

# INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY

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

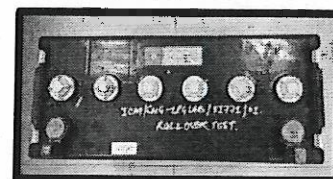
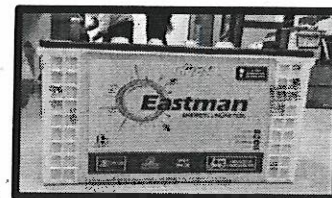
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## TEST REPORT

**C T O B M 5 2 0 9**

**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. CCTNEAPLMFEEG51771 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. : EM 13012ER  
 Quantity : 06 Nos. (ICAT/CNG-LPG/51771/01-06)  
 Trade Name : EASTMAN  
 Drawing No. : EAP-ER-40-0237






- 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	
UDIT KAUL Asst. Manager	MADHUSUDAN JOSHI Dy. General Manager		PAMELA TIKKU Sr. General Manager	Page 1 of 7 + Dwg (01) [51771]

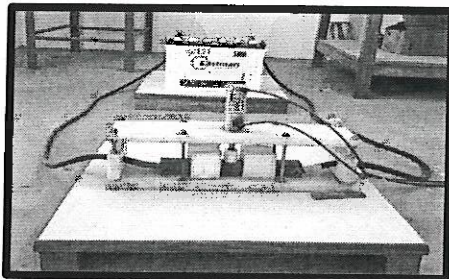
## DISCLAIMER



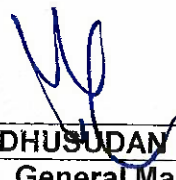
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2. ICAT issues Test reports/ Extension reports/ Developmental Reports in compliance to Motor Vehicle Act/ Central Motor Vehicle Rules and their provisions as amended from time to time or any other statutory orders under which ICAT is authorized. Other Rules/Acts are outside the purview/scope of the Test reports/Extension reports/ Developmental test reports
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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## Annexure – I

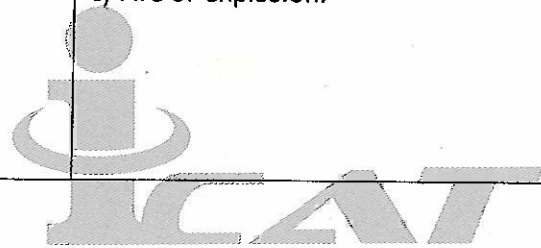
## 1.0 TEST REQUIREMENTS AND RESULTS:



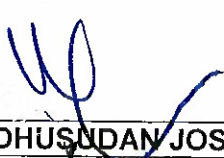
Cl. No.	Test	Test Requirements	Observations/Results
<b>2.1 Electrical Tests</b>			
2.1.1	<b>Short Circuit test</b> (Test ID: ICAT/CNG-LPG/51771/01)	 <p>Battery Condition: Fully charged (100% SOC), contained at ambient temperature.</p> <p>Apply a hard short in less than one second to the battery module 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>            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 : 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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<b>UDIT KAUL</b> Asst. Manager		<b>MADHUSUDAN JOSHI</b> Dy. General Manager	



2.1.2	<b>Over Charge test</b> (Test ID:ICAT/ CNG-LPG/51771/02)	 <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 <math>0.1 (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 10.67A for 10 hours.</p> <p>No physical damage, melting or explosion observed.</p> <p><b>Satisfactory.</b></p>
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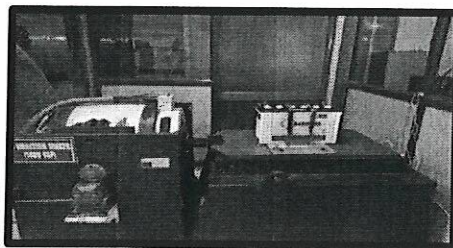

  
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<b>UDIT KAUL</b> Asst. Manager		<b>MADHUSUDAN JOSHI</b> Dy. General Manager	

## 2.2 Mechanical Tests

2.2.1

**Vibration test**  
 (Test ID: ICAT/ CNG-  
 LPG/S1771/03)



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.**

Prepared By



UDIT KAUL  
 Asst. Manager



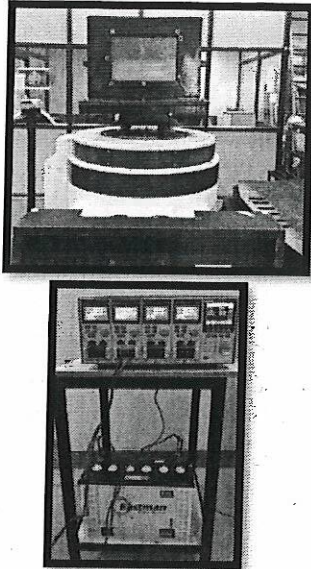
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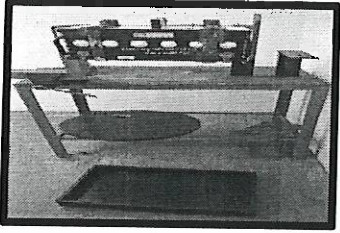
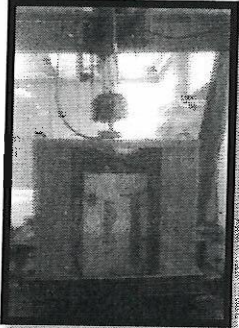
MADHUSUDAN JOSHI  
 Dy. General Manager



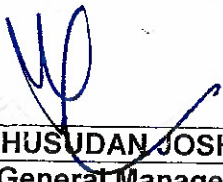
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2.2.2	<p><b>Shock test</b> (Test ID: ICAT/CNG-LPG/51771/04)</p>	<div data-bbox="770 241 1082 808">  </div> <p>Battery Condition: Fully charged (100% SOC), contained at ambient temperature not exceeding 30°C, firmly held on the vibration table in vehicle 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 <math>I = 0.2 \times \text{Battery capacity}(C_3)</math></p> <p>Acceptance Criteria:</p> <p>The deterioration of battery rated capacity during discharging shall not be more than 10%.</p> <p>At the end of the test, there shall be no:</p> <p>a) Physical damage to the casing or other mechanical parts</p> <p>b) Fire or explosion.</p>	<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><b>Satisfactory.</b></p>
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<p><i>Prepared By</i></p> <div data-bbox="272 1722 384 1901">  </div> <p><b>UDIT KAUL</b> Asst. Manager</p>	<div data-bbox="588 1749 774 1924">  </div>	<p><i>Checked By</i></p> <div data-bbox="919 1794 1023 1928">  </div> <p><b>MADHUSUDAN JOSHI</b> Dy. General Manager</p>	<p>Page 6 of 7 + Dwg(01) [51771]</p>
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2.2.3	<b>Roll-Over Test (Battery Module)</b> (Test ID: ICAT/CNG-LPG/51771/05)	 <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. 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. <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/51771/06)	 <p>The battery module shall be penetrated with a mild steel (conductive) pointed rod, which will be electrically insulated from the test fixture. <b>Rate of penetration: 8 cm/s</b> <b>Diameter of Rod: 20mm</b> <b>Orientation of penetration: perpendicular to the electrode plates.</b> <b>Minimum Depth of penetration: Through three cells or 100 mm</b> The battery should be observed, with the rod remaining in place, for a minimum of one hour after the test. <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>

<p><i>Prepared By</i></p>  <p><b>UDIT KAUL</b> Asst. Manager</p>		<p><i>Checked By</i></p>  <p><b>MADHUSUDAN JOSHI</b> Dy. General Manager</p>	<p>Page 7 of 7 + Dwg(01) [51771]</p>
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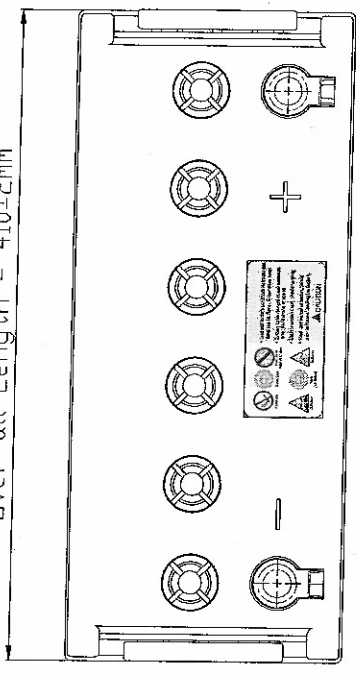


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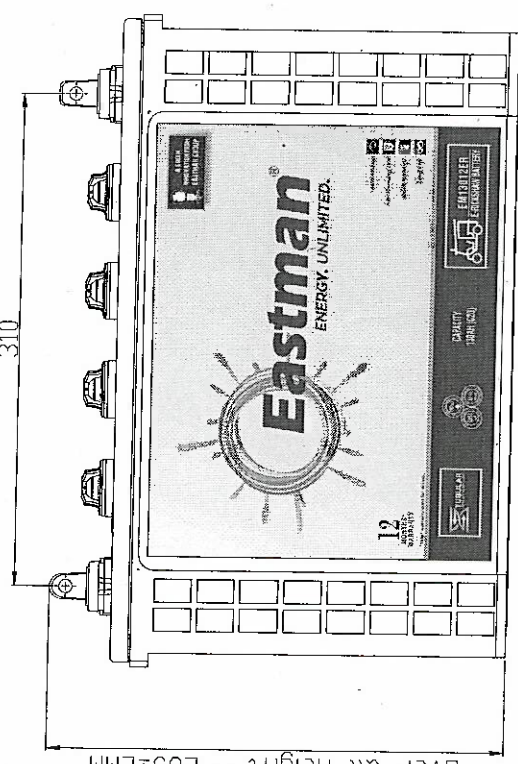
Dated:- 21.07.2017

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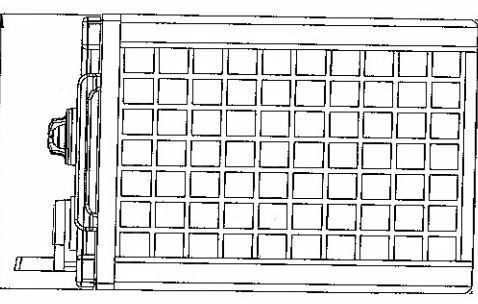
Over all Length =  $410 \pm 2$ mm




310



Over all width =  $172 \pm 2$ mm



Note :-  
Battery Should be Free from dent, scratches , dust etc

REV. DATE		DESCRIPTION					INITIALS	
Material :-							<u>Eastman Auto &amp; Power Ltd.</u> Nalegathi - HP - India	
—								
Finish :-								
Smooth								
GENERAL TOLERANCE (mm) UNLESS OTHERWISE SPECIFIED		2016		NAME	SIGN	DATE	FINISH BATTERY (EM13012ER)	
		DRN	M.K			05/05/2017		
		CHD	R.K			05/05/2017		
		APPD.	IMDS			05/06/2017		
		SCALE :- NOT TO SCALE						
		Unless Otherwise Specified						
		Tolerance $\pm 0.2$						
		Drg. Unit :- MM						
								
		...Let's grow together						