

# INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY

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

Non-Transferable

## TEST REPORT

**C T O B M 5 2 1 0**

**Date: 21.07.2017**

- 1.0 NAME AND ADDRESS OF THE: M/s. Eastman Auto and Power Limited**  
**CUSTOMER** Khasra No. 315/252/1-4 Nalagarh Pinjore Highway  
Nalagarh District Solan (H.P.) 174101, India.
- 2.0 NAME AND ADDRESS OF THE: Same as Sr. No. 1.0**  
**MANUFACTURER**
- 3.0 CUSTOMER LETTER REF: IOCS No. CCTNEAPLMFEEG51772 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) : 108 Ah (Ah in 5 hrs)  
Id/Model No. : EM 14012ER  
Quantity : 06 Nos. (ICAT/CNG-LPG/51772/01-06)  
Trade Name : EASTMAN  
Drawing No. : EAP-ER-40-0238



- 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		Approved By	 Page 1 of 7 + Dwg (01) [51772]
 <b>UDIT KAUL</b> Asst. Manager	 <b>MADHUSUDAN JOSHI</b> Dy. General Manager		 <b>PAMELA TIKKU</b> Sr. General Manager	

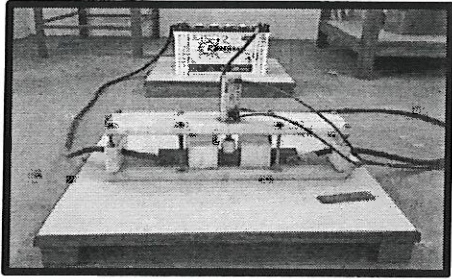
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9. No extract, abridgment or abstraction from this test report may be published or used to advertise the product without the written consent of the Director, ICAT, who reserves the absolute right to agree or reject all or any of the details of any items of publicity for which consent may be sought
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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UDIT KAUL Asst. Manager		MADHUSUDAN JOSHI Dy. General Manager	

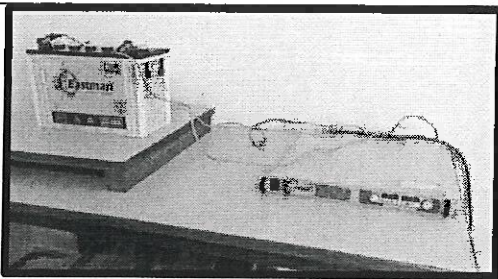
## Annexure – I

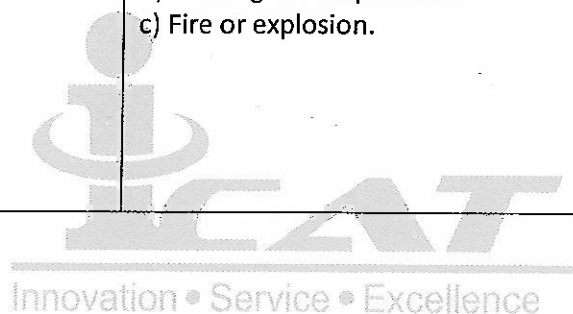
## 1.0 TEST REQUIREMENTS AND RESULTS:



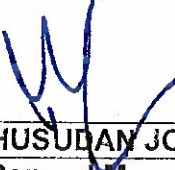
Cl. No.	Test	Test Requirements	Observations/Results
<b>2.1 Electrical Tests</b>			
2.1.1	<b>Short Circuit test</b> (Test ID: ICAT/CNG-LPG/51772/01)	 <p>Battery Condition: Fully charged (100% SOC), contained at ambient temperature.</p> <p>Apply a hard short in less than one second to the battery module 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><b>Acceptance Criteria:</b></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"> <li>Physical damage to the casing or mechanical parts.</li> <li>Melting of components.</li> <li>Fire or explosion.</li> </ol> <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 <math>\leq 5\text{m}\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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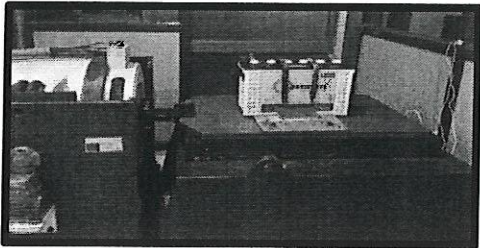




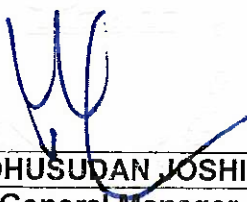
2.1.2	<b>Over Charge test</b> (Test ID: ICAT/ CNG-LPG/51772/02)	 <p>           Battery Condition: Fully charged (100% SOC), contained at ambient temperature at <math>27 \pm 5^{\circ}\text{C}</math>.            Duration: 10 hours            The battery is to be overcharged at a constant charging current of 0.1 (<math>C_{10}</math>).         </p> <p> <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 was charged with 12.0A for 10 hours.         </p> <p>           No physical damage, melting or explosion observed.         </p> <p> <b>Satisfactory.</b> </p>
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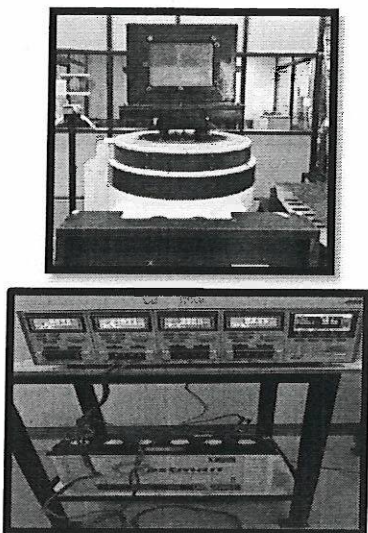




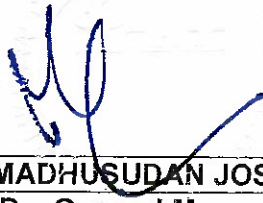
Prepared By		Checked By	
			
<b>UDIT KAUL</b> Asst. Manager		<b>MADHUSUDAN JOSHI</b> Dy. General Manager	Page 4 of 7 + Dwg(01) [51772]

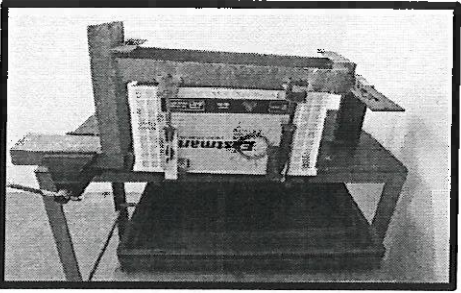

## 2.2 Mechanical Tests



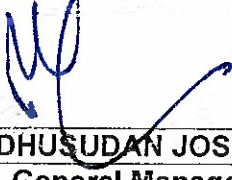
2.2.1	<b>Vibration test</b> (Test ID: ICAT/ CNG-LPG/51772/03)	 <p>             Battery Condition: Fully charged (100% SOC), contained at ambient temperature, firmly held on the vibration table in vehicle mounting position.              Axis: Vertical and Horizontal axis, with battery positioned in longitudinal 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 21.6A. 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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2.2.2	<p><b>Shock test</b> (Test ID: ICAT/CNG-LPG/51772/04)</p>	<div data-bbox="754 266 1123 797">  </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.  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 21.6A 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><i>Prepared By</i></p> <div data-bbox="304 1756 443 1935">  </div> <p><b>UDIT KAUL</b> Asst. Manager</p>	<div data-bbox="604 1767 788 1946">  </div>	<p><i>Checked By</i></p> <div data-bbox="895 1800 1158 2002">  </div> <p><b>MADHUSUDAN JOSHI</b> Dy. General Manager</p>	<p>Page 6 of 7 + Dwg(01) [51772]</p>
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2.2.3	<b>Roll-Over Test (Battery Module)</b> (Test ID: ICAT/CNG-LPG/51772/05)	 <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><b>Acceptance Criteria:</b>  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><b>Satisfactory.</b></p>
2.2.4	<b>Penetration Test</b> (Test ID: ICAT/CNG-LPG/51772/06)	 <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: <b>perpendicular to the electrode plates.</b></p> <p>Minimum Depth of penetration: <b>Through three cells or 100 mm</b></p> <p>The battery 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 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><b>Satisfactory.</b></p>

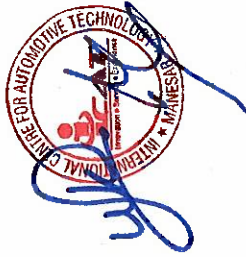
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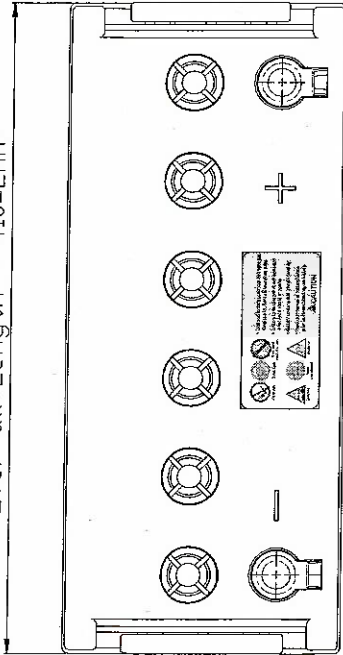
Test report no:- CT08MS210

Dated:- 21.07.2017

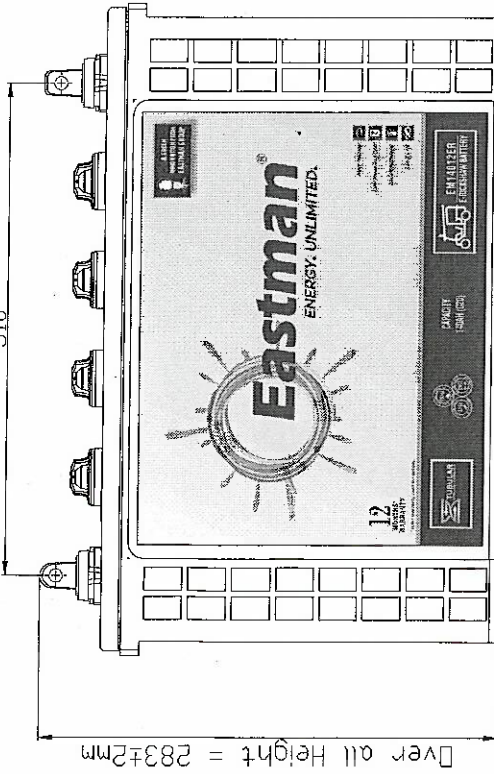
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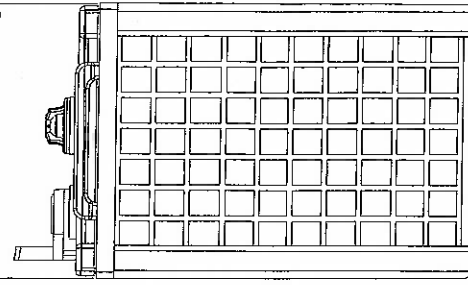
Over all Length =  $410 \pm 2$ mm.



310





Over all width =  $172 \pm 2$ mm



Note :-

Battery Should be Free from dent, scratches, dust etc

REV. DATE		DESCRIPTION					INITIALS	
Material :-							Eastman Auto & Power Ltd. Nalagath - HP - India	
—		2016	NAME	SIGN	DATE			
		DRN	M.K		05/05/2017			
		CHD	R.K		05/05/2017			
Finish :-		APPD.	MDS		05/05/2017			
Smooth		SCALE :- NOT TO SCALE						
Drg. Unit :-		Unless Otherwise Specified Tolerance $\pm 0.2$						
		MM						
		Eastman ...lets grow together						
GENERAL TOLERANCE (mm)							FINISH BATTERY (EM14012ER)	
UNLESS OTHERWISE SPECIFIED								
BEYOND ( > )								
TOLERANCE ( ± )								
BELOW ( ≤ )								
0								
1								
6								
30								
80								
300								
600								