

INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY

[A Division of NATRiP Implementation Society (NATIS), Govt. of India]

Non-Transferable

TEST REPORT

ULR No.: TC536019010000008P
Test Report No.: C T O B O 5 0 1 2

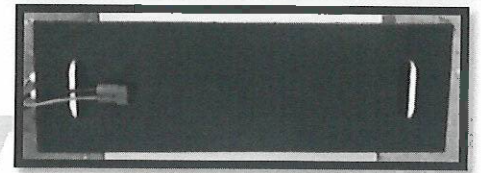
Date: 30.01.2019

1.0 NAME AND ADDRESS OF THE: M/s. Okaya Power Pvt. Limited,
CUSTOMER D7, Udyog Nagar, Rohtak Road, New Delhi-110041

1.1 NAME AND ADDRESS OF THE: Same as serial No. 1.0
MANUFACTURER

2.0 CUSTOMER LETTER REF : CCTNOKYANLEEG63737 Dated 29-Oct-2018

3.0 DESCRIPTION OF DEVICE UNDER TEST (DUT):
DUT Name : Battery Module, 48 V
Battery Type : Lithium-ion Battery
Battery Capacity(Ah) : 80Ah (Ah in 5 hrs)
Rated Voltage : 48 Volt DC
Id/Model No. : LF48080E2
Quantity : 04 Nos. Pack and 2 Nos. Cells
(ICAT/AEEL /63737/01-06)
Trade Name : Okaya
Drawing No. : DW-890-00



4.0 DATE OF RECEIPT OF SAMPLE : 04.01.2019
5.0 CONDITION OF SAMPLE : No Physical Damage observed

6.0 TEST OBJECTIVE:
To validate the Safety Requirements of Traction Batteries as per AIS: 048 amended up to date

7.0 TEST METHOD: Test method referred from AIS: 048 as amended up to date.





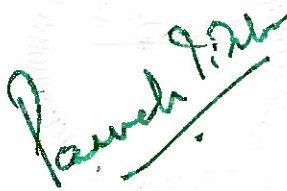
8.0 FUNCTIONAL VERIFICATION: Functional verification done and battery was found satisfactory

9.0 CONCLUSION:
The battery specified in Sr. No. 3.0 of this test report met all the test requirements when tested as per AIS: 048 amended up to date as mentioned in Annexure No. 1 of this report.

10.0 TEST DISCRPTION: Please refer the Annexure No. 1 of this report.




11.0 DATE OF PERFORMANCE OF TEST: Please refer the Annexure No. 1 of this report.

12.0 TEST RESULTS:
Please refer the Test requirements and Results in Annexure-I of this report.

Prepared By	Checked By		Approved By	
 UDIT KAUL Asst. Manager	 MAHENDAR PAL Asst. General Manager		 PAMELA TIKKU Sr. General Manager	

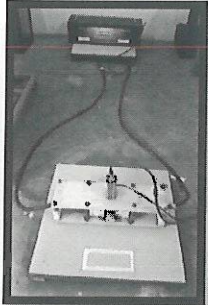
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3. Test(s) on prototype/ vehicle(s)/ sample(s) is/are carried out on the basis of standard procedures as notified under specific rules/ requested by the applicant. Results of such tests are property of bearer of Test Reports/ Extension Reports / Developmental test reports. These results cannot be disclosed unless specifically so ordered by Government, Court, etc
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10. The appropriate local court at Gurgaon shall have the jurisdiction in respect of any dispute, claim or liability arising out of this report.

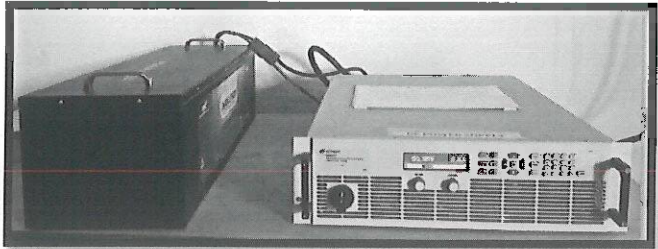
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UDITI KAUL Asst. Manager		MAHENDAR PAL Asst. General Manager	Page 2 of 7 + Dwg(01) [63737]




Annexure – I

1.0 TEST REQUIREMENTS AND RESULTS:

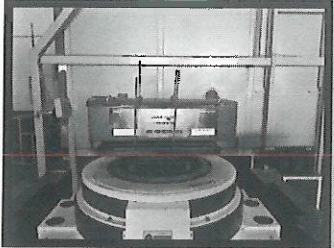
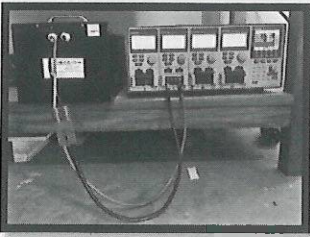
Cl. No.	Test	Test Description	Observations/Results
2.1 Electrical Tests			
2.1.1	<p>Short Circuit test (Test ID:ICAT/AEEL/63737/01) Date of Test : 17.01.2019</p>	 <p>Battery Condition: Fully charged (100% SOC), contained at ambient temperature. Apply a hard short in less than one second to the battery module with a conductor specified in the standard. Test Duration: 10 minutes, or until another condition occurs which prevents completion of test (i.e. component melting, etc.) Lab temperature: Not exceeding 30°C</p> <p>Acceptance Criteria: After 2 hours of observation: At the end of the test, there shall be no: a) Physical damage to the casing or mechanical parts. b) Melting of components. c) Fire or explosion. It is acceptable for the battery to become dry at the end of the test.</p>	<p>Ambient temperature : 25°C</p> <p>Conductor of $\leq 5m\Omega$ was used and short was applied for 10 minutes.</p> <p>No physical damage, explosion or melting observed.</p> <p>Satisfactory.</p>




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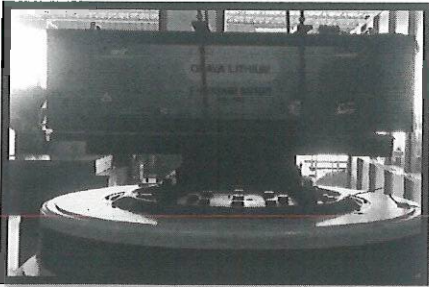

<p>2.1.2</p>	<p>Over Charge test (Test ID:ICAT/ AEEL/63737/02) Date of Test : 18.01.2019</p>	 <p>Battery Condition: Fully charged (100% SOC), contained at ambient temperature at 27±5°C. Duration: 10 hours The battery is to be overcharged at a constant charging current of 0.1 (C₁₀). Acceptance Criteria: At the end of the test, there shall be no: a) Physical damage to the casing or other mechanical parts. b) Melting of components. c) Fire or explosion.</p>	<p>Battery Module was charged with 8.88 A for 10 hours.</p> <p>No physical damage, melting or explosion observed.</p> <p>Satisfactory.</p>
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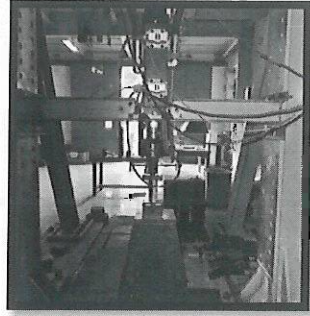
2.2 Mechanical Tests




2.2.1	<p>Vibration test (Test ID: ICAT/AEEL/63737/03) Date of test : 18.01.2019</p>	  <p>Battery Condition: Fully charged (100% SOC), contained at ambient temperature, firmly held on the vibration table in vehicle mounting position. Axis: Vertical and Horizontal axis, with battery positioned in longitudinal direction. Acceleration: 3 g (sinusoidal vibration) Frequency: 30-150 Hz Sweep rate: 1 octave per minute Duration: 2 hours in each axis Immediately after the test, discharge the battery at room temperature not exceeding 30°C, at the rate of $I = 0.2 \times$ Battery capacity(C_5)</p> <p>Acceptance Criteria: During test, there shall be no electrolyte loss. The deterioration of battery rated capacity during discharging shall not be more than 10%. At the end of the test, there shall be no: a) Physical damage to the casing or other mechanical parts b) Fire or explosion</p>	<p>No electrolyte loss observed during test.</p> <p>Immediately after the test, battery was discharged at 16 A. And deterioration observed was not more than 10%.</p> <p>No physical damage or explosion observed.</p> <p>Satisfactory.</p>
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2.2.2	<p>Shock test (Test ID: ICAT/AEEL/63737/04) Date of test : 18.01.2019</p>	  <p>Battery Condition: Fully charged (100% SOC), contained at ambient temperature not exceeding 30°C, firmly held on the vibration table in vehicle mounting position. Axis: Vertical and Horizontal axis, with battery positioned in longitudinal direction. Acceleration: 30 g (half-sine wave) No. of shocks: 10 in each axis Duration: 15 ms of each shock Immediately after the test, discharge the battery at room temperature, at the rate of $I = 0.2 \times \text{Battery capacity}(C_5)$ Acceptance Criteria: The deterioration of battery rated capacity during discharging shall not be more than 10%. At the end of the test, there shall be no: a) Physical damage to the casing or other mechanical parts b) Fire or explosion.</p>	<p>Immediately after the test, battery was discharged at 16 A and deterioration observed was not more than 10%.</p> <p>No physical damage or explosion observed.</p> <p>Satisfactory.</p>
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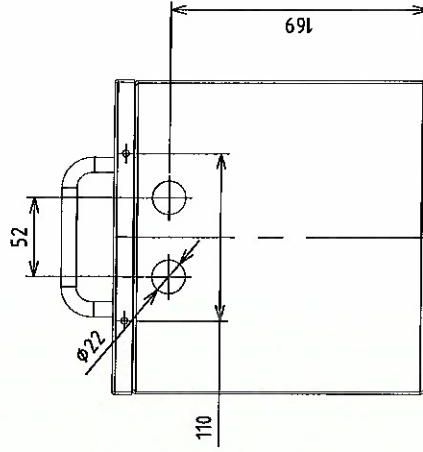
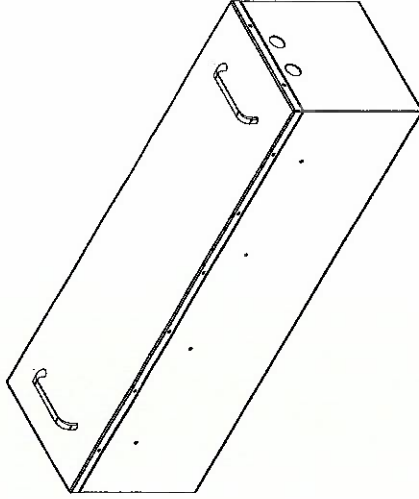
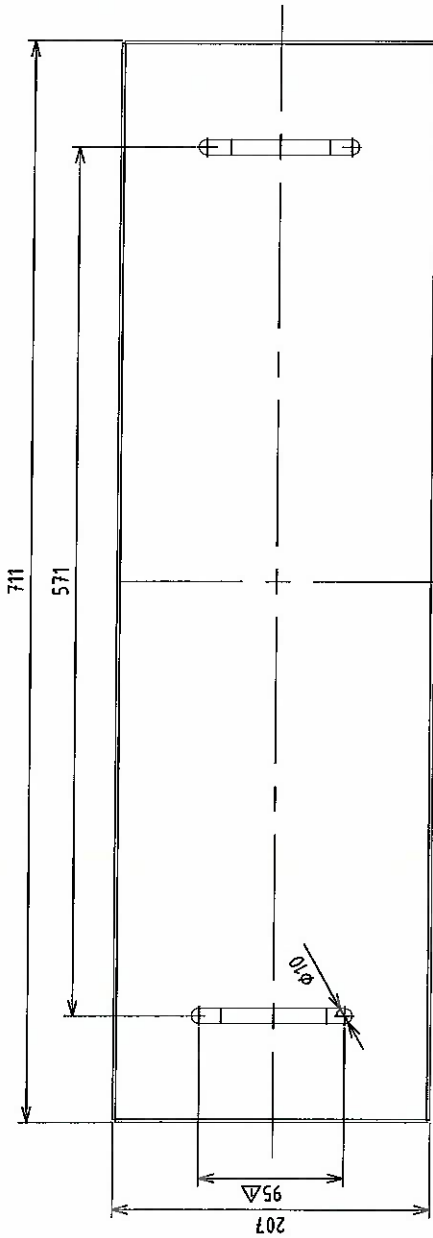
<p>2.2.3</p>	<p>Roll-Over Test</p>	<p>Rotate the battery module one complete revolution in one direction, for one minute in a continuous, slow-roll fashion, and observe leakage, if any. Then rotate the battery module in 90° increments in same direction for one full revolution. Hold the battery module for one hour at each position. Acceptance Criteria: The volume of electrolyte spilled in each position shall not be more than 25 ml per module.</p>	<p>Not Applicable</p>
<p>2.2.4</p>	<p>Penetration Test (Test ID: ICAT/AEEL/63737/05) Date of test : 21.01.2019</p>	 <p>The battery Cell shall be penetrated with a mild steel (conductive) pointed rod, which will be electrically insulated from the test fixture. Rate of penetration: 8 cm/s. Diameter of Rod: 3mm Orientation of penetration: perpendicular to the electrode plates. Minimum Depth of penetration: Through three cells or 100 mm The battery Cell should be observed, with the rod remaining in place, for a minimum of one hour after the test. Acceptance Criteria: At the end of the test, there shall be no: a) Melting of components. b) Fire or explosion.</p>	<p>After penetration, up to a depth through cell with a pointed mild steel rod of diameter 3mm, electrically insulated from the test fixture, no explosion, no fire and no melting observed. Satisfactory.</p>

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Test Report No: CT0B05012

Dated: 30-01-2019

MARK	REV. NO	DESCRIPTION	REVISED BY	DATE
△	01	Centre Distance of handle changed to 95mm from 100mm	MANU	16.11.2018



Note:

Trade Name: OKAYA

Model: LF48080E2

Capacity in 5hr: 80AH

DESIGN	DRAWN	CHECKED	APPROVED	DATE	SCALE	PART MATL. / MATL. CODE	DESIGN WEIGHT	ACTUAL WEIGHT	
QANYESH	MANU			22.01.2019	1:10	xxkggr	---	---	
	UNSPECIFIED TOLERANCE				SCALE	SPECIFICATION. NO.			
	UNDER 4				ANGLE 15-30°	SP_MS-1147			
	OVER 4 UNDER 16				UNSPECIFIED DRAFT RADIUS 0.2	REVISION			
	OVER 16 UNDER 250				ALL DIMENSIONS ARE IN mm	01			
	OVER 250				IF IN DOUBT PLEASE ASK	PART NAME			
	ANGLE				DO NOT SCALE THE DRG.	Lithium 48V_EV Assembly			
						DW-890-90			
								ORG.NO.	SHEET
									01 OF 01



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