

INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY

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

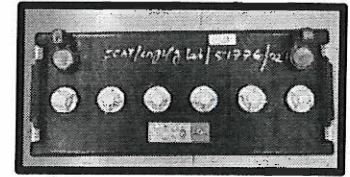
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TEST REPORT





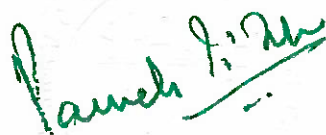
C T O B M 5 2 1 1

Date: 21.07.2017

- 1.0 **NAME AND ADDRESS OF THE: CUSTOMER** **M/s. Eastman Auto and Power Limited**
Khasra No. 315/252/1-4 Nalagarh Pinjore Highway
Nalagarh District Solan (H.P.) 174101, India.
- 2.0 **NAME AND ADDRESS OF THE: MANUFACTURER** **Same as Sr. No. 1.0**
- 3.0 **CUSTOMER LETTER REF:** **IOCS No. CCTNEAPLMFEEG51776 08-May-2017**
- 4.0 **DESCRIPTION OF DEVICE UNDER TEST (DUT):**
 DUT Name : Battery Module, 12 V
 Battery Type : Lead Acid Battery
 Battery Capacity(Ah) : 96 Ah (Ah in 5 hrs)
 Id/Model No. : AD 13012ER
 Quantity : 06 Nos.(ICAT/CNG-LPG/51776/01-06)
 Trade Name : ADDO
 Drawing No. : EAP-ER-40-0234






- 5.0 **OBJECTIVE OF THE TEST:**
To validate the Safety Requirements of Traction Batteries as per AIS: 048 amended up to date
- 6.0 **TEST RESULTS:**
Please refer the Test requirements and Results in **Annexure-I** of this report.
- 7.0 **CONCLUSION:**
The battery specified in **Sr. No. 4.0** of this test report **met** all the test requirements when tested as per AIS: 048 amended up to date.

Prepared By	Checked By	 INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY Innovation • Service • Excellence MANESAR • 130001	Approved By	 BM5211 Page 1 of 7 + Dwg (01) [51776]
				
UDIT KAUL Asst. Manager	MADHUSUDAN JOSHI Dy. General Manager		PAMELA TIKKU Sr. General Manager	

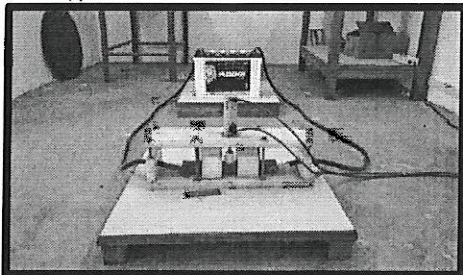
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10. The appropriate local court at Gurgaon shall have the jurisdiction in respect of any dispute, claim or liability arising out of this report.

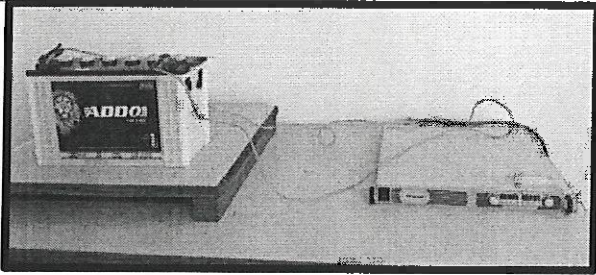
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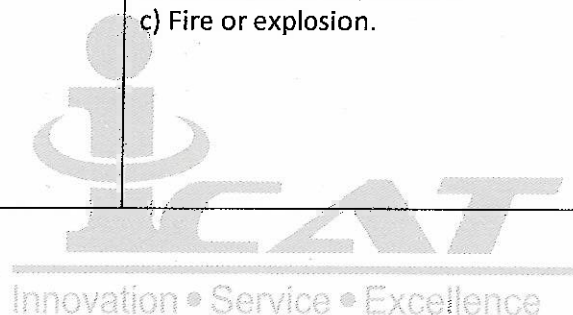
Annexure – I




1.0 TEST REQUIREMENTS AND RESULTS:

Cl. No.	Test	Test Requirements	Observations/Results
2.1 Electrical Tests			
2.1.1	Short Circuit test (Test ID: ICAT/CNG-LPG/51776/01)	 <p>Battery Condition: Fully charged (100% SOC), contained at ambient temperature.</p> <p>Apply a hard short in less than one second to the battery module with a conductor specified in the standard.</p> <p>Test Duration: 10 minutes, or until another condition occurs which prevents completion of test (i.e. component melting, etc.)</p> <p>Lab temperature: Not exceeding 30°C</p> <p>Acceptance Criteria:</p> <p>After 2 hours of observation:</p> <p>At the end of the test, there shall be no:</p> <ol style="list-style-type: none"> Physical damage to the casing or mechanical parts. Melting of components. Fire or explosion. <p>It is acceptable for the battery to become dry at the end of the test.</p>	<p>Ambient temperature : 29°C</p> <p>Conductor of $\leq 5\text{m}\Omega$ 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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2.1.2	Over Charge test (Test ID: ICAT/ CNG-LPG/51776/02)	 <p> Battery Condition: Fully charged (100% SOC), contained at ambient temperature at $27 \pm 5^{\circ}\text{C}$. Duration: 10 hours The battery is to be overcharged at a constant charging current of $0.1 (C_{10})$. </p> <p> 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 was charged with 10.67A for 10 hours. </p> <p> No physical damage, melting or explosion observed. </p> <p> Satisfactory. </p>
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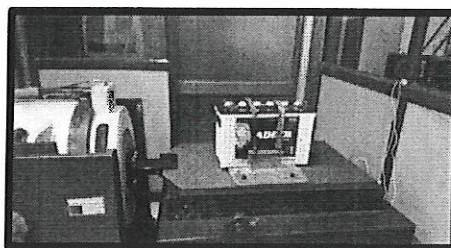


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2.2 Mechanical Tests

2.2.1

Vibration test
(Test ID: ICAT/ CNG-
LPG/51776/03)



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 $I = 0.2 \times \text{Battery capacity}(C_5)$

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

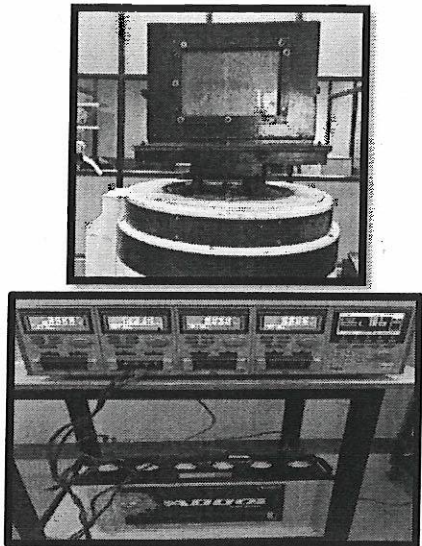
No electrolyte loss observed during test.




Immediately after the test, battery was discharged at 19.2A And deterioration observed was not more than 10%.

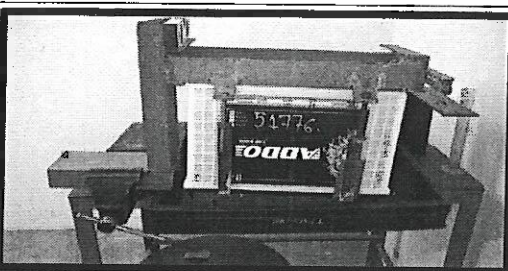
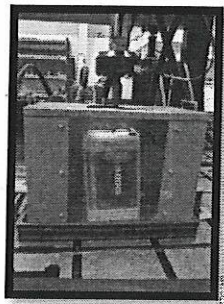
No physical damage or explosion observed.



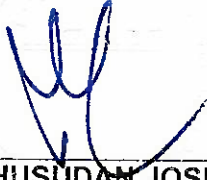
Satisfactory.

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<p>UDIT KAUL Asst. Manager</p>		<p>MADHUSUDAN JOSHI Dy. General Manager</p>	

2.2.2	<p>Shock test (Test ID: ICAT/CNG-LPG/51776/04)</p>	<div data-bbox="719 264 1142 808">  </div> <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.</p> <p>Axis: Vertical and Horizontal axis, with battery positioned in longitudinal direction.</p> <p>Acceleration: 30 g (half-sine wave)</p> <p>No. of shocks: 10 in each axis</p> <p>Duration: 15 ms of each shock</p> <p>Immediately after the test, discharge the battery at room temperature, at the rate of $I = 0.2 \times \text{Battery capacity}(C_5)$</p> <p>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:</p> <ol style="list-style-type: none"> Physical damage to the casing or other mechanical parts Fire or explosion. 	<p>Immediately after the test, battery was discharged at 19.2A and deterioration observed was not more than 10%.</p> <p>No physical damage or explosion observed.</p> <p>Satisfactory.</p>
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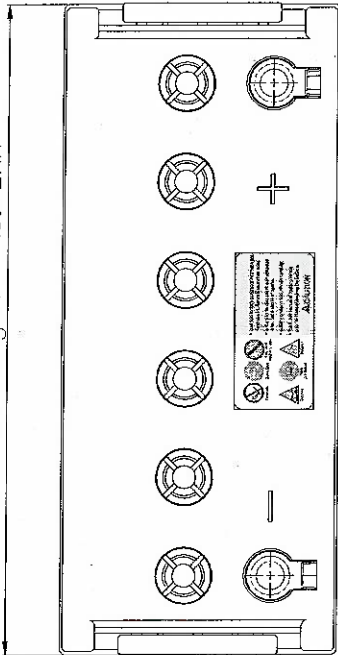
<p><i>Prepared By</i></p> <div data-bbox="300 1765 432 1928">  </div> <p>UDIT KAUL Asst. Manager</p>	<div data-bbox="608 1787 791 1966">  </div>	<p><i>Checked By</i></p> <div data-bbox="970 1809 1070 1951">  </div> <p>MADHUSUDAN JOSHI Dy. General Manager</p>	<p>Page 6 of 7 + Dwg(01) [51776]</p>
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2.2.3	Roll-Over Test (Battery Module) (Test ID: ICAT/CNG-LPG/51776/05)	 <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.</p> <p>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>Acceptance Criteria: The volume of electrolyte spilled in each position shall not be more than 25 ml per module.</p>	<p>Spillage observed was less than 25ml in each position.</p> <p>Satisfactory.</p>
2.2.4	Penetration Test (Test ID: ICAT/CNG-LPG/51776/06)	 <p>The battery module shall be penetrated with a mild steel (conductive) pointed rod, which will be electrically insulated from the test fixture.</p> <p>Rate of penetration: 8 cm/s.</p> <p>Diameter of Rod: 20mm</p> <p>Orientation of penetration: perpendicular to the electrode plates.</p> <p>Minimum Depth of penetration: Through three cells or 100 mm</p> <p>The battery should be observed, with the rod remaining in place, for a minimum of one hour after the test.</p> <p>Acceptance Criteria: At the end of the test, there shall be no:</p> <ol style="list-style-type: none"> Melting of components. Fire or explosion. 	<p>After penetration, up to a depth through three cells with a pointed mild steel rod of diameter 20mm, electrically insulated from the test fixture, no explosion, no fire and no melting observed.</p> <p>Satisfactory.</p>

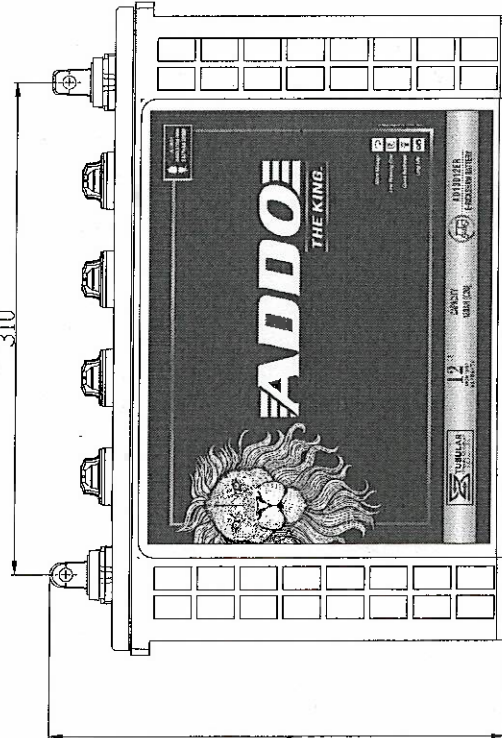
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Test report no:- CT08MS2-11 Dated:- 21.07.2017

Over all Length = 410 ± 2 mm

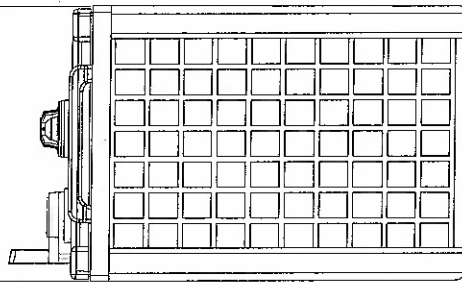


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Over all Height = 283 ± 2 mm

Over all width = 172 ± 2 mm



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Note :-

Battery Should be Free from dent, scratches, dust etc

REV. DATE		DESCRIPTION				INITIALS	
Material :-		2016	NAME	SIGN	DATE	Eastman Auto & Power Ltd. Nalagam - HP - India	
		DRN	M.K		05/05/2017		
		CHD	R.K		05/05/2017		
Finish :-		APPD.	MDS		05/05/2017		
Smooth		SCALE :-		NIT	T/D		
				SCALE			
Drg. Unit :-		Unless Otherwise Specified		FINISH BATTERY (AD13012ER)			
MM		Tolerance ± 0.2					
Eastman ...Let's grow together						Drg.No. :- EAP-ER-40-0234	
						Rev. 0	

GENERAL TOLERANCE (mm)	
BEYOND (>)	TOLERANCE (+/-)
0	0.05
1	0.1
6	0.2
30	0.3
80	0.4
300	0.5

Doc. No. :-