK44 Jul 21, 2023 12-46-11

Testing time
Remaining Time: 00:00:00
Run Start Time: Jul-21-2023 12:46:13
Total elapsed time: 03:00:11
Full level elapsed time: 03:00:00

Test parameters
Current Frequency: 7.000 Hz
Signal Plot Points: 2048
Sweeping Rate: 0.64487 Oct/Min
Sweep Type: Logarithmic
Sweep Number: 24

Control Composite





ANNEXURE-1

1.3	Mechanical Shock Reference Standard: AIS 156(Part II)-2022 (A3P2)	
1.3.1	Procedure	
Sample ID: NATRAX/TB/23-24/22-02	Particulars	Parameter During Test
	Test Component	REESS Subsystem (Battery Pack)
	Ambient temperature (20 ± 10°C)	26 °C
	Test Component SOC (>50%)	90 %
	Protection Devices of DUT	Fuse
	Test Axis	X-Axis (Linear Axis), Y-Axis (Lateral Axis) and Z-Axis (Vertical Axis)
	Test Component Weight	52.5 Kg
	Frequency Type	Half-Sine
	Peak Acceleration	500 m/s^2
	Pulse Duration	11 milliseconds
	Total Shock	18 (3 shocks in the positive direction followed by 3 shocks in the negative direction in all 3 axis)
	Observation duration after Standard Cycle	1 Hour
	Test Start Date	26.07.2023
	Test End Date	26.07.2023

1.3.2	Test Result	
	Requirement	Observations
	During the test, there shall be no evidence of: (a) Electrolyte leakage, (b) Rupture, c) Fire, (d) Explosion	No Electrolyte leakage, no rupture, no fire and no explosion.
	Standard cycle	Standard cycle was feasible after test.
	The isolation resistance measured after the test.	Isolation resistance was found greater than 100Ω/Volt.

ANNEXURE-1

1.3.3	Mechanical Shock Test Setup (Photo)

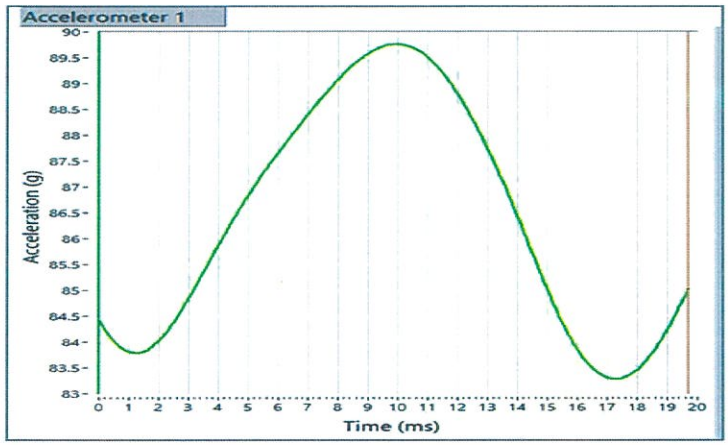
(Tarang Pneumatic Shock Test Machine)

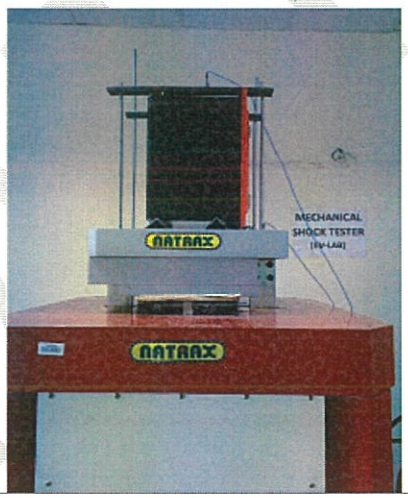
WAVE FORM REPORT

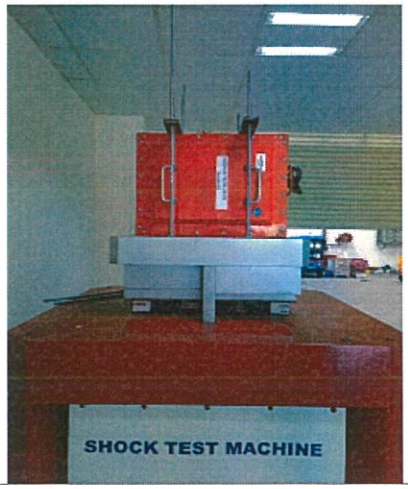
'TARANG' TSC-1001 Test Report File
Shock Test Number: 3
Time: 2:27:08 PM
Date: 7/26/2023
Test operator: REDON S1V100AH
Channel Number: 2
Accelerometer Sensitivity (mV/g): 10.450
Accelerometer S No: LW225606

Observation 2

Selected Test
Peak (g): 89.76
Pulse Duration (ms): -19.90
Filter Cut Off (Hz): 100







NATIONAL AUTOMOTIVE TEST TRACKS NATRAX

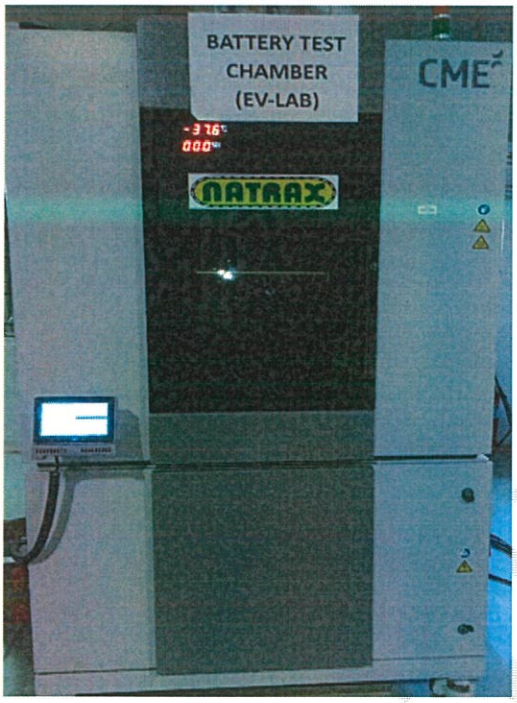
ANNEXURE-1

2.1	Thermal Shock & Cycling Test Reference Standard: AIS 156(Part II)-2022 (A3P2)	
2.1.1	**Procedure**	
Sample ID: NATRAX/TB/23-24/22-01	**Particulars**	**Parameter During Test**
	Test Component	REESS Subsystem (Battery Pack)
	Ambient temperature (20 ± 10°C)	27 °C
	Test Component SOC (>50%)	80 %
	Protection Devices of DUT	Fuse
	Positive Set Temperature	60 °C
	Positive Temperature Duration	6 Hours
	Time taken to reach Negative Set Temperature	20 Minutes
	Negative Set Temperature	-40°C
	Negative Temperature Duration	6 Hours
	Time taken to reach Positive Set Temperature	20 Minutes
	No of Cycles	5
	Storage Time	24 Hours after test
	Test Start Date	20.07.2023
	Test End Date	26.07.2023

2.1.2	**Test Result**	
	Requirement	**Observations**
	During the test, there shall be no evidence of: (a) Electrolyte leakage (b) Rupture c) Fire (d) Explosion	No Electrolyte leakage, no rupture, no fire and no explosion.
	Standard cycle	Standard cycle was feasible after test.
	The isolation resistance measured after the test.	Isolation resistance was found greater than 100Ω/Volt.

ANNEXURE-1

2.1.3	Thermal Shock & Cycling Test Setup (Photo)



ANNEXURE-1

3.1	Fire Resistance Test Reference Standard: AIS 156(Part II)-2022 (A3P2)	
3.1.1	**Procedure**	
Sample ID: NATRAX/TB/23-24/22-06	**General Parameter**	
	Particulars	**Parameter During Test**
	Test Component	REESS Subsystem (Battery Pack)
	Ambient temperature (> 0°C)	27 °C
	Test Component SOC (>50%)	90 %
	Protection Devices of DUT	Fuse
	Fuel Temperature	Less than 20°C
	Test Fixture Parameter	
	Particulars	**Parameters During Test**
	Grating Table steel rods diameter (Eqvl.)	6-10 mm
	Distance between Grating Table steel rods	4-6 Cm
	Fuel	Petrol
	Fuel Pan Dimension	L- 230 mm, B- 230 mm, H- 80 mm
	Fuel Level from Pan Top	< 8 cm
	Distance between Fuel Level and DUT	50 cm
	Fixed Component	Fuel Pan
	Movable Component	DUT Fixture
	Screen Height from Fuel Level	3 cm
	Length and Width of the screen	2 to 4 cm smaller than Pan
	Screen Material (Brick)	SK 30
	Test Lab Ventilation	Yes (Indoor with Ventilation)
	Test Parameter	
	Particulars	**Parameter During Test**
	Fuel Pan distance from DUT	3 m
	Pre-Heating Duration (Phase-A)	60 s
	Duration of DUT direct Exposure to Flame (Phase-B)	70 s
	Duration of DUT direct Exposure to Flame (Phase-C)	60 s
	Observation Time	3 Hours
	Test End Date	01.08.2023
	Test End Date	01.08.2023

3.1.2	Test Result	
	Requirement	Observation
	No explosion at end of test.	No explosion observed.

3.1.3	Test Setup

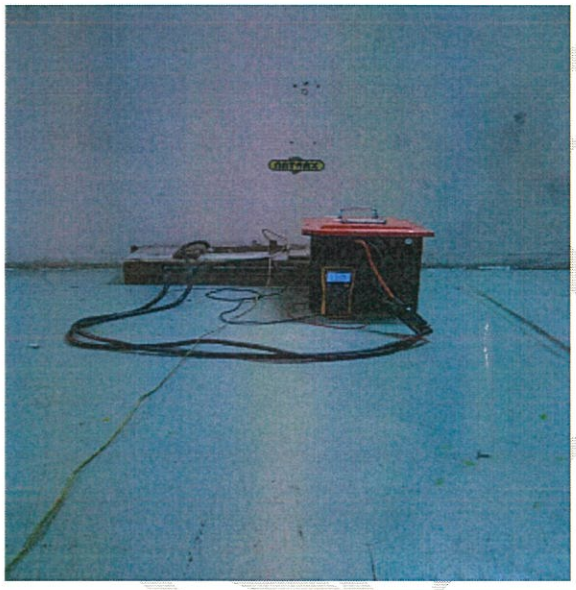
ANNEXURE-1

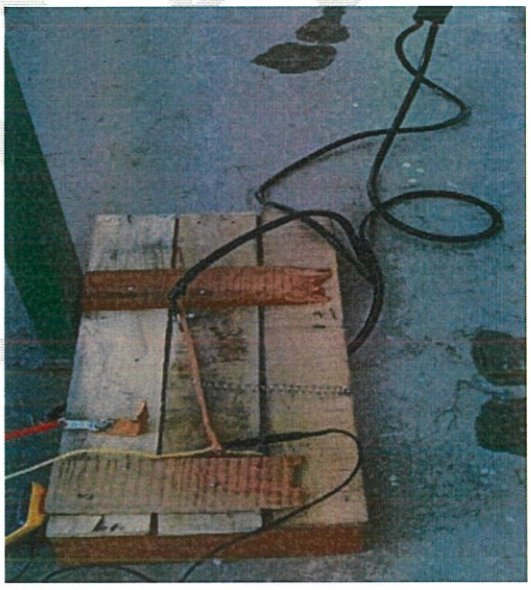
PROTECTION VARIFICATION

4.1	External Short Circuit Protection Reference Standard: AIS 156(Part II)-2022 (A3P2)	
4.1.1	Procedure	
Sample ID: NATRAX/TB/23-24/22-05	Particulars	Parameters During Test
	Test Component	REESS Subsystem (Battery Pack)
	Battery Management System	Available
	Ambient temperature (20 ± 10°C)	26 °C
	Test Component SOC (>50%)	100 %
	Protection Devices of DUT	Fuse
	DUT Condition	Active Mode
	Test Component Weight	52.5 Kg
	Connector resistance	< 5 mΩ
	Test Stopped when	REESS's operated and interrupted the short circuit.
	Observation duration after Standard Cycle	1 Hour
	Test Start Date	29.07.2023
	Test End Date	29.07.2023

4.1.2	Test Result	
	Requirement	**Observations**
	During the test, there shall be no evidence of: (a) Electrolyte leakage (b) Rupture c) Fire (d) Explosion	No Electrolyte leakage, no rupture, no fire and no explosion.
	External Short Circuit Protection	REESS's operated and interrupted the short circuit as soon as the current crossed the upper limit set in the Battery Management System
	Standard cycle	Standard cycle was feasible after test.
	The tested battery was kept in observation for 1 hour	Normal Functionality was observed.
	The isolation resistance measured after the test.	Isolation resistance was found greater than 100Ω/Volt.

4.1.3	Test Setup





ANNEXURE-1

4.2	Over-Charge Protection Reference Standard: AIS 156(Part II)-2022 (A3P2)	
4.2.1	**Procedure**	
Sample ID: NATRAX/TB/23-24/22-05	**Particulars**	**Parameter During Test**
	Test Component	REESS Subsystem (Battery Pack)
	Battery Management System	Available
	Ambient temperature (20 ± 10°C)	26 °C
	Protection Devices of DUT	Fuse
	DUT Condition	Active Mode
	Charging Current	33 A
	Test Stopped when	The charging continued until the tested-device (automatically) interrupts or limits the charging.
	Observation Period	1 Hour
	Test Start Date	25.07.2023
	Test End Date	25.07.2023

4.2.2	**Test Result**	
	Requirement	**Observations**
	During the test, there shall be no evidence of: (a) Electrolyte leakage (b) Rupture c) Fire (d) Explosion	No Electrolyte leakage, no rupture, no fire and no explosion.
	Over-charge Protection	Automatic Interruption
	Standard cycle	Standard cycle was feasible after test.
	The tested battery was kept in observation for 1 hour	Normal Functionality was observed.
	The isolation resistance measured after the test.	Isolation resistance was found greater than 100Ω/Volt.

4.2.3	Test Setup

	A	B	G	H	I	J	K	L	M	N	O
1	Test Name:	Over Charge Propagation Redon 51v100Ah, S4									
2	Test Date:	25-07-23 12:58									
3	Operator ID:	Admin									
4	Program Nam	CHARGE									
5	Program Description:										
6	Program Data	C:\VisualCN\Programs\NATRAX.mdb									
7	Module Type	yd									
8	Module Desc	LCV 100-80									
9	Address:	Port: 1, Sys Controller: 3 Circuit: 7									
10	Name:	Port 1, Ctrl 3, Addr 7									
11											
12	Exclude	Total Ti	Step	Step Tir	Current, A	Voltage, V	Power, W	Constan	Interna	Amp-Hc	Watt-H
13	No	0:00:01	1	0:00:01	33	53.49	1764	0	0	0	0.4
14	No	0:00:02	1	0:00:02	33	53.55	1767	0	0	0.01	0.9
15	No	0:00:03	1	0:00:03	32.99	53.6	1768	0	0	0.02	1.3
16	No	0:00:04	1	0:00:04	33	53.65	1770	0	0	0.03	1.8
17	No	0:00:05	1	0:00:05	33	53.69	1771	0	0	0.04	2.3
18	No	0:00:06	1	0:00:06	33	53.72	1772	0	0	0.05	2.8
19	No	0:00:07	1	0:00:07	33	53.76	1774	0	0	0.06	3.3
20	No	0:00:08	1	0:00:08	33	53.79	1775	0	0	0.07	3.8
21	No	0:00:09	1	0:00:09	33	53.82	1776	0	0	0.08	4.3
22	No	0:00:10	1	0:00:10	33	53.85	1777	0	0	0.09	4.8
6721	No	1:51:49	1	1:51:49	33	56.66	1869	0	0	61.49	3357
6722	No	1:51:50	1	1:51:50	33	56.67	1870	0	0	61.5	3358
6723	No	1:51:51	1	1:51:51	33	56.68	1870	0	0	61.51	3358
6724	No	1:51:52	1	1:51:52	33	56.7	1870	0	0	61.52	3359
6725	No	1:51:53	1	1:51:53	33	56.71	1871	0	0	61.53	3359
6726	No	1:51:53	1	1:51:53	0.01	81.21	0	0	0	61.53	3360
6727											
6728	Notes:	5.50, MDB 11.88									
6729											

Over_Charge_Propagation_Redon_5

ANNEXURE-1

4.3	Over-Discharge Protection Reference Standard: AIS 156(Part II)-2022 (A3P2)	
4.3.1	**Procedure**	
Sample ID: NATRAX/TB/23-24/22-01	**Particulars**	**Parameter During Test**
	Test Component	REESS Subsystem (Battery Pack)
	Battery Management System	Available
	Ambient temperature (20 ± 10°C)	28 °C
	Protection Devices of DUT	Fuse
	DUT Condition	Active Mode
	Discharging Current	50 A
	Test Stopped when	The discharging continued until the tested-device (automatically) interrupts or limits the discharging.
	Observation Period	1 Hour
	Test Start Date	29.07.2023
	Test End Date	29.07.2023

4.3.2	**Test Result**	
	Requirement	**Observations**
	During the test, there shall be no evidence of: (a) Electrolyte leakage (b) Rupture c) Fire (d) Explosion	No Electrolyte leakage, no rupture, no fire and no explosion.
	Over-discharge Protection	Interrupted the discharging current.
	Standard cycle	Standard cycle was feasible after test.
	The tested battery was kept in observation for 1 hour	Normal Functionality was observed.
	The isolation resistance measured after the test.	Isolation resistance was found greater than 100Ω/Volt.

4.3.3 Test Setup

	A	B	C	I	J	K	L	M	N	O
1	Test Name:	Over Discharge Redon 51V100ah								
2	Test Date:	29-07-23 16:29								
3	Operator ID:	Admin								
4	Program Nar	Dis-charge								
5	Program Description:									
6	Program Dat	C:\VisuaLCN\Programs\NATRAX.mdb								
7	Module Type	yd								
8	Module Desc	LCV 100-80								
9	Address:	Port: 1, Sys Controller: 3 Circuit: 7								
10	Name:	Port 1, Ctrl Device ID:								
11										
12	Exclude	Total Time	Cycle	Current, A	Voltage, V	Power, W	Constant F	Internal I	Amp-Hour	Watt-Ho
13	No	0:00:01.0	1	-50	43.71	-2185	0.87	0	-0.01	-0.4
14	No	0:00:02.0	1	-50	43.6	-2179	0.87	0	-0.02	-1
15	No	0:00:03.0	1	-50	43.5	-2175	0.87	0	-0.03	-1.6
16	No	0:00:04.0	1	-50	43.42	-2171	0.87	0	-0.05	-2.2
17	No	0:00:05.0	1	-50	43.34	-2166	0.87	0	-0.06	-2.8
18	No	0:00:06.0	1	-50	43.26	-2163	0.87	0	-0.07	-3.4
19	No	0:00:07.0	1	-50	43.19	-2159	0.86	0	-0.09	-4
20	No	0:00:08.0	1	-50	43.12	-2156	0.86	0	-0.1	-4.6
21	No	0:00:09.0	1	-50	43.05	-2152	0.86	0	-0.12	-5.2
22	No	0:00:10.0	1	-50	42.99	-2149	0.86	0	-0.13	-5.8
23	No	0:00:11.0	1	-50	42.92	-2146	0.86	0	-0.14	-6.4
24	No	0:00:12.0	1	-50	42.86	-2143	0.86	0	-0.16	-7
47	No	0:00:35.0	1	-50	41.61	-2080	0.83	0	-0.48	-20.5
48	No	0:00:36.0	1	-50	41.56	-2078	0.83	0	-0.49	-21.1
49	No	0:00:37.0	1	-50	41.5	-2075	0.83	0	-0.51	-21.7
50	No	0:00:38.0	1	-50	41.45	-2072	0.83	0	-0.52	-22.2
51	No	0:00:39.0	1	-50	41.39	-2069	0.83	0	-0.53	-22.8
52	No	0:00:40.0	1	0	-11.64	0	25	0	-0.53	-22.8
53	No	0:00:41.0	1	0	-9.48	0	25	0	-0.53	-22.8

Over_Discharge_Redon_51V100ah,_

ANNEXURE-1

4.4	Over-Temperature Protection Reference Standard: AIS 156(Part II)-2022 (A3P2)	
4.4.1	Procedure	
Sample ID: NATRAX/TB/23-24/22-01	Particulars	Parameter During Test
	Test Component	REESS Subsystem (Battery Pack)
	Temperature Sensor	On Board
	Battery Management System	Available
	Protection Devices of DUT	Fuse
	Chamber Temperature	60°C
	DUT Condition	Active Mode
	Charging Current	33 A
	Discharging Current	50 A
	Test Stopped when	Battery inhibits and/or limits the charge and/or discharge to prevent the temperature increase-(Auto Cut-off)
	Observation Period	1 Hour
	Test Start Date	27.07.2023
	Test End Date	27.07.2023

4.4.2	Test Result	
	Requirement	Observations
	During the test, there shall be no evidence of: (a) Electrolyte leakage (b) Rupture c) Fire (d) Explosion	No Electrolyte leakage, no rupture, no fire and no explosion.
	Over-temperature Protection	Inhibited and limits the charge to prevent the temperature increase, when battery temperature reached 54.24°C.
	The isolation resistance measured after the test.	Isolation resistance was found greater than 100Ω/Volt.

ANNEXURE-1

4.5	Thermal Propagation Reference Standard: AIS 156(Part II)-2022 (A3P2)	
4.5.1	Procedure	
Sample ID: NATRAX/TB/23-24/22-05	Particulars	Parameter During Test
	Test Component	REESS Subsystem (Battery Pack)
	Battery Management System	Operational
	Potation devices SOC	Not Applicable
	Test Component SOC	100 %
	Trigger Method	Over Charge
	Initiation cell temperature	22°C
	Maximum temperature (define by the manufacturer)	60°C
	DUT Condition	OK
	Thermal runaway condition (i) The measured voltage of the initiation cell drops: (ii) The measured temperature exceeds [the maximum operating temperature defined by the manufacturer] (iii) dT/dt≥ [1°C/s] of the measured temperature. Thermal runaway can be judged when: (a) Both (i) and (iii) are detected: or (b) Both (ii) and (iii) are detected	Thermal runaway not detected. Only condition (i) and (ii) wear met.
	Test Stopped when	Auto cut-off and Voltage exceeded 200%
	Test Start Date	27.07.2023
	Test End Date	27.07.2023

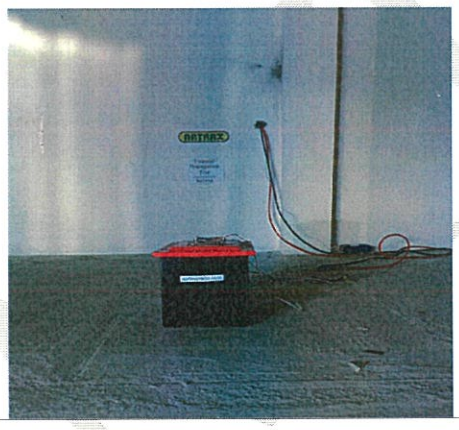
4.5.2	Test Result	
	Requirement	Observations
	During the test, there shall be no evidence of: (a) Fire. (b) Explosion.	No fire, No explosion observed during test.

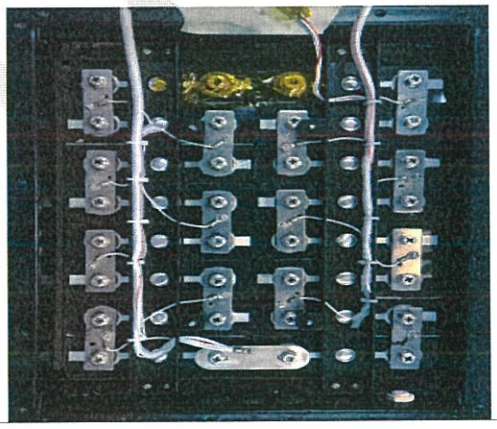
4.6.3	Test Setup

6

	A	B	I	J	K	L	M	N	O	X	Y
1	Test Name:	Tharmal propagation Redon 51v100									
2	Test Date:	27-07-23 14:51									
3	Operator ID:	Admin									
4	Program Nan	3.7V 16Ah									
5	Program Description:										
6	Program Dat	C:\VisualCN\Programs\NATRAX.mdb									
7	Module Type	yd									
8	Module Desc	LCV 100-80									
9	Address:	Port: 1, Sys Controller: 3 Circuit: 4									
10	Name:	Port 1, Ctrl 3, Addr 4									
11											
12	Exclude	Total Time,	Current	Voltage	Power,	Constar	Interna	Amp-Hc	Watt-H	Temper	Unassig
13	No	0:00:01.0	50	-2.99	149	0	0	0.01	0	27	0
14	No	0:00:02.0	50	-2.98	149	0	0	0.02	0	26.9	0
15	No	0:00:03.0	50	-2.98	149	0	0	0.03	0.1	27	0
16	No	0:00:04.0	50	-2.98	149	0	0	0.05	0.1	27	0
17	No	0:00:05.0	50	-2.97	148	0	0	0.06	0.1	27	0
18	No	0:00:06.0	50	-2.97	148	0	0	0.08	0.2	27	0
19	No	0:00:07.0	50	-2.97	148	0	0	0.09	0.2	27	0
20	No	0:00:08.0	50	-2.97	148	0	0	0.1	0.3	27	0
21	No	0:00:09.0	49.99	-2.97	148	0	0	0.12	0.3	27	0
22	No	0:00:10.0	50	-2.96	148	0	0	0.13	0.4	27	0
3213	No	2:16:39.1	50	7.83	391	0	0	113.9	436.5	73.5	0
3214	No	2:16:40.1	50	7.87	393	0	0	113.9	436.6	73.6	0
3215	No	2:16:41.1	49.99	7.91	395	0	0	113.9	436.7	73.7	0
3216	No	2:16:42.1	50	7.95	397	0	0	113.9	436.8	73.8	0
3217	No	2:16:43.1	50	7.99	399	0	0	113.9	437	73.9	0
3218	No	2:16:44.1	50	8.03	401	0	0	113.9	437.1	74	0
3219	No	2:16:45.1	50	8.07	403	0	0	114	437.2	74.3	0
3220	No	2:16:46.1	50	8.11	405	0	0	114	437.3	74.8	0
3221	No	2:16:47.1	50	8.15	407	0	0	114	437.4	75.3	0

Tharmal propagation Neuron 51v1



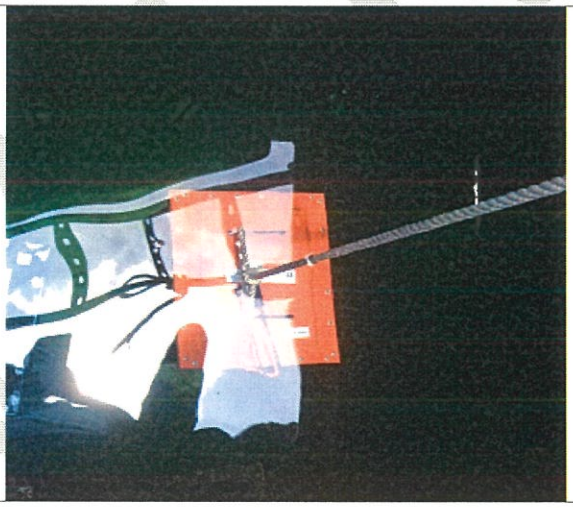


ANNEXURE-1
Water Ingress Protection Test

4.6 TEST REQIRMENTS AND RESULTS:

	IPX7 Reference Standard: IEC 60529 AIS-156 A3 P2
	Procedure
Sample ID: NATRAX/TB/23-24/22-5	REESS with 100% SOC shall be tested:- ☑ The lowest point of enclosures with a height less than 850 mm is located 1000 mm below the surface of water. ☐ The highest point enclosures with a height equal to or greater than 850 mm is located 150 mm below the surface of the water **Test Date: -** 22-07-2023 **Test duration: -** 30 min **Acceptance Criteria:** - There shall be no fire or explosion during testing of REESS.
	Test Result: - At the end of the test, no fire and no explosion was observed from tested device.

4.6.1	Test Setup



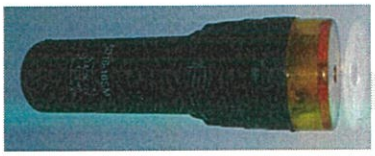
ANNEXURE-1

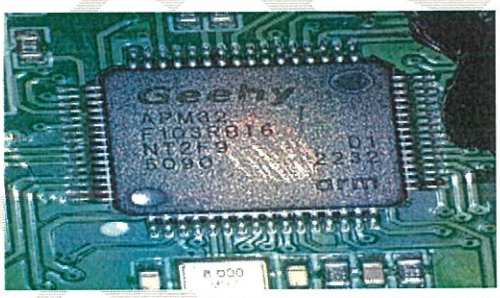
Sr.N	Cl. No.	Verification/Test Name	Date	Observation	Result
5.0 Verifications:					
5.1	6.1.2.1	BMS Shall be microprocessor/ microcontroller-based circuit	27.07.2023	Microcontroller Make: ST	Complied
5.2	6.1.2.3 (a)	BMS over charge protection	25.07.2023	56.71V	Complied
5.3	6.1.2.3 (b)	BMS over discharge protection	29.07.2023	41.39V	Complied
5.4	6.1.2.3 (c)	BMS over temperature	27.07.2023	T charge = 55°C T discharge = 60°C	Complied
5.5	6.1.2.3 (d)	BMS over current protection	27.07.2023	Verified	Complied
5.6	6.1.2.3 (e)	BMS Short circuit protection	01.08.2023	Verified	Complied
5.7	6.1. 3(a)	Charger voltage cut off	01.08.2023	58.2 V	Complied
5.8	6.1.3(b)	Soft start function	01.08.2023	Initial Current = 0.5 A Set Current = 19.3 A	Complied
5.9	6.1.3 (c)	Pre-charge function to detect over discharge	01.08.2023	Verified	Complied
5.10.	6.1.3(d)	Input supply variation with battery pack	01.08.2023	Verified	Complied
5.11	6.1.3(f)	Communication verification with battery pack	01.08.2023	Verified	Complied
5.12	Annexure 8k-(3)	Verification of cell charge/discharge cycle data	29.07.2023	Verified	Complied
5.13	Annexure 8k-(7)	Verification of the cell to cell spacing in battery pack	01.08.2023	0.6 mm	Complied
5.14	Annexure 8k-(8)	Verification of additional safety fuse/ circuit breaker	27.07.2023	Verified	Complied
5.15	Annexure 8k-(9)	Verification of the cells, BMS charger w.r.t serial number	27.07.2023	Verified	Complied

ANNEXURE-1

Sr.N	Cl. No.	Verification/Test Name	Date	Observation	Result
5.0 Verifications:					
5.16	Annexure 8k-(10)	Protection against regenerative	29.07.2023	BMS	Complied
5.17	6.1.2.2	BMS shall comply EMC requirements as per AIS 004 Part 3 or AIS 004 Part 33 Rev 1 as applicable at ESA level(test report Verification)	12.09.2023	Report no: CT0MS0662, 11.09.2023	Complied
5.18	6.1.3(e)	Earth leakage detection	25.07.2023	Verified	Complied
5.19	Annexure 8k-(1)	Verification of manufacturing date on cell	27.07.2023	Verified	Complied
5.20	Annexure 8k-(2)	Cell report Verification as per IS 16893	27.07.2023	Report no: IEC/22121204-03/01/2023	Complied
5.21	Annexure 8k-(4)	Verification of pressure release vent	27.07.2023	Verified	Complied
5.22	Annexure 8k-(5)	Verification of temperature sensor	27.07.2023	Verified	Complied
5.23	Annexure 8k-(6)	Verification of action paralleling circuit in the battery pack	27.07.2023	Verified	Complied
5.24	Annexure 8k-(11)	BMS data logging	27.07.2023	Verified	Complied

Verification of Temperature Sensor

Verification of Pressure Release vent &b Visual Alarm
 
Verification of Safety Fuse- 200 A

Verification of Microcontroller-based circuit


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