

## CORRIGENDUM

**E-tendering reference no.** BHU/CHEM/EQUIP/2014/E-01

**Tender ID:** 2014\_BHU\_13861\_1 **Published on:** 15.9.2014

**Title:** Supply of Solar Simulator

1. Technical specifications for the above tender have been modified in respect of lamp power and voltage range of I-V test station as under:

### Specifications

#### **1. Solar Simulator:**

2x2 inch Class-AAA Solar Simulator for solar cell characterizations.

Spectral Match, Non-Uniformity of Irradiance and Temporal Instability of irradiance should be certified to all the three standards IEC60904-9 Edition 2 2007, JIS C 8912 and ASTM E 927-05 standards.

Collimation Angle:  $<\pm 4^\circ$

Typical Power Output:  $100 \text{ mW/cm}^2$  (1 Sun)  $\pm 20\%$  adjustable

Should be able to vary the Intensity (without changing the input power/current/voltage to the lamp) from 0.75 to 1.0 Sun without any change in Class A for Non Uniformity and up to 0.10 Sun with Class B for Non-uniformity.

Spectral Range: 400 to 1100 nm

Non Uniformity:  $\leq 2\%$

Uniformity Classification A (IEC 60904-9 2007)

A (JIS C 8912)

A (ASTM E927 - 05)

Temporal Instability  $< 0.5\%$  STI

$< 2.0\%$  LTI

Temporal Instability Classification A (IEC 60904-9 2007)

A (JIS C 8912)

A (ASTM E927 - 05)

Spectral Match

13.8% - 23.0% (400-500nm)

14.9% - 24.9% (500-600nm)

13.8% - 23.0% (600-700nm)

11.2% - 18.6% (700-800nm)

9.4% - 15.6% (800-900nm)

11.9% - 19.9% (900-1100nm)

Spectral Match Classification A (IEC 60904-9 2007)

A (JIS C 8912)

A (ASTM E927 - 05)

Working Distance  $12 \pm 0.5$  in

**Lamp Power 300 W or more**

Input Power (Simulator) :95 - 264 VAC/15A; 47 - 63 Hz

Line Regulation 0.01 %

Overheat Prevention Mechanism

- i. System should come with Calibration certificate validating Class AAA performance for all 3 standards for all the standard organizations.

- ii. Certifying lab should be ISO 17025 standard and manufacturing labs should be ISO certified.
- iii. Should come with Variable attenuator to change the intensity from 0-1 Sun without changing the Power supply.
- iv. Temperature sensors and interlocks that ensures operator safety.
- v. CE certified

## 2. I-V test station

Voltage range  $\pm 20$  V or above

Current range  $\pm 1$  amps

Voltage accuracy 0.03 % or better voltage

Voltage resolution 0.00001 mV or better

Current accuracy % .1 %

Current resolution .00001 mA or better

Ability to independently control voltage step and frequency of measurement

Ability to provide I-V sweeps at various voltage sweep rates from  $<1$  V/sec to  $>100$  V/sec

Measurement to be performed:  $V_{oc}$ ,  $J_{sc}$ ,  $I_{max}$ ,  $V_{max}$ ,  $P_{max}$ , Fill Factor,  $R_{sc}$ ,  $R_{oc}$

## 3. Probe Kit

Magnetic electrical contact probe kit with X-Y control

## 4. Test fixture

1 in x 1 in vacuum test fixture

## 5. Reference cell and Meter

Reference cell with meter (certified by NIST and traceable to NREL and SI unit)

Should be able to read 0 - 3.5 Sun and equipped in accordance with IEC 60904-2

## 6. Temperature controller

To maintain cell temperature in the range  $10^{\circ}\text{C}$  to  $60^{\circ}\text{C}$

Height adjustable cell holder and compatible with vacuum pump/chiller

**Compatible UPS** (Minimum 30 min back up), **computer and printer** to complete the installation should be provided.

## Spare Xenon Lamp

Spare Xenon Lamp compatible with Solar Simulator should be provided.

**Installation & Commissioning:** Installation, commissioning and on-site training by representative of manufacturer at site.

**Warranty:** At least 5 years warranty from the date of installation and specify extended warranty periods if any. Provide minimum 12 months Class AAA performance warranty.

**Notes:** The complete set of documentations, manuals and software manuals should be provided both in softcopy and hard copy.

**Compliance statement:** Point wise according to our document.

**User List:** Provide user list with contact details (address and phone) of the quoted instrument (model) for last 3 years.

### General Terms and Conditions

- i. The tender document should also indicate what kind of service/maintenance is required for the system. Whether this service has to be carried out by a company engineer or it can be carried by trained service personnel within India. The frequency of visit should be mentioned.
- ii. Pre-installation site preparation requirements to be indicated and specified along with the bid.
- iii. Warranty period to be clearly mentioned and should begin from the date of installation.
- iv. Port of shipment to be clearly mentioned in the tender. The Port of destination shall be New Delhi.
- v. Bid should include FOB price.
- vi. Give Bankers name and address.
- vii. List of similar systems installed during the last five years in India with contact person name, address, phone, fax and email IDs.
- viii. The vendor to provide necessarily the quote for all the items 1-6. However some of them may be skipped, subject to fund availability.
- ix. The vendor to provide compliance statement with respect to each technical specification in the tender document duly supported by the manufacturer's literature. Any other claim will not be accepted and may lead to rejection of the bid.



Prof. Lal Bahadur  
Department of Chemistry  
Banaras Hindu University  
VARANASI-221005