

**DEPARTMENT OF CHEMICAL ENGINEERING  
NATIONAL INSTITUTE OF TECHNOLOGY: TIRUCHIRAPPALLI - 620 015**

**24.01.2014**

**Minutes of the pre-bid conference**

**Tender Notification No.: NITT/F.NO:SIF005/PLAN2013-14**

**dt. 19.12.2013**

**Specification for Solar Simulator**

S.No.	Original tender specification	Amended specification
1.	<ul style="list-style-type: none"> <li>• Solar Simulator: Class AAA Solar Simulator AM1.5. These solar simulators meet ASTM E927 (Japanese Standard JIS C8912 and European Standard IEC 60904-9)</li> </ul>	Solar Simulator: Class AAA Solar Simulator AM1.5. These solar simulators meet European Standard IEC 60904-9
2.	<ul style="list-style-type: none"> <li>• Type of lamp: Xenon Short Arc</li> </ul>	No Change
3.	<ul style="list-style-type: none"> <li>• Lamp Power : 150 W</li> </ul>	Lamp Power : 150 W or better
4.	<ul style="list-style-type: none"> <li>• Max. Illuminated area: 2'' (50mm) x 2'' (50mm)</li> </ul>	No Change
5.	<ul style="list-style-type: none"> <li>• Light Source: Steady State</li> </ul>	No Change
6.	<ul style="list-style-type: none"> <li>• Air Mass: AM1.5G Standard: AM0 or AM1 optional</li> </ul>	No Change
7.	<ul style="list-style-type: none"> <li>• Adjustment Range of light intensity: 100 mW/cm<sup>2</sup> +/- 15%</li> </ul>	No Change
8.	<ul style="list-style-type: none"> <li>• Spectral Match to ASTM E927: +/-25% or better</li> </ul>	Spectral Match compliance to IEC standard: +/-25% or better
9.	<ul style="list-style-type: none"> <li>• Non-uniformity of irradiance as per ASTM E927: ≤2% or better</li> </ul>	Non-uniformity of irradiance as per compliance to IEC standard: ≤2% or better
10.	<ul style="list-style-type: none"> <li>• Temporal Stability as per ASTM E927: ≤2% or better</li> </ul>	Temporal Stability in compliance to IEC standard: ≤2% or better
11.	<ul style="list-style-type: none"> <li>• Optimum Working Distance : 5.8'' (147mm)</li> </ul>	Optimum Working Distance : 147mm or better
12.	<ul style="list-style-type: none"> <li>• Phase/Voltage/Frequency : Single Phase/110-220 Volts/50-60Hz</li> </ul>	No Change
13.	<ul style="list-style-type: none"> <li>• Max. Power Consumption (W): 0.5 KVA</li> </ul>	No Change
14.	<ul style="list-style-type: none"> <li>• Lamp Alignment: External lamp alignment with lamp on</li> </ul>	No Change

15.	<ul style="list-style-type: none"> <li>Light Intensity: Light intensity feedback for stable output intensity</li> </ul>	No Change
16.	<ul style="list-style-type: none"> <li>Shutter Control: Manual / automatic shutter control</li> </ul>	No Change
17.	<ul style="list-style-type: none"> <li>Cooling System: Forced air cooling</li> </ul>	No Change
18.	<ul style="list-style-type: none"> <li>Safety warning: Safety Interlock override LED, Over Temperature Warning LED, Shutter Status Indicator, Lamp status indicator</li> </ul>	No Change
19.	<ul style="list-style-type: none"> <li>Mode: Selectable and adjustable constant intensity or constant power mode</li> </ul>	No Change
20.	<ul style="list-style-type: none"> <li>Warranty: Comprehensive three years Warranty</li> </ul>	No Change
21.	<u>2. System Technical Specifications</u> <ul style="list-style-type: none"> <li>Max. Current Range (A): <math>\pm 1</math> Amps</li> </ul>	No Change
22.	<ul style="list-style-type: none"> <li>Available Current Ranges : <math>\pm 1</math>A, <math>\pm 100</math>mA, <math>\pm 10</math>mA, <math>\pm 1</math>mA, <math>\pm 100</math>uA, <math>\pm 10</math>uA, <math>\pm 1</math>uA</li> </ul>	No Change
23.	<ul style="list-style-type: none"> <li>Max. Voltage Range (V): <math>\pm 20</math> Volts</li> </ul>	No Change
24.	<ul style="list-style-type: none"> <li>Max. Power (W): 20 Watts</li> </ul>	No Change
25.	<ul style="list-style-type: none"> <li>Measurement Resolution: 16 Bit</li> </ul>	No Change
26.	<ul style="list-style-type: none"> <li>Measurement Accuracy : Better than 0.5%</li> </ul>	No Change
27.	<ul style="list-style-type: none"> <li>Measurement Mode : Fixed or Auto</li> </ul>	No Change
28.	<ul style="list-style-type: none"> <li>Measurement Time (Light) : - &lt;500ms for stable light (Up to 4s if filtering for light fluctuations required)</li> </ul>	No Change
29.	<ul style="list-style-type: none"> <li>Measurement Time (Dark) : 100-1,000ms</li> </ul>	No Change
30.	<ul style="list-style-type: none"> <li>Maximum Points per Curve : 100-1,000 (model specific)</li> </ul>	No Change
31.	<ul style="list-style-type: none"> <li>Maximum Data Acquisition Speed : 100kHz, 4,096</li> </ul>	No Change

32.	<ul style="list-style-type: none"> <li>Maximum Cell Throughput:1,200/Hour (With optional Robotics)</li> </ul>	No Change
33.	<ul style="list-style-type: none"> <li>Phase (Power): Single Phase</li> </ul>	No Change
34.	<p><b><u>3. Reference Cell</u></b></p> <ul style="list-style-type: none"> <li>A NREL certified reference cell by any internationally acceptable accredited laboratories. Should provide the valid certificate for as longer period as possible (mention the period) along with the cell.</li> </ul>	No Change
35.	<p><b><u>3.1 Software specifications</u></b></p> <ul style="list-style-type: none"> <li>Easy to use MS Windows environment and user friendly software.</li> </ul>	No Change
36.	<ul style="list-style-type: none"> <li>Light Intensity &amp; Temperature monitoring and control, 0-60°C Standard. Other ranges optional.</li> </ul>	No Change
37.	<ul style="list-style-type: none"> <li>Calculation of cell series resistance according to IEC 60891 standard.</li> </ul>	No Change
38.	<ul style="list-style-type: none"> <li>Computes solar cell parameters including ISC, VOC, FF, IMAX, VMAX, PMAX, Eff, Rs and Rsh and saves them automatically on hard disk drive. In addition cell's temperature and irradiance level is measured and stored for future analysis.</li> </ul>	No Change
39.	<ul style="list-style-type: none"> <li>Thermal Coefficients of Voc &amp; Pm</li> </ul>	No Change
40.	<ul style="list-style-type: none"> <li>Dark saturation current, RS and RSH determination</li> </ul>	No Change
41.	<ul style="list-style-type: none"> <li>Provides printable test reports and test data in text files for easy exchange between programs</li> </ul>	No Change
42.	<ul style="list-style-type: none"> <li>Software features include cell sorting in various categories. This cell sorting can be performed in</li> </ul>	No Change

	production or in virtual binning modes specified by the user.	
43.	<ul style="list-style-type: none"> <li>Solar Simulator shutter control (Solar Simulator sold separately)</li> </ul> <p>Computer with latest configuration for the operation of the system &amp; analysis.</p>	No Change
44.	<p><b>4. <u>Temperature Control</u></b> 5 – 75 deg C. Automated through software for thermal coefficients. Peltier cooler bring the required temp (cooling/heating) on the sample and shutter opens for light measurements at predetermined temperatures.</p>	No Change
		5% bank guarantee for 5 years towards the supply of spare components after the warranty period.
	<p><b>Note:</b> Any other accessories apart from the mandatory accessories and systems mentioned above may be quoted separately. Pre-installation/post-installation training expenses (including travel, boarding and lodging) should be borne by the supplier</p>	

  
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**(Initiating Faculty)**