

INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY

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

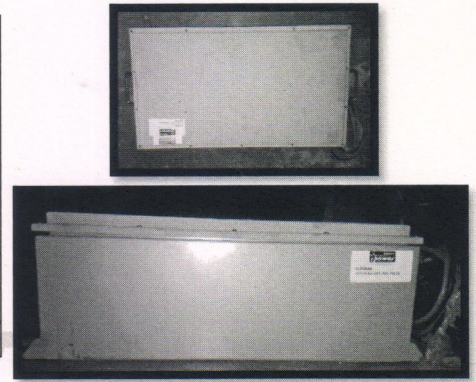
TEST REPORT


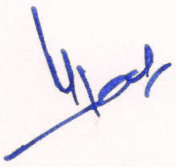
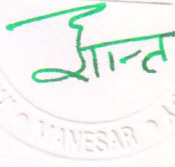
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ULR No.: TC536019010000136P
Test Report No.: C T 0 B O 5 3 2 7

Date: 13.12.2019

- 1.0 NAME AND ADDRESS OF THE : **CUSTOMER** **M/s. COMPUTECH SYSTEMS**
G-4 ,Harsha House ,Karampura Commercial
Complex , New Delhi- 110015 , India
- 1.1 NAME AND ADDRESS OF THE : **MANUFACTURER**
Same as serial No. 1.0
- 2.0 CUSTOMER LETTER REF : IOCS No. CCTNCOMSOMEEL73401 Dated 07-Nov-2019
- 3.0 DESCRIPTION OF DEVICE UNDER TEST (DUT):
- | | |
|------------------------|---|
| DUT Name | Battery Pack, 51.2 V |
| Battery Type | LFP |
| Battery Capacity(Ah) | 86Ah (Ah in 5 hrs) |
| Rated Voltage | 51.2 V DC |
| Id/Model No. | LFP5186 |
| Quantity | 06 Nos. of Battery Pack
(ICAT/EEL/73401/01-06) |
| Trade Name | I POWER |
| Configuration of Cells | 16S2P |
| Drawing No. | IP-5186-01 |
- 4.0 DATE OF RECEIPT OF SAMPLE : 14.11.2019
- 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 ANY DEVIATION OR EXCLUSION FROM TEST METHOD: Not Applicable.
- 9.0 FUNCTIONAL VERIFICATION: Functional verification done and battery was found satisfactory.
- 10.0 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.
- 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 LOCATION OF TEST: ICAT CENTER-I.
- 14.0 TEST RESULTS: Please refer the Test requirements and Results in **Annexure-I** of this report.





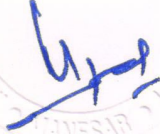
Prepared By	Checked By	Approved By
		
UDIT KAUL Dy. Manager	MAHENDAR PAL Asst. General Manager	PAMELA TIKKU Sr. General Manager



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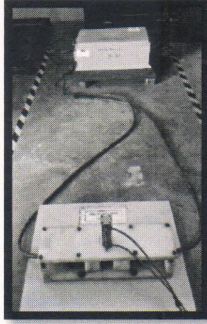
DISCLAIMER



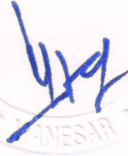
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2. ICAT issues Test reports/ Extension reports/ Developmental Reports in compliance to Motor Vehicle Act/ Central Motor Vehicle Rules and their provisions as amended from time to time or any other statutory orders under which ICAT is authorized. Other 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
4. Unless otherwise supported by a separate Certificate, this Test report Extension Reports / Developmental test reports shall not be considered in isolation as valid Type approval for any vehicle
5. ICAT is not responsible for testing each vehicles/ parts/assemblies etc. for which Test Reports/ Extension reports/ Developmental test reports is issued. Further, ICAT is not responsible for ensuring manufacturing quality of the vehicles/ components/ parts/ assemblies etc. for which the Test Reports/ Extension reports/ Developmental test reports is /are issued.
6. ICAT is no way responsible for any misuse or copying any design/type/system in connection with entire vehicle/ components/parts and assemblies covered under the Test Reports/ Extension reports/ Developmental test reports is /are issued
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8. Further, ICAT has the right, but not under obligation to initiate cancellation / withdrawal of the Test report/Extension/ Developmental test report is/are issued, in case of any fraud, misrepresentation, when it surfaces and comes in the knowledge of ICAT
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.

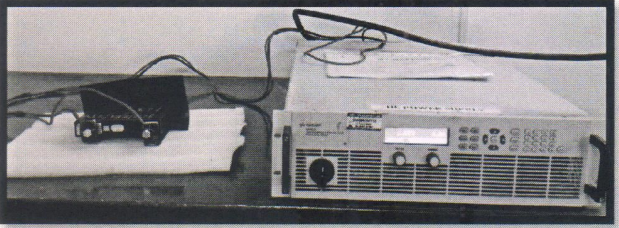
<p>Prepared By</p> 		<p>Checked By</p> 	<p>Page 02 of 07 + Dwg(01) [73401]</p>
<p>UDIT KAUL Dy. Manager</p>		<p>MAHENDAR PAL Asst. General Manager</p>	

Annexure – I



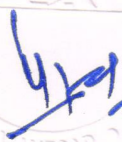
1.0 TEST REQUIREMENTS AND RESULTS:

Cl. No.	Test	Test Description	Observations/Results
2.1 Electrical Tests			
2.1.1	Short Circuit test (Test ID:ICAT/EEL/73401/01) Date of Test : 02.12.2019	 <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 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.</p>	<p>Ambient temperature : 27°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	<p>Over Charge test (Test ID: ICAT/ EEL/73401/02) Date of Test : 10.12.2019</p>	 <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}). 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 Cell was charged with 4.77 A for 10 hours.</p> <p>No physical damage, melting or explosion observed.</p> <p>Satisfactory.</p>
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2.2 Mechanical Tests



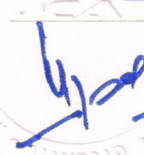
2.2.1	<p>Vibration test (Test ID: ICAT/EEL/73401/03) Date of test : 10.12.2019</p>	 <p>Battery Condition: Fully charged (100% SOC), contained at ambient temperature, firmly held on the vibration table in vehicle mounting position. Axis: Vertical and Horizontal axis, with battery positioned in longitudinal 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 $I = 0.2 \times \text{Battery capacity}(C_5)$</p> <p>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</p>	<p>Immediately after the test, battery was discharged at 17.2A And deterioration observed was not more than 10%.</p> <p>No physical damage or explosion observed.</p> <p>Satisfactory.</p>
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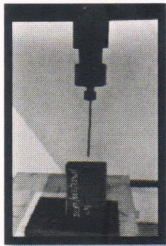
Date: 13.12.2019




2.2.2	<p>Shock test (Test ID: ICAT/EEL/73401/04) Date of test : 06.12.2019</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 $I = 0.2 \times \text{Battery capacity}(C_5)$ 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.</p>	<p>Immediately after the test, battery was discharged at 17.2A and deterioration observed was not more than 10%.</p> <p>No physical damage or explosion observed.</p> <p>Satisfactory.</p>
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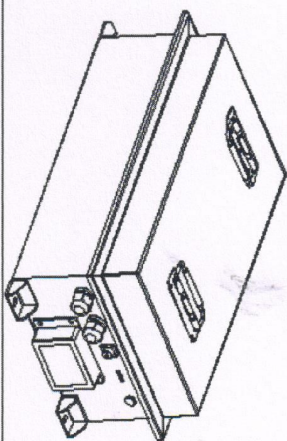
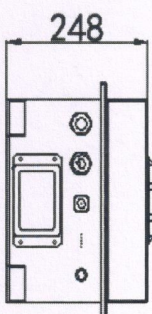
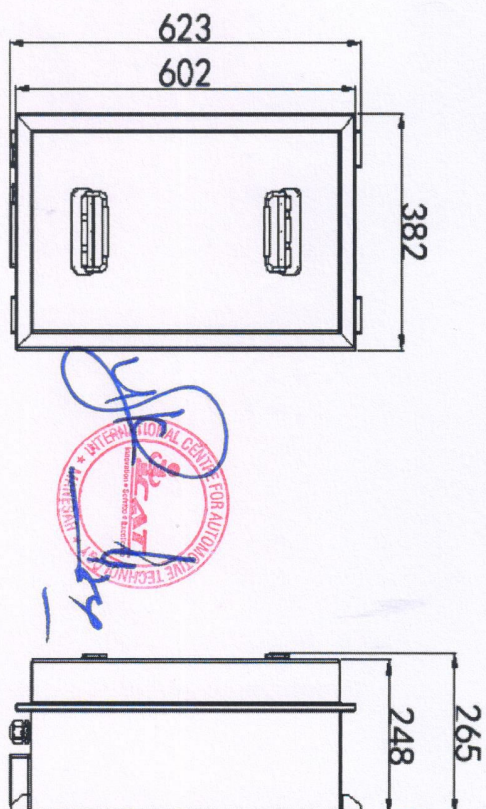
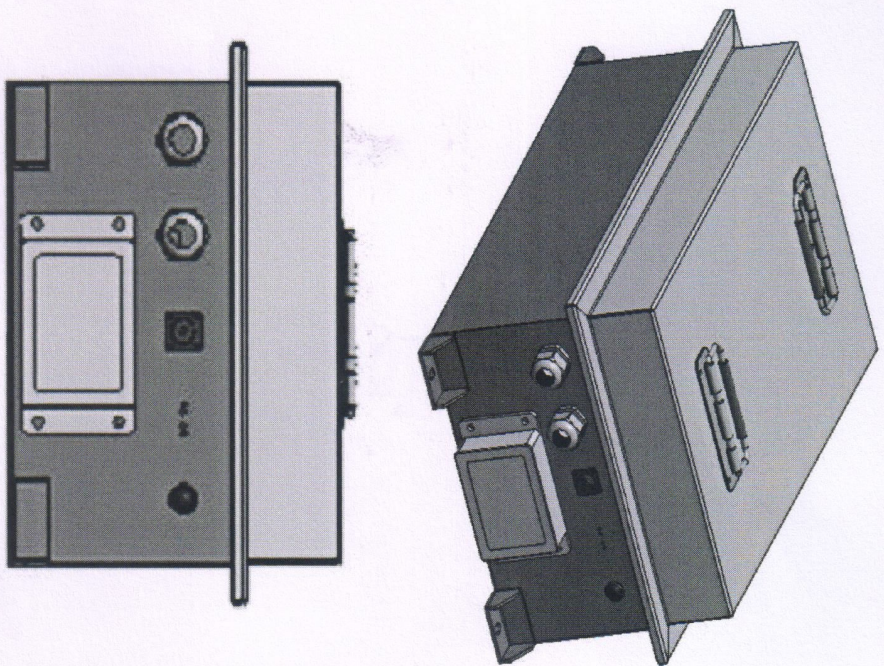
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2.2.3	Roll-Over Test	<p>Rotate the battery module one complete revolution in one direction, for one minute in a continuous, slow-roll fashion, and observe leakage, if any.</p> <p>Then rotate the battery module in 90° increments in same direction for 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>	Not Applicable.
2.2.4	Penetration Test (Test ID: ICAT/EEL/73401/05) Date of test : 10.12.2019	 <p>The battery Cell 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: 3mm</p> <p>Orientation of penetration: perpendicular to the electrode plates.</p> <p>Minimum Depth of penetration: Through cell</p> <p>The battery Cell 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: 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>Satisfactory.</p>

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SIDE VIEW

Trade name	I Power	COMPUTECH SYSTEMS			
Model No.	LFP5186				
Rating	51.2V, 86 Ah @ C5	Cell Configuration: 16S2P			
Drawing By	Manoj	Date	07/11/2019	All Dimensions are in mm	
Approved By	Vikas Aggarwal	Drawing No	IP-5186-01	Scale: 1:1	Sheet-1/1