

# INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY

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

Non-Transferable

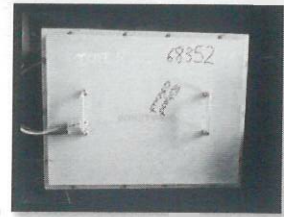
## TEST REPORT

ULR No.: TC536019010000066P  
Test Report No.: C T 0 B O 5 1 3 8




Date: 19.06.2019

- 1.0 **NAME AND ADDRESS OF THE CUSTOMER:** M/s. Okaya Power Private Limited  
D7, Udyog Nagar Rohtak Road Udyog Nagar-110041  
New Delhi INDIA
- 1.1 **NAME AND ADDRESS OF THE MANUFACTURER:** Same as Sr. No. 1.0
- 2.0 **CUSTOMER LETTER REF :** IOCS No. CCTNOKYAOFEEL68352 Dated 16-May-2019
- 3.0 **DESCRIPTION OF DEVICE UNDER TEST (DUT):**

DUT Name	Battery Pack, 60.8 V
Battery Type	Lithium Battery
Battery Capacity(Ah)	92 Ah (Ah in 5 hrs)
Rated Voltage	60.8 V DC
Id/Model No.	LF6092E
Quantity	04 Nos. of Battery Module & 02 Nos. of Cells (ICAT/AEEL /68352/01-06))
Trade Name	OKAYA
Drawing No.	OPG6092-003
Configuration of Cells	19S1P



- 4.0 **DATE OF RECEIPT OF SAMPLE :** 22.05.2019
- 5.0 **CONDITION OF SAMPLE :** No physical damage observed.
- 6.0 **TEST OBJECTIVE:**  
To validate the Safety Requirements of Traction Battery as per AIS: 048 as amended upto date.
- 7.0 **TEST METHOD:** Test method referred from AIS: 048 as amended upto 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 as amended upto date as mentioned in Annexure-I of this report.
- 10.0 **TEST DESCRIPTION:** Please refer the Annexure-I of this report.
- 11.0 **DATE OF PERFORMANCE OF TEST:** Please refer the Annexure-I of this report.
- 12.0 **TEST RESULTS:** Please refer the Test requirements and Results in Annexure-I of this report.



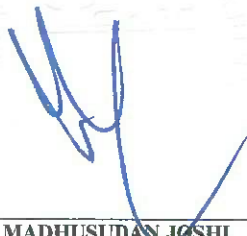
Prepared By	Checked By	Approved By
		
UDIT KAUL Asst. Manager	MADHUSUDAN JOSHI Dy. General Manager	PAMELA TIKKU Sr. General Manager



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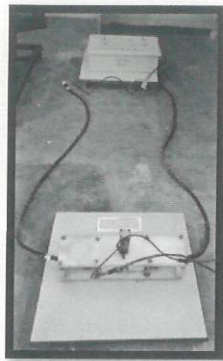
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9. No extract, abridgment or abstraction from this test report may be published or used to advertise the product without the written consent of the Director, ICAT, who reserves the absolute right to agree or reject all or any of the details of any items of publicity for which consent may be sought The appropriate local court at Gurugram shall have the jurisdiction in respect of any dispute, claim or liability arising out of this report.

Prepared By		Checked By	Page 02 of 07 + Dwg(01) [68352]
			
<b>UDIT KAUL</b> Asst. Manager		<b>MADHUSUDAN JOSHI</b> Dy. General Manager	


Annexure-I

1.0 TEST REQUIREMENTS AND RESULTS:




Cl. No.	Test	Test Description	Observations/Results
<b>2.1 Electrical Tests</b>			
2.1.1	<p><b>Short Circuit test</b>                      (Test ID:ICAT/AEEL/68352/01)                      Date of Test : 29.05.2019</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><b>Acceptance Criteria:</b>                      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 : 27°C</p> <p>Conductor of <math>\leq 5m\Omega</math> was used and short was applied for 10 minutes.</p> <p>No physical damage, explosion or melting observed.</p> <p><b>Satisfactory.</b></p>

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UDIT KAUL Asst. Manager		MADHUSUDAN JOSHI Dy. General Manager	Page 03 of 07 + Dwg(01) [68352]

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2.1.2	<p><b>Over Charge test</b>                  (Test ID:ICAT/                  AEEL/68352/02)                  Date of Test :                  29.05.2019</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 (C<sub>10</sub>).  <b>Acceptance Criteria:</b>                  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 Cell                  was charged                  with                  10.22 A for 10                  hours.</p> <p>No physical                  damage,                  melting or                  explosion                  observed.</p> <p><b>Satisfactory.</b></p>
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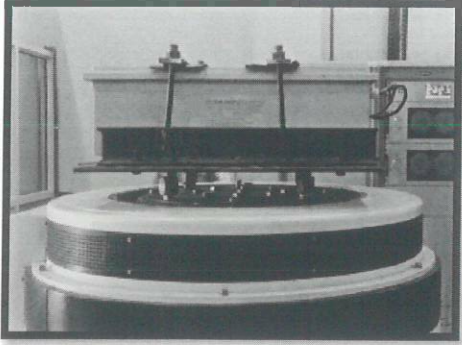
2.2 Mechanical Tests




<p>2.2.1</p>	<p><b>Vibration test</b>          (Test ID: ICAT/          AEEL/68352/03)          Date of test :          15.06.2019</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 <math>I = 0.2 \times \text{Battery capacity}(C_5)</math></p> <p><b>Acceptance Criteria:</b>          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 18.4A And deterioration observed was not more than 10%.</p> <p>No physical damage or explosion observed.</p> <p><b>Satisfactory.</b></p>
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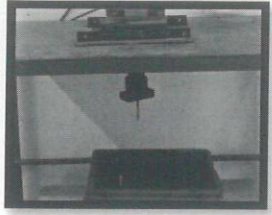
<p>Prepared By</p> 		<p>Checked By</p> 	<p>Page          05 of 07          +          Dwg(01)          [68352]</p>
<p>UDIT KAUL          Asst. Manager</p>		<p>MADHUSDAN JOSHI          Dy. General Manager</p>	




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<p>2.2.2</p>	<p><b>Shock test</b>                  (Test ID:                  ICAT/AEEL/68352/04)                  Date of test :                  15.06.2019</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 <math>i = 0.2 \times \text{Battery capacity}(C_5)</math>  <b>Acceptance Criteria:</b>                  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 18.4A and deterioration observed was not more than 10%.</p> <p>No physical damage or explosion observed.</p> <p><b>Satisfactory.</b></p>
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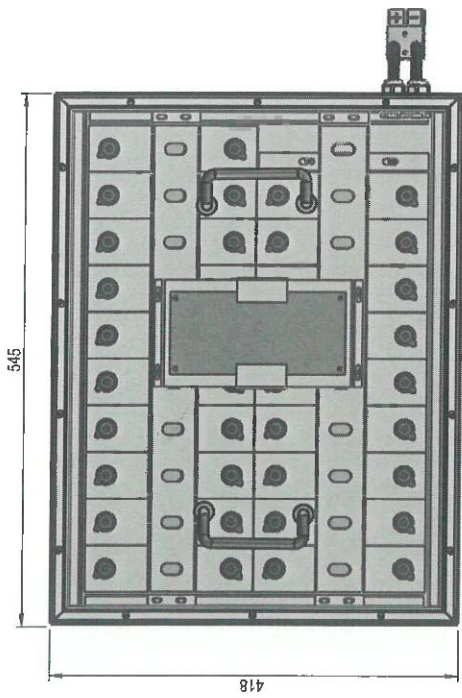
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<p>UDIT KAUL                  Asst. Manager</p>		<p>MADHUSUDAN JOSHI                  Dy. General Manager</p>	

2.2.3	<b>Roll-Over Test</b>	<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.</p> <p><b>Acceptance Criteria:</b>                  The volume of electrolyte spilled in each position shall not be more than 25 ml per module.</p>	Not Applicable
2.2.4	<p><b>Penetration Test</b>                  (Test ID: ICAT/AEEL/68352/05)                  Date of test : 16.06.2019</p>	<div style="text-align: center;">  </div> <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: <b>8 cm/s.</b>                  Diameter of Rod: <b>3mm</b>                  Orientation of penetration: <b>perpendicular to the electrode plates.</b>                  Minimum Depth of penetration: <b>Through three cells or 100 mm</b>                  The battery Cell should be observed, with the rod remaining in place, for a minimum of one hour after the test.</p> <p><b>Acceptance Criteria:</b>                  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.</p> <p><b>Satisfactory.</b></p>

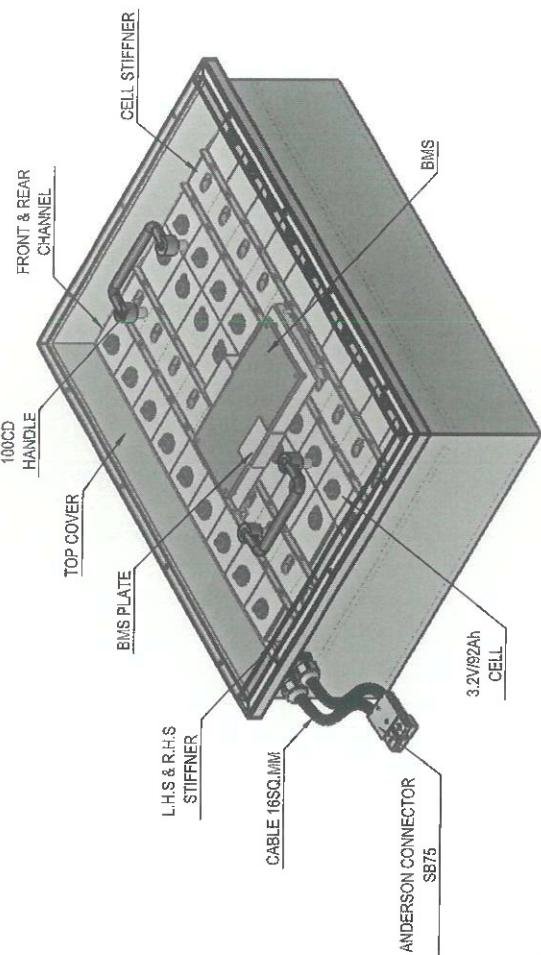
<p>Prepared By</p> <div style="text-align: center;">  </div> <p><b>UDIT KAUL</b>                  Asst. Manager</p>		<p>Checked By</p> <div style="text-align: center;">  </div> <p><b>MADHUSDAN JOSHI</b>                  Dy. General Manager</p>	<p>Page                  07 of 07                  +                  Dwg(01)                  [68352]</p>
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Test Report No.: CTAR05138

Dated: 19.06.2019



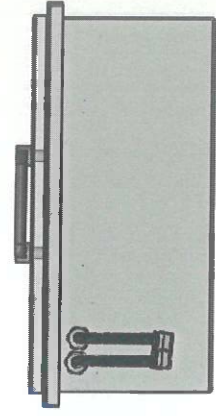
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



SIDE VIEW

**Note:**

Trade Name: OKAYA  
Model No.: LF6092E  
Capacity in Shr:92AH

<b>OKAYA</b> Chhattisgarh Veh Zirogi		<b>OKAYA POWER GROUP D-7 UDYOG NAGAR PEERAGARHI NEW DELHI-110041</b>	
TITLE :-		GAD FOR 60/92Ah	
CONFIGURATION NAME :-		ASSEMBLY	
CLIENT :-		DRAWN	A.R
MATERIAL	CRCA	CHKD.	P.S
SCALE :- NTS	DWG.No./PART NO :-	APPD.	P.S
	OPG6092-003	SHEET No. :-	01 OF 01
		DATE	16-05-2019
		SIGN.	
		REV. 0	
		SHEET SIZE A3	

PLEASE DO NOT SCALE THE DRAWING. IF IN DOUBT, ASK.		ALL ROUND WELD		FILLET WELD		SINGLE V-BUTT WELD		SPOT WELD		TYPE OF CHANGE		
DIMENSION	TOLERANCE	2001-3150	1001-2000	501-1000	101-500	21-120	1-150	0-10	0-10	REV.No.	NAME	DATE
FABRICATION (REF. IT 19)	±0.58	±0.6	±6.0	±3.6	±2.8	±1.4	±1.2	±0.58	±0.58			
MACHINING (REF. IT 12)	±0.15	±2.1	±2.1	±0.9	±0.7	±0.35	±0.3	±0.15	±0.15			
Grade	N1 N2 N3 N4 N5 N6 N7 N8 N9 N10 N11 N12											
Ra	0.025 0.05 0.1 0.2 0.4 0.8 1.6 3.2 6.3 12.5 25 50											

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