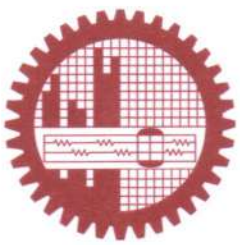
DEPARTMENT OF
ELECTRICAL AND ELECTRONIC ENGINEERING

TEST REPORT ON A 15W NEW SOLAR STREET LIGHT SYSTEM SUPPLIED AND REQUESTED BY MIND TOUCH LIMITED

BRTC REF. NO.: 1102-11643/EEE/2019-20(iii) DATE: 23/06/2020
CLIENT'S REF. NO.: MTL/BUET/LT/2020-0001 DATE: 23/03/2020



Bangladesh University of
Engineering and Technology, Dhaka

তড়িৎ ও ইলেকট্রনিক কৌশল বিভাগ
বাংলাদেশ প্রকৌশল বিশ্ববিদ্যালয়, ঢাকা-১২০৫
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Date: July 12, 2020

The tests are conducted and the report is prepared by the Department of Electrical and Electronic Engineering (EEE) of Bangladesh University of Engineering and Technology (BUET), Dhaka-1205, Bangladesh.

Head of the Department
Department of Electrical and Electronic Engineering
Bangladesh University of Engineering and Technology (BUET)
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1. INTRODUCTION

The Managing Director of Mind Touch Limited sent a request letter, dated 23/03/2020, to the Bureau of Research, Testing and Consultation (BRTC) of Bangladesh University of Engineering and Technology (BUET) to perform tests on one set of Solar Street Light System as per IDCOL standard and provide the test report. In response to the request, tests were carried out on the supplied sample of the Solar Street Light System in the laboratories of the Department of Electrical and Electronic Engineering (EEE), BUET and the report has been prepared based on the findings of the tests.

2. SAMPLE SPECIFICATIONS

One set of Solar Street Light System of 15W was supplied to the laboratory of the Department of EEE, BUET. The set consisted of one LED street light, one solar charge controller and one $LiFePO_4$ battery pack. The lot size and the mode of sampling are unknown. Table 1 gives the detail of the supplied system.

Table 1: Detail of the supplied Street Light System

SN	Company Name	Components	Model	Capacity
1.	EverExceed	LED	MT-EVAL-15W	15W
		Controller	MT-ESLC-M8D	8A
		Lithium Iron Phosphate ($LiFePO_4$) Battery	MT-LLS-12V16AH	16AH

2.1 Nameplate data of the LED street light

The nameplate data of the supplied LED street light are shown in Table 2.1.

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Table 2.1: Nameplate data of the LED street light unit

Brand	EverExceed
Model	MT-EVAL-15W
Serial No.	MTL032001602
Voltage	12V
LED Power	15W
Made in China	

2.2 Nameplate data of the charge controller unit

The nameplate data of the charge controller unit are shown in Table 2.2.

Table 2.2: Nameplate data of the charge controller unit

Brand	EverExceed
Model	MT-ESLC-M8D
Rated Input	12V, 8A
Controller Type	MPPT

2.3 Nameplate data of the battery unit

The nameplate data of the battery unit are shown in Table 2.3.

Table 2.3: Nameplate data of the battery unit

Brand	EverExceed
Model	MT-LLS-12V16AH
Battery Type	$LiFePO_4$
Rated Voltage	12V
Capacity	16AH
Serial No.	191218290646

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3. RESULTS

Measured data of the supplied Solar Street Light System are shown in Tables 3.1, 3.2 and 3.3 for the LED light unit, the charge controller unit and the battery unit, respectively. Test results are also compared with IDCOL technical specifications (where applicable) in each case.

3.1 IP65 TEST

Degree of protection provided by the enclosure of the solar street light system was tested according to IEC standard 60529. The following two tests were carried out:

(i) Test for protection against solid foreign objects
(ii) Test for protection against water

3.1.1 TEST FOR PROTECTION AGAINST SOLID FOREIGN OBJECTS

The test was carried out using a dust chamber that was built in-house, incorporating the basic principle shown in IEC standard 60529. The amount of talcum powder used was ~2kg per cubic meter of test chamber volume. Fans and a blower were used to maintain the talcum powder in suspension. The test was continued for a period of 8 hrs.

At the end of the test period, the protection enclosure was inspected for accumulation of talcum powder.

COMMENT

The protection is satisfactory as no talcum powder accumulation was found inside the enclosure.

3.1.2 TEST FOR PROTECTION AGAINST WATER

The test was made by spraying the enclosure from all practicable direction with a stream of water from a test nozzle according to IEC standard 60529. The internal diameter of the nozzle was ~6.3 mm and delivery rate was 12.5 L/min ± 5%. The stream of water was sprayed using the nozzle from a distance of ~2.5 m for ~4 minutes.

The protection enclosure was inspected to check whether water entered inside it.

COMMENT

The protection is found to be satisfactory as water did not enter inside the enclosure.

The enclosure of the solar street light fulfills the requirement of IP65.

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3.2 The LED street light

The LED street light was placed inside the integrating sphere photometer from Labsphere, connected and controlled with its Integral™ light measurement platform, and tested for its Luminous Efficacy. The results of the test are provided in Table 3.1.

Table 3.1: Test results of the LED street light unit

Sl. No	Features	Observation /Test Results	Compliance /Non-compliance (with IDCOL)
1.	Measured Input Voltage (V)	12.00	
2.	Measured Input Current (A)	1.25	
3.	Measured Power (W)	15	
4.	Luminous Efficacy (Lm/W)	102.73	Comply (> 90 lm/W)
5.	(a) Ambient Temperature (°C)	31.5	Comply (<20° C)
	(b) Heat Sink Temperature (°C)	36.2	
	(c) Heat Sink temperature Rise (°C)	4.7	
6.	Deviation of Power Consumption from the rated condition (%)		Comply (within ±15%)
	(a) Input voltage (10.2 V)	-4.8	
	(b) Input voltage (12.0 V)	-4.9	
	(c) Input voltage (14.0 V)	-5.0	
7.	Type of LED light	White	Comply
8.	Color Rendering Index (CRI)	71.19	Comply (>70)

COMMENT:

The overall performance of the supplied LED street light unit was found to be SATISFACTORY as per IDCOL requirements.

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3.3 The charge controller unit

Various parameters of the Charge Controller unit were measured under specific test conditions, which are provided in Table 3.2.

Table 3.2: Test results of the charge controller unit

Sl. No	Features	Observation/Test Results	Compliance /Non-compliance (with IDCOL)
1.	MPPT mechanism	Present	Comply
2.	Maximum Drawn Self-Current	With indicator LEDs lit: 19 mA	Comply ($\leq$ 50mA)
3.	Factory preset set points of the charge controller for the particular battery to be used.	Present	Comply
4.	Input Current Rating	Controllable through remote device	Comply
5.	Maximum Voltage withstand capacity at PV input terminal when battery and load are disconnected	The charge controller could withstand 25V DC without causing any damage	Comply
6.	Labeling on charge controller casing	Present	Comply
7.	Battery high voltage disconnect (HVD)	14.23V (controllable through remote device)	Comply
8.	Reverse current leakage protection	Protected	Comply
9.	Short-circuit protection	(a) Protected against load terminal shorted (b) Protected against panel terminal shorted	Comply

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Sl. No	Features	Observation/Test Results	Compliance /Non-compliance (with IDCOL)
10.	LVD maximum current handling capacity	LVD device handled 150% of the maximum expected continuous load	Comply
11.	Current handling capacity at PV, Battery and Load Terminals	120% of rated current was sustained for 1 hour without the charge controller being damaged	Comply
12.	Reverse polarity protection	(a) Panel End: Protected (b) Battery End: Protected	Comply
13.	Low voltage disconnect (LVD):	(both controllable through remote device)	Comply
	(a) Disconnect voltage	(a) 9.9V	
	(b) Reconnect voltage	(b) 13.1V	
14.	Nominal Voltage	12V	Comply
15.	Efficiency of the Charge Controller	Avg. Discharging efficiency: 93.6% Avg. Charging efficiency: 98.7%	Comply (> 90%)

COMMENT:

The overall performance of the charge controller unit was found to be SATISFACTORY as per IDCOL requirements.

3.4 Capacity test of the battery unit

The capacity test was carried out over five cycles of charging and discharging of the battery unit. During charging, the battery was charged following the standard procedure of charging Lithium Ferrite Phosphate battery. During discharging, the battery was discharged at a constant DC current of 3.2 A. The discharging was tried to be continued for 5 hours or until the battery terminal voltage reached to 10V whichever was achieved earlier. Table 3.3 shows the results of the test.

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Table 3.3: Capacity test results of the battery unit

Cycle No.	Voltage at the start of Discharge (V)		Discharge Current (A)	Average Temperature (°C)	Discharge Period (Hrs)	Battery Capacity (Ah) at Measured Temperature
	Without Load	With Load				
1.	14.12	13.48	3.2	31.30	5.80	18.56
2.	14.01	13.52	3.2	31.37	5.82	18.62
3.	14.11	13.61	3.2	31.93	5.84	18.69
4.	13.89	13.50	3.2	32.80	5.83	18.66
5.	14.25	13.65	3.2	32.71	5.84	18.69

COMMENT:

The average capacity of the supplied battery at measured temperature was found to be 18.64Ah which is about 17% higher than the declared capacity.

4. OVERALL COMMENT

The overall performance of the supplied Solar Street Light System was found to be SATISFACTORY as per IDCOL requirements.