Non-Transferable

TEST REPORT

ULR No.: TC536021040000159F
Test Report No.: C T 0 G Q 9 3 0 5

Date: 01.10.2021

1.0 **NAME AND ADDRESS OF THE: CUSTOMER** — **M/s. Okaya Power Private Limited**, D-8 Udyog Nagar,Rohtak Road,New Delhi-110041

1.1 **NAME AND ADDRESS OF THE: MANUFACTURER** — **M/s. Sunoxx International**, Vill. Panjhera, Nalagarh-Swarghat Road, Tehsil Nalagarh, Distt. Solan, Himachal Pradesh-174101

2.0 **CUSTOMER LETTER REF** : IOCS No. CCTNOKYAPBEEL85848 Dated - 20-Feb-2020

3.0 **DESCRIPTION OF DEVICE UNDER TEST (DUT):**

DUT Name	Battery module, 12 V
Battery Type	Lead Acid
Battery Capacity(Ah)	90Ah (Ah in 5 hrs)
Rated Voltage	12 V DC
Id/Model No.	OTER 16012
Quantity	06 Nos. of Battery module (ICAT/EEL/85848/01-06)
Trade Name	OKAYA
Drawing No.	DW-1042-00

4.0 **DATE OF RECEIPT OF SAMPLE :** 06.11.2020

5.0 **CONDITION OF SAMPLE:** No physical damage observed.

6.0 **TEST OBJECTIVE:** To validate the safety requirements of traction battery as per AIS:048:2009 with amendment No.2 on 17.01.2020

7.0 **TEST METHOD:** Test method referred from AIS:048:2009 with amendment No.2 on 17.01.2020.

8.0 **ANY DEVIATION OR EXCLUSION FROM TEST METHOD:** No

9.0 **FUNCTIONAL VERIFICATION:** Functional verification done and battery module was found satisfactory.

10.0 **CONCLUSION:** The battery module 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.

11.0 **TEST DESCRIPTION:** Please refer the Annexure-I of this report.

12.0 **DATE OF PERFORMANCE OF TEST:** Please refer the Annexure-I of this report.

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

14.0 **LOCATION OF TEST:** ICAT CENTRE-I.

Prepared By	Checked By		Approved By	
MANISH BERWAL	UDIT KAUL		PAMELA TIKKU	Page 01 of 07 + Dwg. (01) [85848]
Engineer	Dy. Manager		Sr. General Manager	

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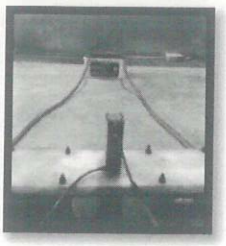
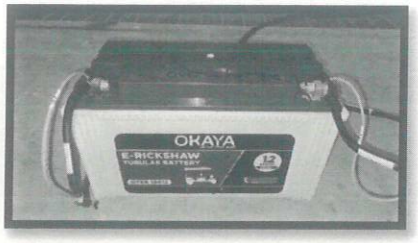
Prepared By		Checked By	
Manish	INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY * MANESAR * ICAT Innovation • Service • Excellence		
MANISH BERWAL		UDIT KAUL	
Engineer		Dy. Manager	

Annexure–I

1.0 TEST REQUIREMENTS AND RESULTS:

Cl. No.	Test	Test Description	Observations/Results
2.1 Electrical Tests			
2.1.1	**Short Circuit test (Test ID:ICAT/ EEL /85848/01)** Date of Test : 20.09.2021	 Battery Module 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 **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.	Ambient temperature : 25°C Conductor of ≤ 5mΩ was used and short was applied for 10 minutes. No physical damage, explosion or melting observed. **Satisfactory.**

2.1.2	**Over Charge test (Test ID:ICAT/ EEL /85848/02)** Date of Test : 20.09.2021	 Battery Module 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_{10}). **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.	Temperature was 25°C Battery module was charged with 10 A for 10 hours. No physical damage, melting or explosion observed. **Satisfactory.**

Prepared By		Checked By	
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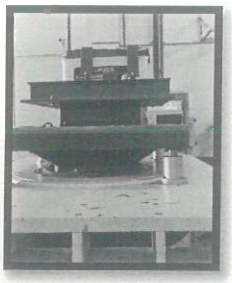
MANISH BERWAL		UDIT KAUL	Page 04 of 07 + Dwg(01) [85848]
Engineer		Dy. Manager	

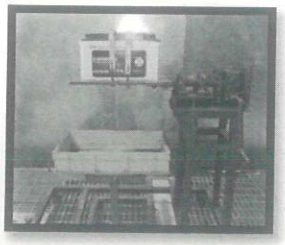
2.2 Mechanical Tests

2.2.1	**Vibration test (Test ID:ICAT/ EEL /85848/03)** Date of test : 08.09.2021	 Battery Module Condition: Fully charged (100% SOC), contained at ambient temperature, firmly held on the vibration table in vehicle mounting position. Vibration test will be carried out in three-axis viz. in the vertical axis, horizontal axis and 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 x Battery capacity(C_5) **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	Temperature was 25°C during test No electrolyte loss observed during test. Immediately after the test, battery was discharged at 18 A And deterioration observed was not more than 10%. No physical damage or explosion observed. **Satisfactory.**

Prepared By		Checked By	
MANISH BERWAL Engineer		UDIT KAUL Dy. Manager	Page 05 of 07 + Dwg(01) [85848]

2.2.2	**Shock test (Test ID: ICAT/ EEL /85848/04)** Date of test: 09.09.2021	 Battery Module Condition: Fully charged (100% SOC), contained at ambient temperature not exceeding 30°C, firmly held on the vibration table in vehicle mounting position. Shock test will be carried out in three-axis viz. in the vertical axis, horizontal axis and 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 x 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.	Temperature was 25°C during test Immediately after the test, battery was discharged at 18 A and deterioration observed was not more than 10%. No physical damage or explosion observed. **Satisfactory.**

Prepared By		Checked By	
Manish			
MANISH BERWAL		UDIT KAUL	
Engineer		Dy. Manager	

2.2.3	**Roll-Over Test (Test ID: ICAT/EEL/85848/05)** Date of test : 20.09.2021	 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.	Spillage observed was less than 25ml in each position. Satisfactory.
2.2.4	**Penetration Test (Test ID: ICAT/ EEL /85848/06)** Date of test 21.09.2021	 The battery Module shall be penetrated with a mild steel (conductive) pointed rod, which will be electrically insulated from the test fixture. The test will be carried out with 100% SOC of the Battery cell/Battery module. Rate of penetration: **8 cm/s.** Diameter of Rod: **3mm/20mm** 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.	After penetration, up to a depth through module with a pointed mild steel rod of diameter 20mm, electrically insulated from the test fixture, no explosion, no fire and no melting observed. **Satisfactory.**

Prepared By		Checked By	
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MANISH BERWAL		UDIT KAUL	
Engineer		Dy. Manager	

Test Report No - CTOGA9305

Date: 01.01.2021

MARK	REV. NO		REVISED BY	DATE
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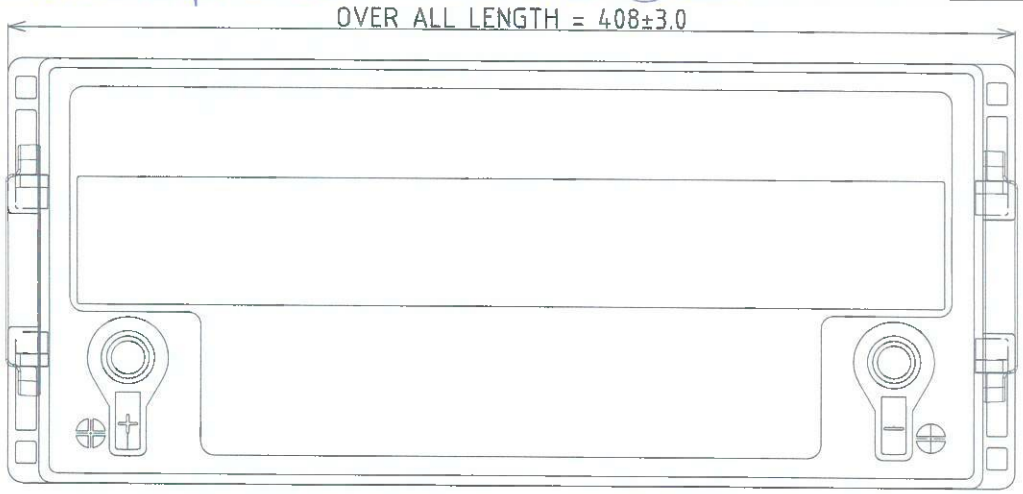
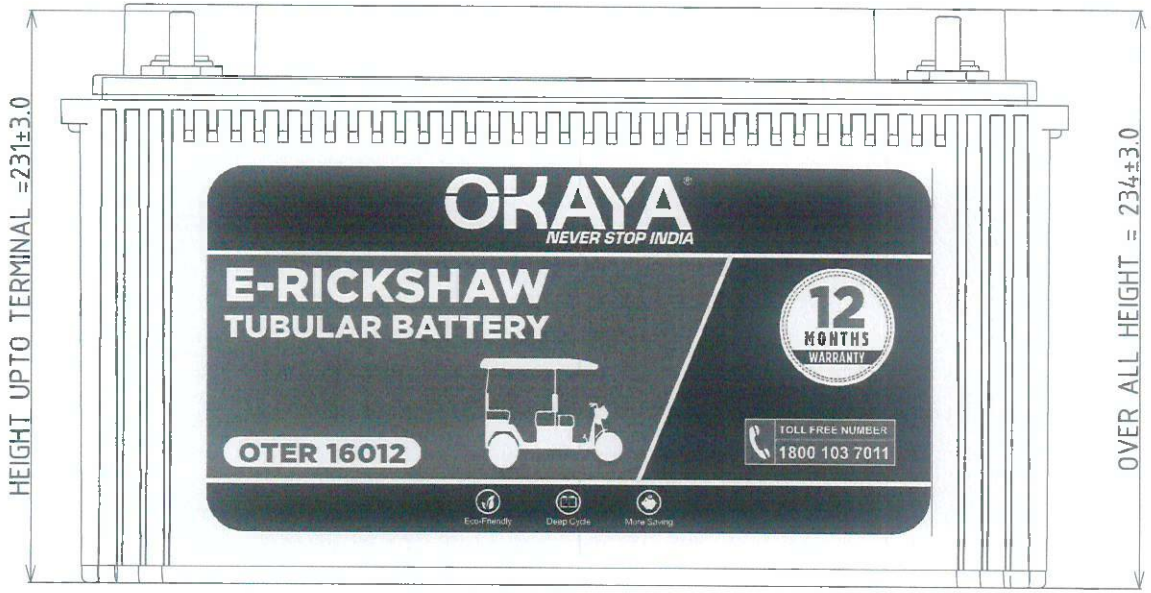
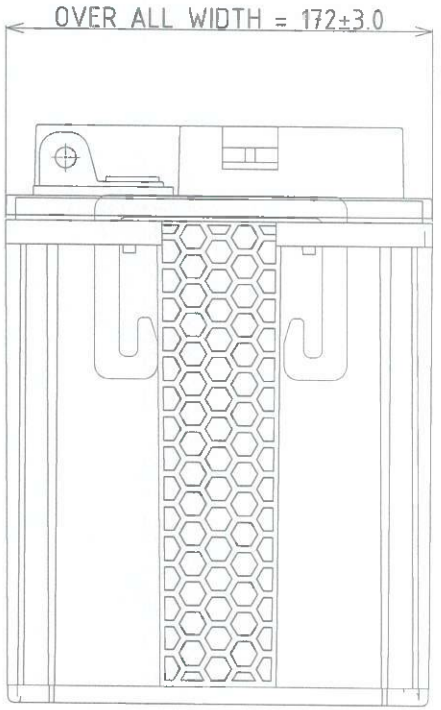


NOTE
CONTAINER MATERIAL : POLYPROPYLENE
1.TYPE OF BATTERY : LEAD ACID BATTERY -TUBULAR
2.NOMINAL VOLTAGE :12
3.CAPACITY (Ah) : 90Ah@C5 CORRECTED AT 30°C
4.TERMINAL POLARITY :RIGHT
5.SUITABLE APPLICATION : ELECTRIC VEHICLE





DESIGN	DRAWN	CHECKED	APPROVED	DATE	SCALE	PART MATL.	DESCRIPTION	PART WEIGHT	OKAYA POWER LTD
RAJESH	RAJESH	M.SHETTY		20-02-2020	1:1	----	-----		D-7, UDYOG NAGAR, ROHTAK ROAD NEW DELHI - 110041

UNSPECIFIED TOLERANCE	
UNDER 4	±0.15
OVER 4, UNDER 16	±0.2
OVER 16 UNDER 63	±0.3
OVER 63 UNDER 250	±0.5
OVER 250	±0.8
ANGLE	±0.5°

UNSPECIFIED DRAFT ANGLE 15'-30'
UNSPECIFIED RADIUS 0.2
ALL DIMENSIONS ARE IN mm
IF IN DOUBT PLEASE ASK
DO NOT SCALE THE DRG.

SPECIFICATION NO. SP.MS.1299 | REVISION

PART NAME. FINISHED BATTERY FOR OTER 16012

DRG.NO. DW-1042-00 | SHEET